

April 12, 2001  
Project No. 011704.00 – 499

Edward J. Kirsh  
Kerr-McGee Corporation  
Kerr-McGee Center  
Post Office Box 25861  
Oklahoma City, Oklahoma 73125

RE: **Laboratory Services, Soil – Bentonite, Backfill Mix Design  
Henderson Slurry Wall, Nevada**

To Whom It May Concern:

Vector Engineering, Inc. (Vector) has completed testing for the referenced project. The goal of our services was to provide laboratory information to assist in evaluating various "Soil-Bentonite Backfill Mixes" for use at the reference site. Additionally, rock and tube samples provided by Kerr-McGee were tested for strength and hydraulic conductivity properties to provide information on in-situ materials. Tests were conducted at Vector's geotechnical laboratory in Grass Valley California.


The data provided is for 7 Soil -Bentonite Mixes. Also included are 4-Grain Size analysis and 2 Atterberg Limit tests for the bulk soil samples provided and used in the mixes. Data is presented summarizing each mix and the results of hydraulic conductivity tests. The SB mixes presented here have hydraulic conductivities between  $4.7 \times 10^{-8}$  and  $8.0 \times 10^{-7}$  cm/sec. with slumps of 4.5 to 5.75 inches.

Hydraulic Conductivity tests are also presented for 6 drive tube samples, and Point Load index tests on 2 rock specimens.

If you have any questions or need further assistance please feel free to call us.

Sincerely Yours,

**VECTOR ENGINEERING, INC.**

  
Kenneth R. Criley  
Director of Laboratory Services



**Soil- Bentonite, Slurry Mix Design  
 Henderson Project**

**Mix Components**

**Soils:** Kerr-McGee provided site soils, from the proposed site. The soils received were identified as follows:

- 1) M-108 @ 0 – 32 ft., 1 barrel Lt. Brown Sand w. Silt and Gravel
- 2) M-108 @ 32 – 70 ft., 1 barrel Lt. Brown Elastic Silt w/ Sand
- 3) M-109 @ 0 – 30 ft., 1 barrel Brown Silty Sand w/ Gravel
- 4) M-109 @ 30 – 70 ft., 1 barrel Lt. Brown Elastic Silt w/ Sand

Initial water contents were taken from the samples before mixing and blending to indicate the in-situ water content and obtain a starting water content of the soils for mixing from each borrow sample. The initial water contents (as-received) were as follows:

<u>M-108 @ 0-32</u>	<u>M-108 @ 32-70</u>	<u>M-109 @ 0-30</u>	<u>M-109 @ 0-30</u>
11.2%	51.2%	12.9%	62.2%

The water contents of the individual samples were lowered by air-drying. The bulk soils were next processed through 1-½" & # 4 sieves to facilitate mixing and blending. Individual sieve analyses were conducted on each and the 4 separate samples then were blended into 2 groups. Group 1 is classified as silty sand with gravel and group 2 as silt with sand.

Next the two groups were blended and mixed with water to approximately the average of the as-received water contents. Three different blends were prepared. The blends or ratios are proportioned on volume bases to simulate variations that could exist in the field. Following are listed each blend. The ratios are Group 1 / Group 2.

Blend 1	30 / 70	Initial water content, %	38
Blend 2	50 / 50	Initial water content, %	29
Blend 3	70 / 30	Initial water content, %	21

The given initial water contents are based on the weighted average of the blends and decrease as the amount of Group 2 material decreases. Group 2 has as-received water content of 56.7%. A mass of approximately 10-kg of dry soil was used for each mix.

**Bentonite:** A Bentonite from M-1 Drilling Fluid Co., designated as "Federal Gel 90" was used for the slurry and dry additive. The Bentonite meets the requirements of API specifications 13A Section 4.

**Bentonite Slurry:** The powdered Bentonite was mixed with tap water at a ratio of 52-g Bentonite to 1 liter of water and use as mix slurry. This blend equals a 5% Bentonite solution (total mass basis). Sufficient slurry was prepared for several mixes at one time. The slurry was allowed to hydrate for a minimum of 24 hours before blending with the soil. The Marsh viscosity at 24 hours was 42 to 43 sec.

We conducted both Fluid Loss, ASTM D-5891 and Swell Index, ASTM D-5892 tests on the Bentonite using the supplied site water. The results are attached.

**Mix Water:** Laboratory tap water was use in these mixes, for both increasing the soil water content and in the slurry used. The pH of the tap water is between 7.0 and 7.5.

**Permeant:** Laboratory tap water was used as the permeant for the hydraulic conductivity tests. The permeant was de-aired.

### **Mixing Procedures**

Mixes were prepared in two to three steps. Mix nos. 1, 2 & 3 were prepared using the three soil blends (30/70,50/50,70/30) and adding sufficient slurry to obtain slumps between 4 and 6 inches. The mix slump was determined using ASTM D-143 method. Mixes nos. 4, 5 & 6, using the same soil blends, were prepared by first adding approximately 20 % of the required slurry, then blending in the dry powdered Bentonite, and after mixing for 1 min. additional slurry was added to achieve a slump within the specified range. Typically the mixing of all components for each mix took 10 to 15 minutes each.

After achieving the required slump, each SB mix was placed into a 2-gal. container and sealed. A wet unit weight (bulk density) and water content was determined and recorded for each of the mixes. Portions of each sample were used for hydraulic conductivity tests.

### **Hydraulic Conductivity Tests**

Sub-samples of each mix were obtained and prepared for hydraulic conductivity tests. Tests were conducted using the ASTM D-5084 test method. Specimens were tested within 24 hours of being prepared. Back pressures of 60 psi and an effective confinement stress of 10 psi (700psf) was used. "Skempton's B" parameter was measured and recorded. A "B" parameter of 0.95 or greater was used as the indicator of saturation before proceeding with consolidation. Tests were conducted using tap water. Tests were performed using a hydraulic gradient range of 15-30.

### **Results**

Summary tables are attached listing the mixes developed for this project. The tables list the mix designations, the amount of materials used in preparing the mixes and test results for the hydraulic conductivity tests. Also included are results for the gradation analysis and Atterberg limits tests.

