

AP - 018

REPORTS

12/07/1999

PHASE II ENVIRONMENTAL ASSESSMENT

**South Langley Jal Unit
Lea County, New Mexico**

RECEIVED

DEC 07 1999

**ENVIRONMENTAL BUREAU
OIL CONSERVATION DIVISION**

PHASE II ENVIRONMENTAL ASSESSMENT

South Langley Jal Unit
Lea County, New Mexico

PREPARED FOR:

Bristol Resources Corporation

Mr. Dan Abney

6655 South Lewis

Tulsa, Oklahoma 74136

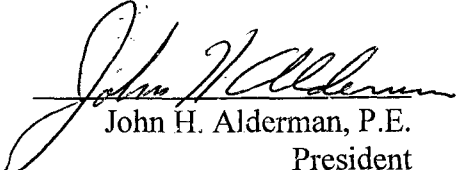
PREPARED BY:

Cornerstone Environmental Resources, Inc.

2997 LBJ Freeway

Suite 103

Dallas, Texas 75234-7606


John H. Alderman, P.E.
President

PHASE II ENVIRONMENTAL ASSESSMENT

South Langley Jal Unit Lea County, New Mexico

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1.0 EXECUTIVE SUMMARY

Cornerstone Environmental Resources, Inc. (CERI) conducted an Environmental Assessment (EA) of the South Langley Jal Unit located in Lea County, New Mexico on January 18, 1999 at the request of and on behalf of Bristol Resources Corporation (Bristol). The property is located north of Jal as shown on the Location Map, Figure 1, and Topographic Map, Figure 2. CERI conducted this EA to evaluate the extent of a brine water spill from a leak in an injection line on the subject property. The purpose of the EA was to evaluate the impact of the spill and provide recommendations for courses of action. The scope of work included a site visit too the field for soil sample collection to assist in evaluating the vertical and horizontal extent of the salt water leak.

~~The leak occurred in the top of the buried injection line where the force of the water from~~
the pipe was upward. This upward force resulted in most of the water going upward to the grounds surface. After reaching the surface, the water appeared to flow south and form pools in three locations. A backhoe was used to dig seven trenches to obtain soil samples from a background area and from the pooled locations along the reported spill route. The locations of the trenches are shown on Figure 3. Soil samples were taken from the trenches and analyzed for chlorides (Cl).

Our interpretation, based on the results of this study, is that the majority of the water went up to the surface from the leak in the injection line and then moved down a roadbed toward Puddle Area 3 where trenches 4 through 7 are located. Very little of the water soaked into the soil until it reached Area 3. The water did accumulate in Area 3 and some has moved downward. The Cl levels of the subsurface in this area is from 3,000 to 4,000 milligrams/kilogram (mg/kg). A Cl concentration in the top one inch of soil of 14,400 mg/kg was measured. One complication in interpreting the impact of this spill is the past spills which have occurred in the area. The 14,400 mg/kg in the top one inch may be from the recent pipeline break. The deeper Cl concentrations may be from previous spills. These historical leaks would have impacted the area. The effect on our analysis by the early spills can not be evaluated with out knowing the location and amount of the previous spills.

We do not believe that the Cl subsurface concentrations represent a threat to ground water. The surface Cl concentration in Area 3 was high at 14,400 mg/kg. However, we believe this represents a depth of less than an inch and also does not pose a threat. We believe that the action that should be taken is to prevent future leaks from occurring. This can be done by limiting the lines that are used for disposal and insuring that the lines that are used will contain the injection fluids at the pressures required for water disposal.

2.0 INTRODUCTION AND PURPOSE

CERI conducted an EA of the South Langley Jal Unit located in Lea County, New Mexico on January 18, 1999 at the request of and on behalf of Bristol. The property is located north of Jal as shown on the Location Map, Figure 1, and Topographic Map, Figure 2. CERI conducted this EA to evaluate the extent of a brine water spill from a leak in an injection line on the subject property. The purpose of the EA was to evaluate the impact of the spill and provide recommendations for courses of action. The scope of work included a site visit to the field to obtain soil samples to assist in evaluating the vertical and horizontal extent of the salt water leak.