# Vector Engineering, Inc.

12438 Loma Rica, Grass Valley, CA, 530-272-2448

LABORATORY SERVICES

# Mix Summary

## Laboratory Report

Client: Kerr McGee

Project No: 011704.00

Lab Sample Number: 499

Project Name: Henderson Slurry Wall

Description: S/B Mix Design

Report Date: April 12, 2001

### MIX PORTIONS

	<u>Mix No 1</u>	<u>Mix No. 2</u>	<u>Mix No. 3</u>
Ratio of Silty Sand w/ Gravel : Silty Sand	30 / 70	50 / 50	70 / 30
Dry Bentonite used, % (dry soil bases)	0	0	0
Wet Soil mass used as lb / yd <sup>3</sup>	2291	2426	2538
Water Content of soil, %(dry soil bases)	38	29	21
Bentonite Slurry used, gal / yd <sup>3</sup> (lbs)	53 (453)	53.4 (457)	56.4 (483)
<u>Theoretical Values</u>			
Bulk Density of final mix, lb / yd <sup>3</sup>	2754	2884	3021
Water Content of final mix, %	63.1	51.5	42.4

### TEST RESULTS

Measured Bulk (wet) Density, pcf	99.9	105.1	109.6
Measured Water Content, %	63.6	49.6	41.1
Hydraulic Conductivity, cm / sec.	7.8e <sup>-8</sup>	6.7e <sup>-8</sup>	7.0e <sup>-8</sup>
Slump of mix, in.	5.75	5.0	5.0

#### Notes:

- 1) The Bentonite slurry was prepared using a powdered sodium bentonite from MI Drilling Fluids, identified as Federal Gel-90. The slurry was approximately 5% bentonite by total mass of slurry. (52g / Liter ) Prepared slurry was hydrated for a minimum of 24 hr. before use.
- 2) The "as received" water content of soils from the project site were determined and used as initial water contents for the mixes.
- 3) The soils were divided into 2 groups for the mixes. Group 1 soils are silty sands with gravel coming from the upper 30-32 ft and Group 2 are mainly silts with some fine sand and were obtained below 30-32 ft.
- 4) The blends of Group 1 and 2 are based on volumes using estimates of bulk density for each group. The estimate of Group 1 was 91 pcf and Group 2 was 69 pcf (wet).

These results apply only to the above listed samples. The data and information are proprietary and can not be released without authorization of Vector Engineering Inc.

By accepting the data and results represented on this page, client agrees to limit the liability of Vector Engineering, Inc. from Client and all other parties claims arising out of the use of this data to the cost for the respective test(s) represented here, and Client agrees to indemnify and hold harmless Vector from and against all liability in excess of the aforementioned limit.

L:\Labexcel\Projects\2001\011704\499-Mix-Summary.xls Print Date:

Entered By:

Reviewed By:

LSN:

DCN: BkO1 (rev. 01/31/01)

04/14/01

KRC

499

Client: <b>Kerr McGee</b>	Project No: <b>011704.00</b>	Lab Sample Number: <b>499</b>
Project Name: <b>Henderson Slurry Wall</b>	Description: <b>S/B Mix Design</b>	Report Date: <b>April 12, 2001</b>

**MIX PORTIONS**

	<u>Mix No 4</u>	<u>Mix No. 5</u>	<u>Mix No. 6</u>
Ratio of Silty Sand w/ Gravel : Silty Sand	30 / 70	50 / 50	70 / 30
Dry Bentonite used, % (dry soil bases)	2	2	2
Wet Soil mass used as lb / yd <sup>3</sup>	2308	2336	2449
Water Content of soil, %(dry soil bases)	38	29	21
Bentonite Slurry used, gal / yd <sup>3</sup> (lbs)	50 (431)	57.3 (491)	59.7 (511)
<i>Theoretical Values</i>			
Bulk Density of final mix, lb / yd <sup>3</sup>	2772	2863	3000
Water Content of final mix, %	60.5	53.0	43.6

**TEST RESULTS**

Measured Bulk (wet) Density, pcf	98.7	103.3	109.6
Measured Water Content, %	62.6	52.8	43.9
Hydraulic Conductivity, cm / sec.	5.2e <sup>-8</sup>	4.7e <sup>-8</sup>	5.4e <sup>-8</sup>
Slump of mix, in.	4.75	5.5	4.75

Notes:

- 1) The Bentonite slurry was prepared using a powdered sodium bentonite from MI Drilling Fluids, identified as Federal Gel-90. The slurry was approximately 5% bentonite by total mass of slurry. (52g / Liter) Prepared slurry was hydrated for a minimum of 24 hr. before use.
- 2) Federal Gel-90, powdered bentonite was used as the dry additional bentonite.
- 3) The "as received" water content of soils from the project site were determined and used as initial water contents for the mixes.
- 4) The soils were divided into 2 groups for the mixes. Group 1 soils are silty sands with gravel coming from the upper 30-32 ft and Group 2 are mainly silts with some fine sand and were obtained below 30-32 ft.
- 5) The blends of Group 1 and 2 are based on volumes using estimates of bulk density for each group. The estimate of Group 1 was 91 pcf and Group 2 was 69 pcf (wet).

These results apply only to the above listed samples. The data and information are proprietary and can not be released without authorization of Vector Engineering Inc. By accepting the data and results represented on this page, client agrees to limit the liability of Vector Engineering, Inc. from Client and all other parties claims arising out of the use of this data to the cost for the respective test(s) represented here, and Client agrees to indemnify and hold harmless Vector from and against all liability in excess of the aforementioned limit.

Client:

Kerr McGee

Project No:

011704.00

Lab Sample Number:

**499**

Project Name:

Henderson Slurry Wall

Description:

S/B Mix Design

Report Date:

April 12, 2001

**MIX PORTIONS**Mix No 7

Silty Sand with Gravel, Group 1	100%
Dry Bentonite used, % (dry soil bases)	2
Wet Soil mass used as lb / yd <sup>3</sup>	2407
Water Content of soil, %(dry soil bases)	12
Bentonite Slurry used, gal / yd <sup>3</sup> (lbs)	74 (634)

Theoretical Values

Bulk Density of final mix, lb / yd <sup>3</sup>	3084
Water Content of final mix, %	38.7

**TEST RESULTS**

Measured Bulk (wet) Density, pcf	113
Measured Water Content, %	37.5
Hydraulic Conductivity, cm / sec.	8.0e <sup>-8</sup>
Slump of mix, in.	5.75

## Notes:

- 1) The Bentonite slurry was prepared using a powdered sodium bentonite from MI Drilling Fluids, identified as Federal Gel-90. The slurry was approximately 5% bentonite by total mass of slurry. (52g / Liter ) Prepared slurry was hydrated for a minimum of 24 hr. before use.
- 2) Federal Gel-90, powdered bentonite was used as the dry additional bentonite.
- 3) The "as received" water content of soils from the project site were determined and used as initial water contents for the mixes.
- 4) The soils were divided into 2 groups for the mixes. Group 1 soils are silty sands with gravel coming from the upper 30-32 ft and Group 2 are mainly silts with some fine sand and were obtained below 30-32 ft.
- 5) The blends of Group 1 and 2 are based on volumes using estimates of bulk density for each group. The estimate of Group 1 was 91 pcf and Group 2 was 69 pcf (wet).