Mr. John H. Alderman of CERI met with Bristol's representative Mr. Don Taylor and together they conducted the evaluation of the site. Mr. Bob Bowen, a local contractor, was interviewed concerning details of the leak in the injection line. Mr. Bowen was the person who repaired the leak.

According to Mr. Taylor, the leak was discovered in January by the land owner. The leak occurred in the injection line going to injection well #13. The location of the leak was just south of well #9 as shown on the attached Figure 2. The land owner was reported to have told Bristol representatives that he saw a small stream of water flowing south from the leak area. Mr. Taylor said that the New Mexico Oil Conservation Division (OCD) was notified by Bristol and that Mr. Gary Wink with the OCD had conducted an investigation of the incident. The leak was repaired and CERI was contacted to conduct an evaluation of the extent of the spill.

Mr. Bowen was asked about historic line breaks and he said that there had been past corrosion problems and problems with the line.

3.0 AQUIFER AND PRODUCED WATER CHARACTERIZTICS

3.01 Groundwater

The spill occurred in the NE ¼ of Section 18, R37E, T25S. Mr. Ken Frequez with the State Engineer's office was contacted concerning the depth of ground water in the area. He said there were two water wells in the area. These wells and the depth to ground water are as follows in Table 1.

Table 1

Location	Water Depth	Surface Elevation
NW ¼ Sec 17, R37E, R25S	53 ft.	3104 ft.
SE ¼ Sec 18, R37E, R25S	53 ft.	3107 ft.

Based on water depth in these two wells, the depth of ground water in the area is 53 ft.

3.02 Produced Water

A sample of the injection water was taken on 2/5/99 and analyzed by Martin Water Labs., Inc. The results of the analysis is presented in Appendix A. The chloride concentration in the injection water based on this sample is 26,270 milligrams per liter (mg/L).

4.0 DATA GATHERING AND SAMPLING

Mr. Bowen reported that the leak occurred in the top of the buried injection line and that the force of the water from the pipe was upward. This upward force resulted in most of the water going upward to the ground's surface. After reaching the surface, Mr. Bowen said the water appeared to flow south and form pools in three locations. A backhoe was used to dig seven trenches to obtain soil samples from the background area and from the pooled locations along the reported spill route. The locations of the trenches are shown on Figure 3.

Photo 1 shows the northern most extent of the reported surface movement of the brine. The terrain of the area and the reported route of the water movement can be seen in Photo 2 and 3. Photo 2 was taken looking north from trench 3 toward Well #9 and the leak location. Water movement was reported to have been down the road as seen in Photo 2 and 3. The area identified as Puddle Area 3 appears the largest area of water accumulation and is shown in Photos 3 and 4. Four trenches were dug in Area 3.

Trench 1 was placed approximately 30 ft. southeast of the pipeline leak on the downgradient side of the flow path. Soil samples were taken from Trench 1 at 6 in. and at 2 ft.

Trench 2 was placed 72 ft. from the leak along the flow path in an area identified as Puddle Area 1. Trench 3 was placed 252 ft. from the leak along the flow path in an area identified as Puddle Area 2. Trenches 4 through 7 were all placed in the area identified as Puddle Area 3. Puddle Area 3 represented the southern most extent of the surface flow.

Soil samples were taken from 6 in., 2 ft., and 3 ft to 4 ft intervals in Trenches 2, 3, 4, 5, and 7. One surface sample was taken in Area 3. The soil samples were placed in 4 ounce glass jars and taken to Core Laboratories, Inc. to be analyzed for Cl. The results of the analysis are shown in Table 2 and in Appendix B.

Table 2

Analysis of Soil Samples Taken 1/18/1999

Langley Jal Unit

Lea County, New Mexico

	<u>Sample Number</u>	<u>Depth</u>	<u>Chlorides, mg/kg</u>
Trench 1	Sample 011899004	6 inches	2
	Sample 011899005	24 inches	8
Trench 2	Sample 011899006	4 inches	3
	Sample 011899007	23 inches	25
	Sample 011899008	40 inches	8
Trench 3	Sample 011899009	6 inches	50
	Sample 011899010	27 inches	431
	Sample 011899011	46 inches	2270
Trench 4	Sample 011899012	4 inches	3090
	Sample 011899013	24 inches	4420
	Sample 011899014	45 inches	3430
Trench 5	Sample 011899015	8 inches	3530
	Sample 011899016	32 inches	3800
	Sample 011899017	47 inches	3710
Trench 6	Trench not sampled		
Trench 7	Sample 011899001	2 inches*	3340
	Sample 011899002	20 inches*	4740
	Sample 011899003	40 inches*	3570

*Note: Depths of trench 7 were not measured and the depths shown are the approximate locations of the soil samples.

5.0 SAMPLE ANALYSES AND DISCUSSION

The Cl level in the two samples from Trench 1 were 2 and 8 mg/kg. These samples are assumed to represent background Cl concentration.

Trench 2 was placed along the flow path in the area identified as Puddle Area 1. The Cl levels from Trench 2 which represents Puddle Area 1 were low and ranged from 3 to 25 mg/kg. The 25 mg/kg sample was taken at a depth of 23 inches and was the interface between the sand and the caliche zones. The soil sample from the bottom of the trench had a Cl level of 8 mg/kg.

Trench 3 was also placed along the flow path in area identified as Puddle Area 2. The Cl levels increased in the trench with depth. The Cl level at 6 inches was 50 mg/kg. The Cl level increased to 431 mg/kg at 27 inches and 2,270 mg/kg at 46 inches.

Trenches 4 through 7 were all from the area identified as Puddle Area 3. As was mentioned earlier, this area represented the southern most extent of the surface flow. The Cl levels from all the subsurface samples were in the 3,000 to 4,000 mg/kg range as shown in Table 2. The analysis of the surface sample indicated a Cl level of 14,400 mg/kg. This area was also the area that Mr. Bowen said previous leaks had occurred.

6.0 CONCLUSIONS

Our interpretation based on these results is that the majority of the water went up to the surface from the leak in the injection line and then moved down the roadbed toward Puddle Area 3 where trenches 4 through 7 are located. Very little of the water went down until it reached Area 3. The water did accumulate in Area 3 and some has moved downward. The Cl levels of the subsurface in this area is from 3,000 to 4,000 mg/kg. A Cl contamination in the top one inch of soil of 14,400 mg/kg was measured. One complication to analyzing the impact of this spill is the past spills which have occurred in this area. Both Mr. Bowen and Mr. Taylor said that there have

been historical line leaks. The 14,400 mg/kg Cl concentrations in the top one inch may be from the recent pipeline break. The deeper Cl concentrations may be from previous spills. These historical leaks would have impacted the area. The effect on our analysis of the early spills can not be evaluated without knowing the location and amount of the old spills.

We do not believe that the Cl subsurface concentrations represent a threat to ground water. The surface Cl concentration in Area 3 was high at 14,400 mg/kg. However, we believe this represents a depth of less than an inch and also does not pose a threat. We believe that the action that should be taken is to prevent future leaks from occurring. This can be done by limiting the lines that are used for disposal and insuring that the lines that are used will contain the injection fluids at the pressures required for water disposal.