These results apply only to the above listed samples. The data and information are proprietary and can not be released without authorization of Vector Engineering Inc.

By accepting the data and results represented on this page, client agrees to limit the liability of Vector Engineering, Inc. from Client and all other parties claims arising out of the use of this data to the cost for the respective test(s) represented here, and Client agrees to indemnify and hold harmless Vector from and against all liability in excess of the aforementioned limit.

# Vector Engineering Inc.

12438 Loma Rica, Grass Valley, CA, 530-272-2448

**LABORATORY SERVICES**

# HYDRAULIC CONDUCTIVITY SUMMARY REPORT

ASTM D - 5084

Client:  
Kerr-McGee Corp

Project No:  
011704.00

Lab Log:

**499**

Project Name:  
Henderson S/B Slurry Wall

Report Date:

April 5, 2001

## TUBE SAMPLES

Sample Identification:	M-108 @ 49' - 49.5'	M-108 @ 69.5' - 70'	M-108 @ 81' - 81.5'	M-109 @ 49' - 49.5'	M-109 @ 65.5' - 66'	M-109 @ 79.5' - 80'
Lab Sample Number:	499G	499H	499I	499J	499K	499L
<b>INITIAL:</b>						
Water Content (%):	44.2	34.7	68.0	72.6	115.0	33.2
Dry Density (pcf):	76	87	58	55	40	50
Saturation (%):	98	100	96	95	96	38
<b>FINAL:</b>						
Water Content (%):	44.5	31.6	66.3	74.7	112.1	85.1
Dry Density (pcf):	75	89	59	55	41	51
Saturation (%):	97	96	95	98	98	100
Hydraulic Conductivity (cm / sec):	<b>1.6E-05</b>	<b>1.9E-05</b>	<b>1.8E-06</b>	<b>1.3E-05</b>	<b>4.6E-07</b>	<b>1.5E-07</b>
Effective Consolidation Pressure (psi):	20	20	20	20	20	20
Gradient Range:	4-8	4-8	6-9	5-9	2-8	3-9
Relative Compaction (%):						
Notes:						

Sample Identification:						
Lab Sample Number:						
<b>INITIAL:</b>						
Water Content (%):						
Dry Density (pcf):						
Saturation (%):						
<b>FINAL:</b>						
Water Content (%):						
Dry Density (pcf):						
Saturation (%):						
Hydraulic Conductivity (cm / sec):						
Effective Consolidation Pressure (psi):						
Gradient Range:						
Relative Compaction (%):						
Notes:						

NOTES:  
De-aired tap water was used as permeant.  
The above Saturation is based upon an assumed Specific Gravity of 2.70.

These results apply only to the above listed samples. The data and information are proprietary and can not be released without authorization of Vector Engineering Inc. By accepting the data and results on this page, client agrees to limit the liability of Vector Engineering, Inc. from Client and all other parties' claims arising out of the use of this data to the cost for the respective test(s) represented here, and Client agrees to indemnify and hold harmless Vector from and against all liability in excess of the aforementioned limit.

L:\labexcel\projects\1901\011704\499-ksu

Entered By:

MD

Rev. By:

Lab Log:

**499**



Client: **Kerr McGee Corp**

Project No: **011704.00**

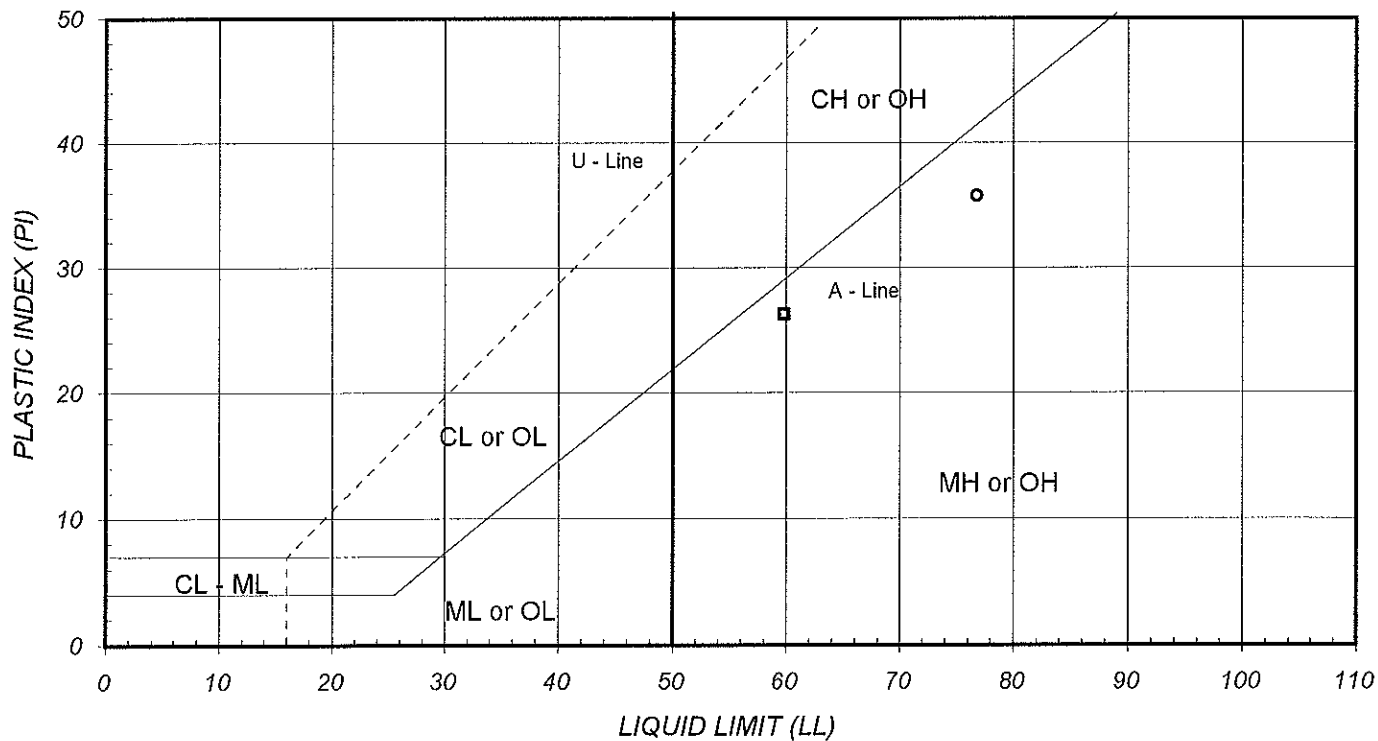
Lab Log No.: **499**

Project Name: **Henderson S/B Slurry Wall**

Report Date: **April 2, 2001**

LSN	SYMBOL	SAMPLE IDENTIFICATION	DESCRIPTION	UNIFIED SYMBOL	LIQUID LIMIT	PLASTIC LIMIT	PLASTIC INDEX
B	□	499B M-108 @ 32-70'	Elastic Silt w/ Sand	MH or OH	60	33	26
D	○	499D M-109 @ 30-70'	Elastic Silt w/ Sand	MH or OH	77	41	36

**PLASTICITY CHART**



These results apply only to the above listed samples. The data and information are proprietary and can not be released without authorization of Vector Engineering Inc. By accepting the data and results represented on this page, client agrees to limit the liability of Vector Engineering, Inc. from Client and all other parties claims arising out of the use of this data to the cost for the respective test(s) represented here, and Client agrees to indemnify and hold harmless Vector from and against all liability in excess of the aforementioned limit.





# Vector Engineering Inc.

12438 Loma Rica, Grass Valley, CA, 530-272-2448

LABORATORY SERVICES

# PARTICLE SIZE ANALYSIS

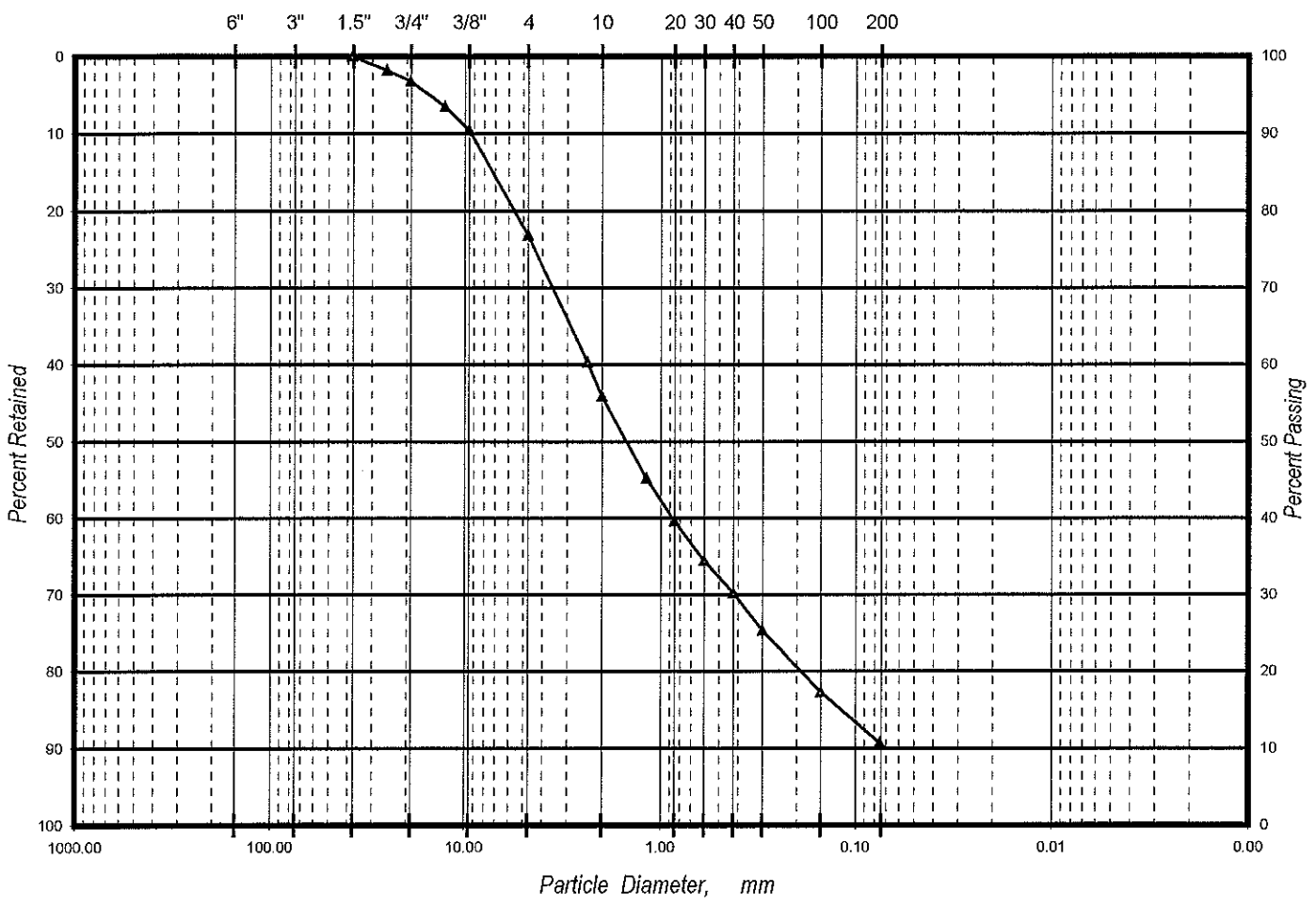
TEST REPORT

ASTM D-422

Client: **KERR MCGEE CORP.** Project No: **011704.00** Lab Sample No: **499A**

Project Name: **HENDERSON S/B SLURRY WALL** Report Date: **3/26/01**

BOLDERS	COBBLES	GRAVEL		SAND			SILT AND CLAY	
		COARSE	FINE	COARSE	MEDIAN	FINE		
US SIEVE SIZE, INCHES			US STANDARD SIEVE SIZE No.					HYDROMETER



Symbol	Sample ID	Description	% Gravel	% Sand	% Silt - Clay
▲	M-108 @ 0'-32' (rec'd 3/19/01)	Lt. Brn. Sand w/ Silt & Gravel	23.1	66.2	10.7

These results apply only to the above listed samples. The data and information are proprietary and can not be released without authorization of Vector Engineering Inc. By accepting the data and results represented on this page, client agrees to limit the liability of Vector Engineering, Inc. from Client and all other parties claims arising out of the use of this data to the cost for the respective test(s) represented here, and Client agrees to indemnify and hold harmless Vector from and against all liability in excess of the aforementioned limit.