FIGURES

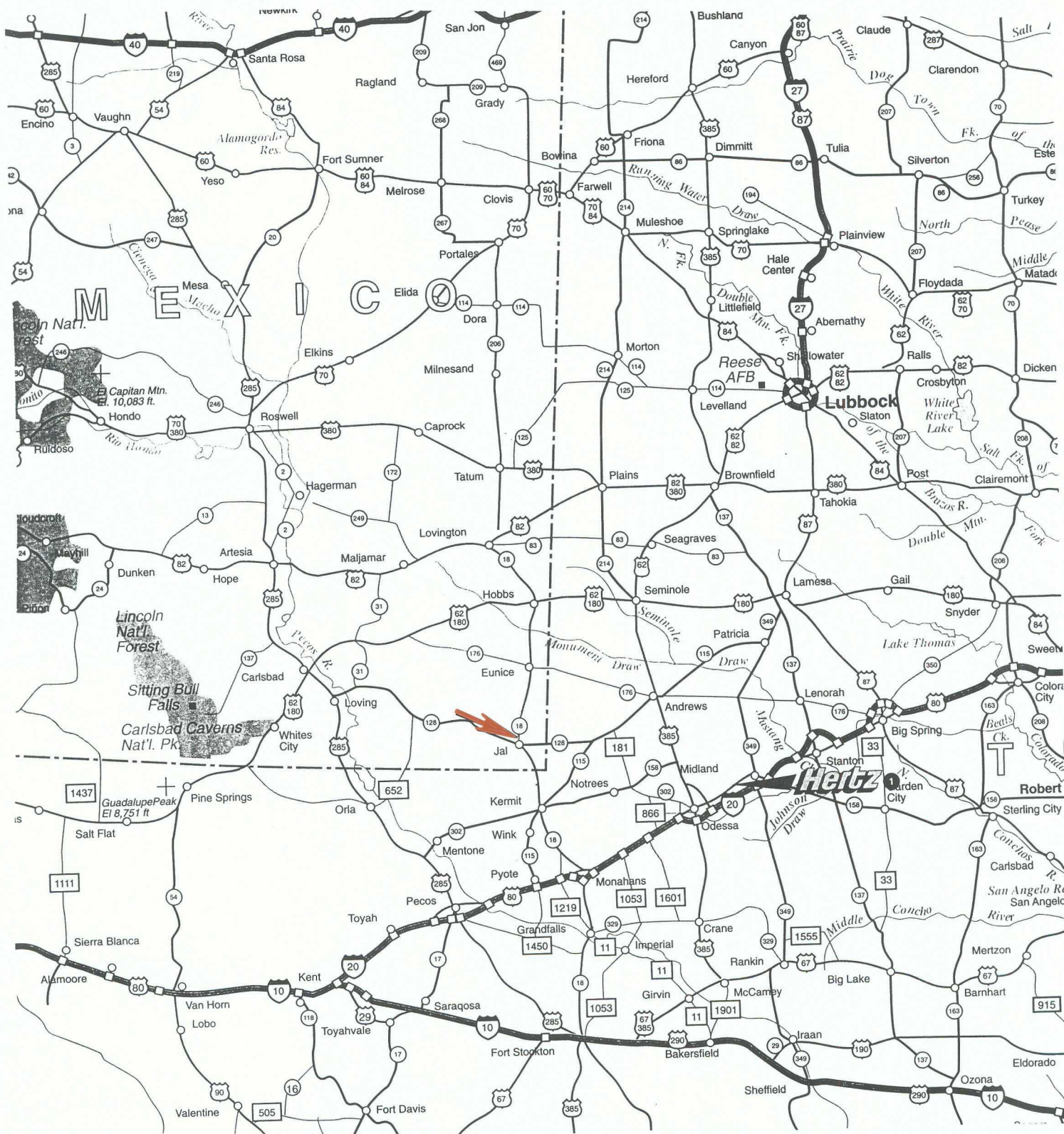


FIGURE 1
LOCATION MAP

Bristol Resources Corporation
South Langley Jal Unit
Lea County, New Mexico

Scale: NONE

Date: 02/99

PHOTOGRAPHS



PHOTO 1: Termination of surface movement of brine from the leak in the injection line and site of trench 7.



PHOTO 2: Photo taken looking north from trench 3 toward Well #9 and the site of the surface leak.



PHOTO 3: Site of trench 4 and north end of puddle area three.



PHOTO 4: Puddle area 3 looking south from trench 5.



PHOTO 5: Puddle area 3 looking north with trench 6 in foreground.

DRAFT

LAB. NO.

DATE REC 2-5-99

RR

South Langlie Jal Unit

TO: Bristol Resources Corp.

Tulsa, OK

COMPANY Bristol Resources Corp.

FIELD

SEC BLK SURVEY

CO. Lea, NM

NO. 1 Injection water - taken from South Langlie Jal Unit. 2-5-99

NO. 2

NO. 3.

NO. 4

REMARKS:

Specific Gravity @ 60°F. 1.0424

pH When Sampled

pH When Received 7.71

Bicarbonate, as HC03 1110

Supersaturated, as CaC03

Undersaturated, as CaC03

Total Hardness, as CaC03 14400

Calcium, as Ca 900

Magnesium, as Mg 2952

Sodium and/or Potassium 12721

Sulfate, as SO4 3944

Chloride, as Cl 26270

Iron, as Fe 0.09

Barium, as Ba

Turbidity

Color

Total Solids, Calc. 47897

Temperature, °F.