# Vector Engineering Inc.

12438 Loma Rica, Grass Valley, CA, 530-272-2448

LABORATORY SERVICES

# PARTICLE SIZE ANALYSIS

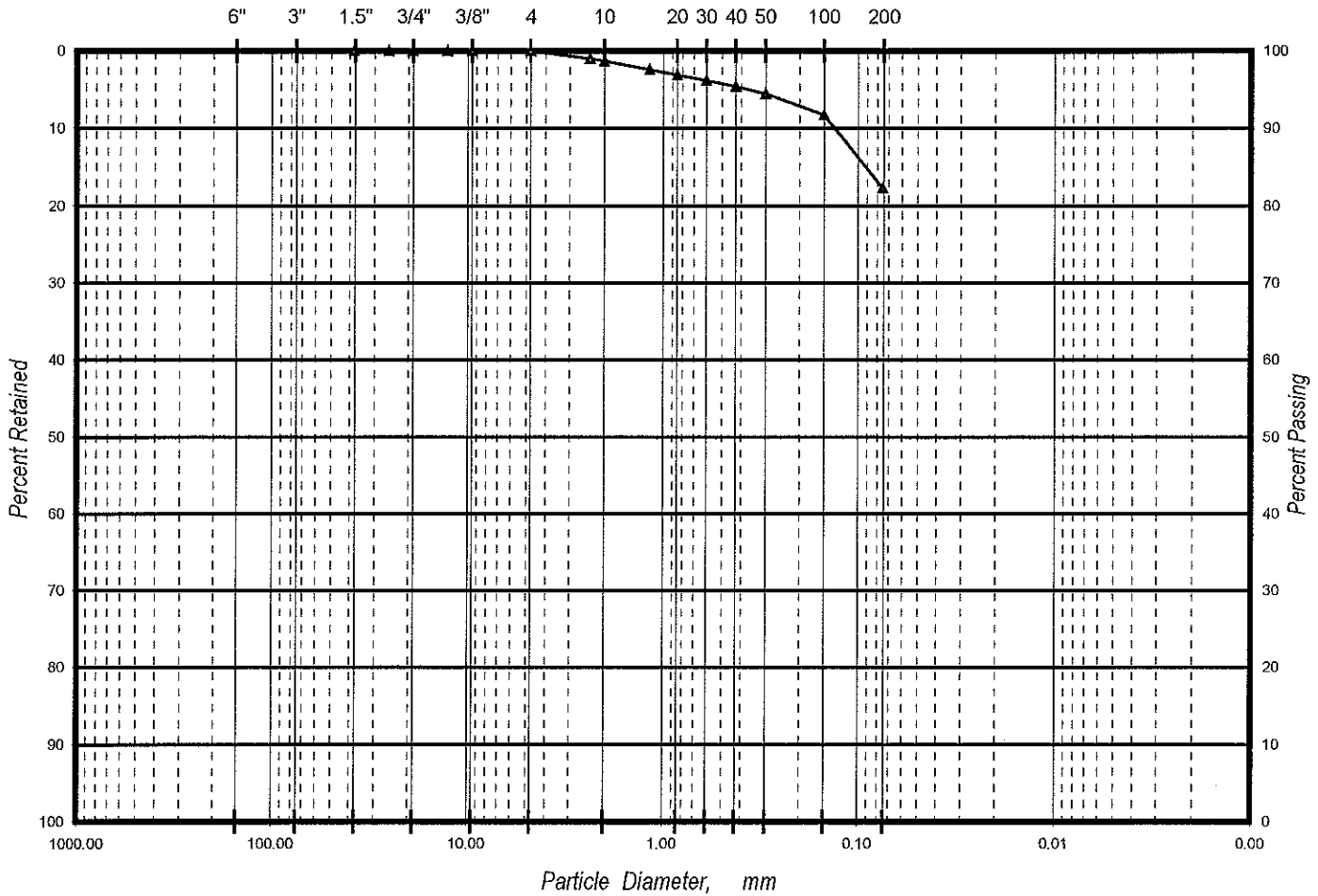
TEST REPORT

ASTM D-422

Client: **KERR MCGEE CORP.** Project No: **011704.00** Lab Sample No: **499B-1**

Project Name: **HENDERSON S/B SLURRY WALL** Report Date: **3/26/01**

BOLDERS	COBBLES	GRAVEL		SAND			SILT AND CLAY
		COARSE	FINE	COARSE	MEDIAN	FINE	
US SIEVE SIZE, INCHES			US STANDARD SIEVE SIZE No.			HYDROMETER	



Symbol	Sample ID	Description	% Gravel	% Sand	% Silt - Clay
▲	M-108 @32'-70' (rec'd 3/19/01)	Lt. Brn. Elastic Silt w/Sand	0.0	17.7	82.3

These results apply only to the above listed samples. The data and information are proprietary and can not be released without authorization of Vector Engineering Inc. By accepting the data and results represented on this page, client agrees to limit the liability of Vector Engineering, Inc. from Client and all other parties claims arising out of the use of this data to the cost for the respective test(s) represented here, and Client agrees to indemnify and hold harmless Vector from and against all liability in excess of the aforementioned limit.