Carbon Dioxide 37

Oxygen

Hydrogen Sulfide 21.0

Resistivity, ohms/m @ 77°F. 0.166

Suspended Oil

Filtrable Solids

Volume Filtered, ml

Remarks: We are not familiar with the objective herein; but if we can be of any assistance in interpreting the significance of these results in regard to your specific objective, please contact us.

FAX: John Alderman (972 247-0617)

RESULTS REPORTED AS MILLIGRAMS PER LITER
MARTIN WATER LABS., INC.

APPENDIX "B"



GULF STATES ANALYTICAL

ANALYSIS SUMMARY REPORT

Cornerstone Environmental
2997 LBJ Frwy., Ste. 103
Dallas, TX 75234-7606

GSA Group: 45895
Date Reported: 01/29/1999
Date Received: 01/20/1999

Attn: Mr. John Alderman
Project: 99003

Purchase Order: 99003
Project No.: 99003

<u>Test Analysis</u>	<u>Results as Received</u>	<u>Units</u>	<u>Limit of Quantitation</u>
Sample:240354 - 01/18/1999 - 011899001 0301A Anions by IC, Solid Chloride	3,340	mg/kg	100
Sample:240355 - 01/18/1999 - 011899002 0301A Anions by IC, Solid Chloride	4,740	mg/kg	100
Sample:240356 - 01/18/1999 - 011899003 0301A Anions by IC, Solid Chloride	3,570	mg/kg	100
Sample:240357 - 01/18/1999 - 011899004 0301A Anions by IC, Solid Chloride	2	mg/kg	1
Sample:240358 - 01/18/1999 - 011899005 0301A Anions by IC, Solid Chloride	8	mg/kg	1
Sample:240359 - 01/18/1999 - 011899006 0301A Anions by IC, Solid Chloride	3	mg/kg	1
Sample:240360 - 01/18/1999 - 011899007 0301A Anions by IC, Solid Chloride	25	mg/kg	1
Sample:240361 - 01/18/1999 - 011899008 0301A Anions by IC, Solid Chloride	8	mg/kg	1
Sample:240362 - 01/18/1999 - 011899009 0301A Anions by IC, Solid Chloride	50	mg/kg	1
Sample:240363 - 01/18/1999 - 011899010 0301A Anions by IC, Solid Chloride	431	mg/kg	10

Core Laboratories, Inc.

6310 Rothway, Houston, Texas 77040, (713) 690-4444, Fax (713) 690-5646



GULF STATES ANALYTICAL

ANALYSIS SUMMARY REPORT

Page 2

Cornerstone Environmental

GSA Group: 45895

<u>Test Analysis</u>	<u>Results as Received</u>	<u>Units</u>	<u>Limit of Quantitation</u>
Sample:240364 - 01/18/1999 - 011899011 0301A Anions by IC, Solid Chloride	2,270	mg/kg	10
Sample:240365 - 01/18/1999 - 011899012 0301A Anions by IC, Solid Chloride	3,090	mg/kg	100
Sample:240366 - 01/18/1999 - 011899013 0301A Anions by IC, Solid Chloride	4,420	mg/kg	100
Sample:240367 - 01/18/1999 - 011899014 0301A Anions by IC, Solid Chloride	3,430	mg/kg	100
Sample:240368 - 01/18/1999 - 011899015 0301A Anions by IC, Solid Chloride	3,530	mg/kg	100
Sample:240369 - 01/18/1999 - 011899016 0301A Anions by IC, Solid Chloride	3,800	mg/kg	100
Sample:240370 - 01/18/1999 - 011899017 0301A Anions by IC, Solid Chloride	3,710	mg/kg	100
Sample:240371 - 01/18/1999 - 011899018 0301A Anions by IC, Solid Chloride	14,400	mg/kg	100

Test Method Summary:

0301A- EPA 300 MOD

Respectfully Submitted,
Reviewed and Approved by:


Ed Fry
Project Manager

Core Laboratories, Inc.