# Vector Engineering Inc.

12438 Loma Rica, Grass Valley, CA, 530-272-2448

LABORATORY SERVICES

# PARTICLE SIZE ANALYSIS

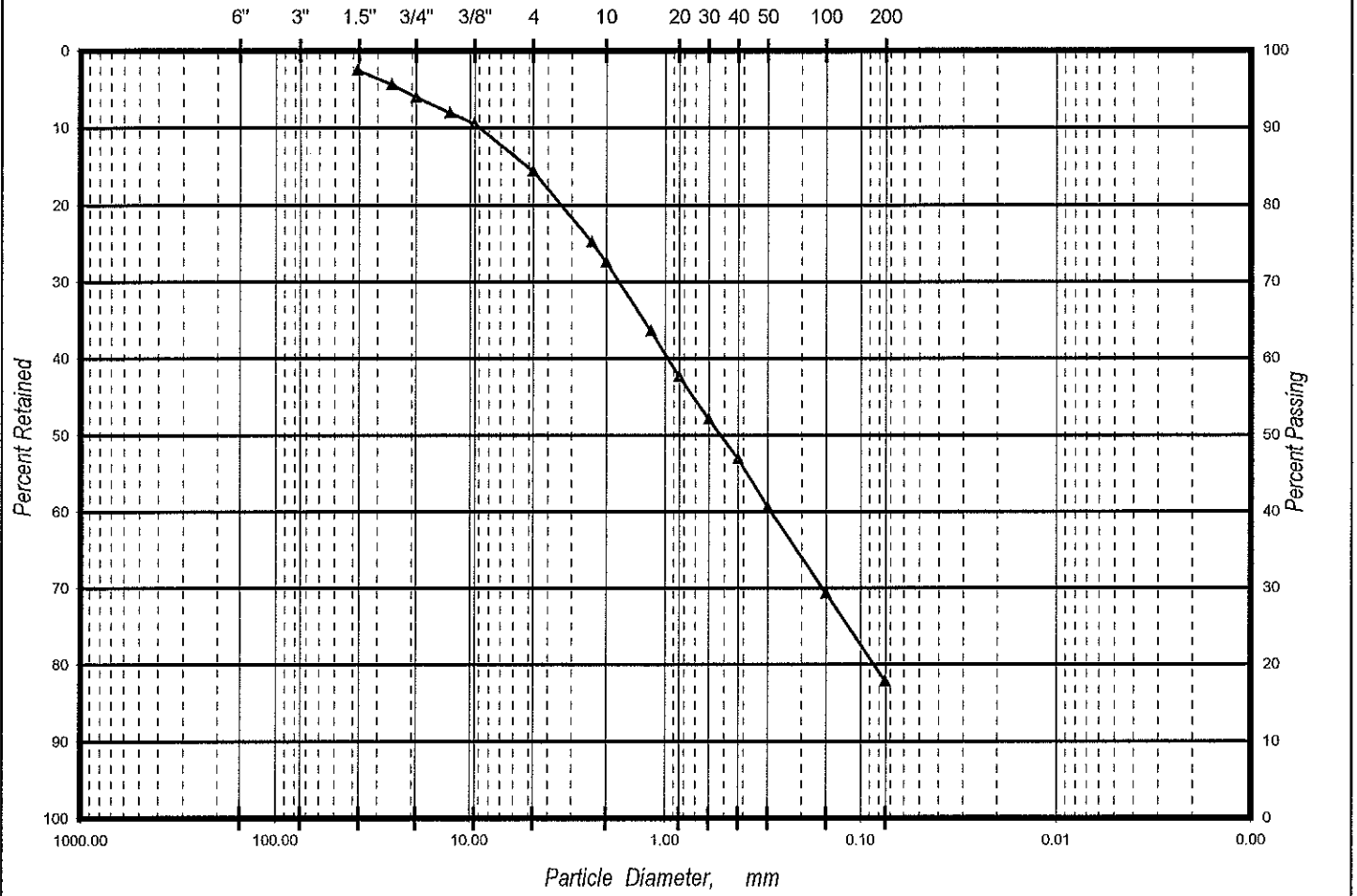
TEST REPORT

ASTM D-422

Client: **KERR MCGEE CORP.** Project No: **011704.00** Lab Sample No: **499C**

Project Name: **HENDERSON S/B SLURRY WALL** Report Date: **3/26/01**

BOLDERS	COBBLES	GRAVEL		SAND			SILT AND CLAY
		COARSE	FINE	COARSE	MEDIAN	FINE	
US SIEVE SIZE, INCHES			US STANDARD SIEVE SIZE No.			HYDROMETER	



Symbol	Sample ID	Description	% Gravel	% Sand	% Silt - Clay
▲	M-109 @ 0'-30' (rec'd 3/19/01)	Brn. Silty Sand w/Gravel	15.6	66.5	17.9

These results apply only to the above listed samples. The data and information are proprietary and can not be released without authorization of Vector Engineering Inc. By accepting the data and results represented on this page, client agrees to limit the liability of Vector Engineering, Inc. from Client and all other parties claims arising out of the use of this data to the cost for the respective test(s) represented here, and Client agrees to indemnify and hold harmless Vector from and against all liability in excess of the aforementioned limit.