6310 Rothway, Houston, Texas 77040, (713) 690-4444, Fax (713) 690-5646

Core Lab-Gulf States Analytical
Daily QC Batching Data
Data Released for Reporting01/29/99
10:52:06
Group: 45895

Analysis Batch Number: 0301A-01/27/99-1204-1

Test Identification : 0301A-Anions by IC, Solid

Units: mg/kg

Sequence: 9A27

Number of Samples : 22

Batch Data-Date/Time : 01/28/99 / 07:55:24

SPIKE						QC LIMITS	
SAMPLE#	ANALYTE	CONC ADDED	CONC SAMPLE	CONC SPIKE	% REC #	LOWER	UPPER
45895-240354	Chloride	100.0000	0.0000	0.0000	0.0(I1)	80.0	120.0
45895-240354-2	Chloride	1000.0000	3216.8500	3858.2200	64.1(I1)	80.0	120.0
45895-240354-3	Chloride	10000.0000	3339.1300	13331.7000	99.9	80.0	120.0
45895-240364-4	Chloride	100.0000	0.0000	0.0000	0.0(I1)	80.0	120.0
45895-240364-5	Chloride	1000.0000	2267.2200	3084.9100	81.8	80.0	120.0
45895-240364-6	Chloride	10000.0000	2188.6200	12067.3000	98.8	80.0	120.0

DUPLICATE							
SAMPLE#	ANALYTE	RESULT 1	RESULT 2	RPD #	LIMIT	DILUTION	
45895-240354	Chloride	0.0000	0.0000	0.0	20.0	1.00	
45895-240354-2	Chloride	3216.8500	3253.8400	1.1	20.0	10.00	
45895-240354-3	Chloride	3339.1300	3455.9700	3.4	20.0	100.00	
45895-240364-4	Chloride	0.0000	0.0000	0.0	20.0	1.00	
45895-240364-5	Chloride	2267.2200	2269.9900	0.1	20.0	10.00	
45895-240364-6	Chloride	2188.6200	2203.0100	0.7	20.0	100.00	

CONTROL						QC LIMITS	
SAMPLE#	ANALYTE	CONC FOUND	CONC KNOWN	% REC #	LOWER	UPPER	
0-12799	Chloride	99.9622	100.0000	100.0	90.0	110.0	

						QC LIMITS	
CV #	ANALYTE	TRUE VALUE	BATCH READ	% REC #	LOWER	UPPER	
0-12799	Chloride	100.0000	100.2290	100.2	90.0	110.0	
0-12799-2	Chloride	100.0000	99.8429	99.8	90.0	110.0	
0-12799-3	Chloride	100.0000	100.2900	100.3	90.0	110.0	
0-12799-4	Chloride	100.0000	99.7508	99.8	90.0	110.0	
0-12799-5	Chloride	100.0000	96.2959	96.3	90.0	110.0	
0-12799-6	Chloride	100.0000	96.4511	96.5	90.0	110.0	
0-12799-7	Chloride	100.0000	97.7915	97.8	90.0	110.0	
0-12799-8	Chloride	100.0000	97.2992	97.3	90.0	110.0	

CCB#	ANALYTE	CONC FOUND #	LMT OF QUANTITATION
0-12799	Chloride	0.7378	1.0000
0-12799	Chloride	0.7463	1.0000
0-12799	Chloride	0.9789	1.0000
0-12799	Chloride	0.7063	1.0000
0-12799	Chloride	0.8761	1.0000
0-12799	Chloride	0.1066	1.0000
0-12799	Chloride	0.6811	1.0000
0-12799	Chloride	0.9447	1.0000

----- Result Footnotes -----
(I1) - Matrix spike outlier due to compound over calibration range.

Groups & Samples

Core Lab-Gulf States Analytical
Daily QC Batching Data
Data Released for Reporting

01/29/99
10:52:06
Group: 45895

Analysis Batch Number: 0301A-01/27/99-1204-1

Test Identification : 0301A-Anions by IC. Solid

Units: mg/kg

Sequence: 9A27

Number of Samples : 22

Batch Data-Date/Time : 01/28/99 / 07:55:24

45895-240354	45895-240355	45895-240356	45895-240357	45895-240358	45895-240359	45895-240360	45895-240361
45895-240362	45895-240363	45895-240364	45895-240365	45895-240366	45895-240367	45895-240368	45895-240369
45895-240370	45895-240371						

APPENDIX "A"



CORE LABORATORIES, INC.