# Vector Engineering Inc.

12438 Loma Rica, Grass Valley, CA, 530-272-2448

LABORATORY SERVICES

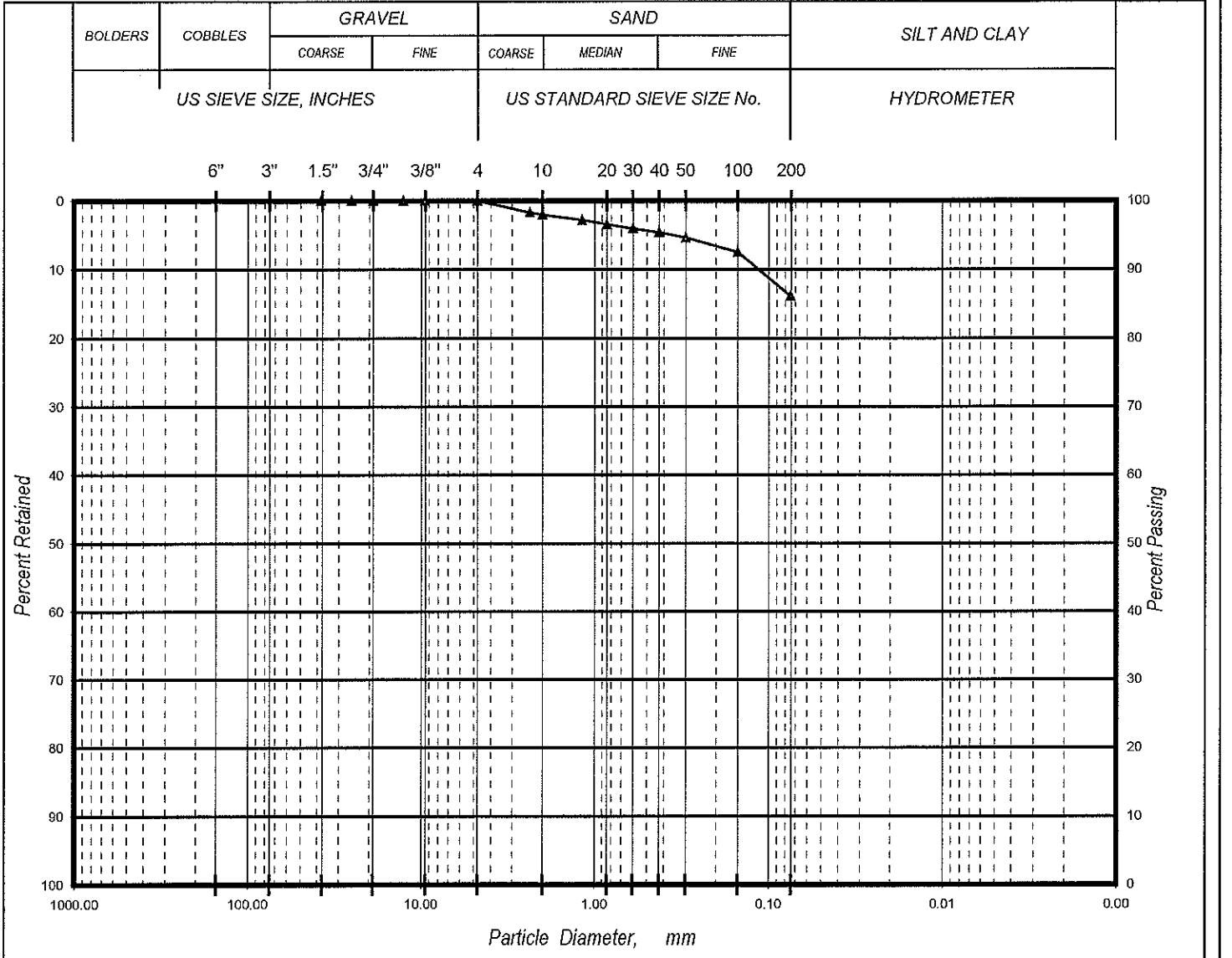
# PARTICLE SIZE ANALYSIS

TEST REPORT

ASTM D-422

Client: **KERR MCGEE CORP.** Project No: **011704.00** Lab Sample No: **499D-1**

Project Name: **HENDERSON S/B SLURRY WALL** Report Date: **3/26/01**



Symbol	Sample ID	Description	% Gravel	% Sand	% Silt - Clay
▲	M-109 @ 30'-70' (rec'd 3/19/01)	Lt. Brn. Elastic Silt w/ Sand	0.0	13.9	86.1

These results apply only to the above listed samples. The data and information are proprietary and can not be released without authorization of Vector Engineering Inc. By accepting the data and results represented on this page, client agrees to limit the liability of Vector Engineering, Inc. from Client and all other parties claims arising out of the use of this data to the cost for the respective test(s) represented here, and Client agrees to indemnify and hold harmless Vector from and against all liability in excess of the aforementioned limit.

# Vector Engineering Laboratory Services

2438 Loma Rica DR. Suite C, Grass Valley, CA 95945  
(530) 272-2448 Fax: (530) 272-8553

# POINT LOAD INDEX

WORKSHEET  
ASTM D-5731

M104

CLIENT NAME:

Kerr Mcgee

PROJECT NO:

11704.00

DATE:

4/5/01

PROJECT NAME:

Henderson S/B Slurry Wall

LAB LOG NO.:

499

SAMPLE ID:							LAB ID.: 499E		
SPECIMEN NO.	TEST TYPE	W mm	D mm	P kN or Lb.	De2 mm2	De mm	Is MPa	F	Is (50) psi
1	Irr. Chunk	107.3	69.2	1260	9449	97	0.6	1.35	116.0
2	Irr. Chunk	75.0	62.1	330	5935	77	0.2	1.21	43.6
3	Irr. Chunk	72.5	57.2	200	5283	73	0.2	1.18	28.9
4	Irr. Chunk	57.9	51.4	150	3788	62	0.2	1.10	28.0
5	Irr. Chunk	59.0	44.4	100	3336	58	0.1	1.07	20.6
6	Irr. Chunk	61.0	38.7	60	3009	55	0.1	1.04	13.4
7	Irr. Chunk	53.1	47.8	220	3231	57	0.3	1.06	46.5
8	Irr. Chunk	68.3	38.8	420	3377	58	0.6	1.07	85.8
9	Irr. Chunk	64.6	42.0	320	3456	59	0.4	1.08	64.2
10	Irr. Chunk	75.2	34.7	450	3324	58	0.6	1.07	93.1
11	Irr. Chunk								
12	Irr. Chunk								

Median = 45.06  
Average = 54.04  
2000 psi

SAMPLE ID:							LAB ID.:		
SPECIMEN NO.	TEST TYPE	W mm	D mm	P Kn or Lb.	De2 mm2	De mm	Is	F	Is (50)
1									
2									
3									
4									
5									
6									
7									
8									
9									
10									

results x 18-24 = unconfined compressive strength

ENTERED BY: WFS

CHECKED BY: *[Signature]*

# Vector Engineering Laboratory Services

2438 Loma Rica DR, Suite C, Grass Valley, CA 95945  
(530) 272-2448 Fax: (530) 272-8553

# POINT LOAD INDEX

WORKSHEET  
ASTM D-5731 *M108*

CLIENT NAME: **Kerr Mcgee** PROJECT NO: **11704.00** DATE: **4/5/01**

PROJECT NAME: **Henderson S/B Slurry Wall** LAB LOG NO.: **499**

SAMPLE ID:							LAB ID.: <b>499F</b>		
SPECIMEN NO.	TEST TYPE	W mm	D mm	P kN or Lb.	De2 mm2	De mm	Is MPa	F	Is (50) psi
1	Irr. Chunk	82.8	44.9	1150	4729	69	1.1	1.15	181.1
2	Irr. Chunk	57.2	44.5	840	3234	57	1.2	1.06	177.5
3	Irr. Chunk	55.4	52.5	1050	3700	61	1.3	1.09	200.0
4	Irr. Chunk	53.3	36.8	700	2501	50	1.2	1.00	180.6
5	Irr. Chunk	55.9	47.0	700	3343	58	0.9	1.07	144.2
6	Irr. Chunk	48.3	48.0	600	2950	54	0.9	1.04	136.2
7	Irr. Chunk	50.8	31.8	200	2054	45	0.4	0.96	60.1
8	Irr. Chunk	46.2	44.5	600	2616	51	1.0	1.01	149.5
9	Irr. Chunk	42.7	40.4	360	2194	47	0.7	0.97	102.8
10	Irr. Chunk	35.6	34.0	350	1541	39	1.0	0.90	131.4
11	Irr. Chunk								
12	Irr. Chunk								

Median = 146.84  
Average = 146.34

SAMPLE ID:							LAB ID.:		
SPECIMEN NO.	TEST TYPE	W mm	D mm	P Kn or Lb.	De2 mm2	De mm	Is	F	Is (50)
1									
2									
3									
4									
5									
6									
7									
8									
9									
10									

ENTERED BY: WFS

CHECKED BY: *[Signature]*

# LAB MEMO

LAB FAX NO. (530) 272-6480


TO: ~~Ed Krish~~ *Tom*  
Kerr-McGee Corp.  
Kerr-Mcgee Center/ Po Box 25861  
Oklahoma City, OK 73125

DATE April 25, 2001

Pages: 3

---

Here are the finalized results for the Point Load Indexes for the Henderson S/B Slurry Wall that were labeled M-108 Caliche (Lab # 499E) and M-104 Caliche (Lab # 499F). Please replace these pages in the report that we sent you. If you have any other questions or comments please contact us.

  
\_\_\_\_\_  
Margaret Dell-Era

The document (s) with this transmission are only for recipient(s) named above and contain privileged/confidential information.

Unauthorized disclosure, dissemination and /or copying of this transmission is strictly prohibited.

If received in error, please notify the sender by calling and then destroy this transmission

# Vector Engineering

## Laboratory Services

2438 Loma Rica DR, Suite C, Grass Valley, CA 95945  
(530) 272-2448 Fax: (530) 272-8553

# POINT LOAD INDEX

WORKSHEET  
ASTM D-5731

CLIENT NAME: **Kerr Mcgee** PROJECT NO: **11704.00** DATE: **4/5/01**

PROJECT NAME: **Henderson S/B Slurry Wall** LAB LOG NO.: **499**

SAMPLE ID:		M-104 Caliche						LAB ID.:		<b>499F</b>
SPECIMEN NO.	TEST TYPE	W mm	D mm	P kN or Lb.	De2 mm2	De mm	Is MPa	F	Is (50) psi	
1	Irr. Chunk	82.8	44.9	1150	4729	69	1.1	1.15	181.1	
2	Irr. Chunk	57.2	44.5	840	3234	57	1.2	1.06	177.5	
3	Irr. Chunk	55.4	52.5	1050	3700	61	1.3	1.09	200.0	
4	Irr. Chunk	53.3	36.8	700	2501	50	1.2	1.00	180.6	
5	Irr. Chunk	55.9	47.0	700	3343	58	0.9	1.07	144.2	
6	Irr. Chunk	48.3	48.0	600	2950	54	0.9	1.04	136.2	
7	Irr. Chunk	50.8	31.8	200	2054	45	0.4	0.96	60.1	
8	Irr. Chunk	46.2	44.5	600	2616	51	1.0	1.01	149.5	
9	Irr. Chunk	42.7	40.4	360	2194	47	0.7	0.97	102.8	
10	Irr. Chunk	35.6	34.0	350	1541	39	1.0	0.90	131.4	
11	Irr. Chunk									
12	Irr. Chunk									
								Median =	146.84	
								Average =	146.34	

SAMPLE ID:								LAB ID.:		
SPECIMEN NO.	TEST TYPE	W mm	D mm	P Kn or Lb.	De2 mm2	De mm	Is	F	Is (50)	
1										
2										
3										
4										
5										
6										
7										
8										
9										
10										

ENTERED BY: WFS

CHECKED BY: *KRC*



# Vector Engineering

## Laboratory Services

2438 Loma Rica DR. Suite C, Grass Valley, CA 95945  
(530) 272-2448 Fax: (530) 272-8553

# POINT LOAD INDEX

WORKSHEET  
ASTM D-5731

CLIENT NAME: **Kerr Mcgee** PROJECT NO: **11704.00** DATE: **4/5/01**  
PROJECT NAME: **Henderson S/B Slurry Wall** LAB LOG NO.: **499**

SAMPLE ID:		M-108 Caliche					LAB ID.:			<b>499E</b>
SPECIMEN NO.	TEST TYPE	W mm	D mm	P kN or Lb.	De2 mm2	De mm	Is MPa	F	Is (50) psi	
1	Irr. Chunk	107.3	69.2	1260	9449	97	0.6	1.35	116.0	
2	Irr. Chunk	75.0	62.1	330	5935	77	0.2	1.21	43.6	
3	Irr. Chunk	72.5	57.2	200	5283	73	0.2	1.18	28.9	
4	Irr. Chunk	57.9	51.4	150	3788	62	0.2	1.10	28.0	
5	Irr. Chunk	59.0	44.4	100	3336	58	0.1	1.07	20.6	
6	Irr. Chunk	61.0	38.7	60	3009	55	0.1	1.04	13.4	
7	Irr. Chunk	53.1	47.8	220	3231	57	0.3	1.06	46.5	
8	Irr. Chunk	68.3	38.8	420	3377	58	0.6	1.07	85.8	
9	Irr. Chunk	64.6	42.0	320	3456	59	0.4	1.08	64.2	
10	Irr. Chunk	75.2	34.7	450	3324	58	0.6	1.07	93.1	
11	Irr. Chunk									
12	Irr. Chunk									
								Median =	45.06	
								Average =	54.04	

SAMPLE ID:							LAB ID.:			
SPECIMEN NO.	TEST TYPE	W mm	D mm	P Kn or Lb.	De2 mm2	De mm	Is	F	Is (50)	
1										
2										
3										
4										
5										
6										
7										
8										
9										
10										

ENTERED BY: WFS

CHECKED BY: *KAC*