CHAIN OF CUSTODY RECORD

CUSTOMER INFORMATION				PROJECT INFORMATION				ANALYSIS / METHOD REQUEST				LAB JOB NO.			
COMPANY: CORNSTONE ENVIRONMENTAL				PROJECT NAME/NUMBER: 99003				CHLORIDE				45895			
SEND REPORT TO: JOHN H. ALDERMAN				BILLING INFORMATION											
ADDRESS: 2997 LBJ Fwy				BILL TO: JOHN H. ALDERMAN											
SUITE 103				ADDRESS: SAME											
DALLAS TX 75234-7643				PHONE: 972-243-7643											
				FAX: 972-247-0617											
PO NO.:															
SAMPLE NO.	SAMPLE DESCRIPTION	SAMPLE DATE	SAMPLE TIME	SAMPLE MATRIX	CONTAINER	PRESERV.	NUMBER OF CONTAINERS	REMARKS / PRECAUTIONS							
011899001		1/18/99	11:52	Soil		None	1	X							
011899002			11:58	C			1	X							
011899003			12:00					X							
011899004			13:30					X							
011899005			13:35					X							
011899006			14:00					X							
011899007			14:05					X							
011899008			14:09					X							
011899009			14:16					X							
011899010			14:20					X							

SAMPLER: _____

SHIPMENT METHOD: _____

AIRBILL NO.: _____

REQUIRED TURNAROUND *		DATE		DATE		DATE	
SAME DAY	24 HOURS	48 HOURS	72 HOURS	5 DAYS	10 DAYS	ROUTINE	OTHER
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	
1. RELINQUISHED BY: _____		DATE: 1/15/99		DATE: _____		DATE: _____	
SIGNATURE: John H. Alderman		SIGNATURE: _____		SIGNATURE: _____		SIGNATURE: _____	
PRINTED NAME/COMPANY: John H. Alderman		PRINTED NAME/COMPANY: _____		PRINTED NAME/COMPANY: _____		PRINTED NAME/COMPANY: _____	
1. RECEIVED BY: _____		DATE: 1/18/99		DATE: 1/20/99		DATE: _____	
SIGNATURE: _____		SIGNATURE: _____		SIGNATURE: _____		SIGNATURE: _____	
PRINTED NAME/COMPANY: Core Lab		PRINTED NAME/COMPANY: William O. Reeves		PRINTED NAME/COMPANY: _____		PRINTED NAME/COMPANY: _____	

☐ Anaheim, CA
10703 E. Berryway Drive
Anaheim, CA 92805
(714) 937-1094 Fax (714) 937-1170

☐ Aurora, CO
10703 E. Berryway Drive
Aurora, CO 80015
(303) 751-1700 Fax (303) 751-1784

☐ Houston, TX (Pet)
8210 Mosley Road
Houston, TX 77063
(713) 943-9776 Fax (713) 943-3846

☐ Indianapolis, IN
7726 Miller Road
Indianapolis, IN 46268
(317) 875-3884 Fax (317) 872-6189

☐ Lake Charles, LA
3645 Begis Parkway
Sulphur, LA 70663
(337) 355-4928 Fax (337) 583-4929

☐ Long Beach, CA
3700 Cherry Avenue
Long Beach, CA 90807
(310) 595-8401 Fax (310) 427-5174

☐ Corpus Christi, TX
1733 N. Padre Island Drive
Corpus Christi, TX 78408
(512) 289-2673 Fax (512) 289-2471

☐ Edison, NJ
Edison Research Center Parkway
Edison, NJ 08837
(908) 225-6700 Fax (908) 225-6777

☐ Houston, TX (Env)
8410 Hollister Lane
Houston, TX 77064
(713) 690-4444 Fax (713) 690-5646

☐ Valparaiso, IN
2400 Cumberland Drive
Valparaiso, IN 46383
(219) 464-2389 Fax (219) 462-2953

* RUSH TURNAROUND MAY REQUIRE SURCHARGE