

**GW - 278**

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**REPORTS**

**YEAR(S):**

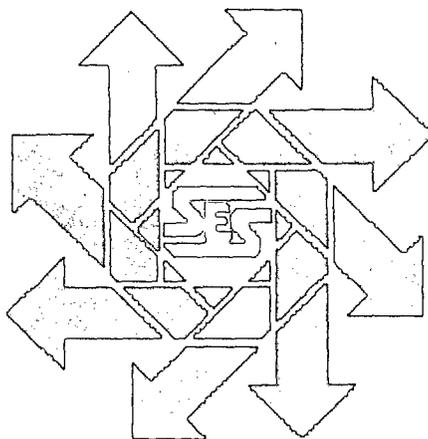
**2000**

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**Closure Report  
Clean Out Pit  
Key Energy Services, Inc.  
Carlsbad, New Mexico**

**SE ¼ of Section 33 and SW ¼ of Section 34  
T21S, R27E, Eddy County, New Mexico**

**March 22, 2000**



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MAR 24 2000  
Environmental Bureau  
Oil Conservation Division

*prepared for:*

**Key Energy Services, Inc.  
1609 E. Greene  
Carlsbad, New Mexico 88220**

**By:**

**Safety & Environmental Solutions, Inc.  
703 E. Clinton, Suite 103  
Hobbs, New Mexico 88240  
(505) 397-0510**

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Oil Conservation Division

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Key Energy Services, Inc.  
Carlsbad, New Mexico

Clean Out Pit Closure Report  
March 23, 2000

**I. Physical Description**

The legal description of the Key Energy Services Carlsbad facility is SE ¼ of Section 33 and the SW ¼ of Section 34, T21S, R27E in Eddy County, New Mexico. The street address of the facility is 1609 E. Greene Street in Carlsbad, New Mexico. (Exhibit 1)

**II. Background**

Safety & Environmental Solutions, Inc. (SESI) was engaged on August 27, 1998 to perform a site assessment of the abandoned clean out pit site located on the Key Energy Services Carlsbad facility. At that time, Rowland Trucking Company, Inc. owned and operated the property. The results of that assessment were reported in "Site Assessment, Carlsbad Clean Out Pit, Rowland Trucking Company, Inc." dated September 1, 1998. (Exhibit 8)

**III. Contaminant and Area of Impact**

The contaminants identified in the site assessment were Total Petroleum Hydrocarbons (TPH) and chlorides. The estimated area of impact of the contaminants was estimated to be 75' X 50'. No evidence of other contaminants was found.

**IV. Vertical and Horizontal Extent of Contamination**

The site assessment performed by SESI determined that the vertical extent of TPH contamination was approximately 20' and elevated chloride levels were found at 25'.

**V. Surface Water and Waterways**

The distance to the nearest permanent surface water is in excess of 1 mile. A natural drainage ravine borders the subject facility on the east side.

**VI. Groundwater**

According to the State of New Mexico Engineer's office, the depth to groundwater in the nearest water well, which is to the southwest, is 40', however, the surface elevation of this well is approximately 70' to 80' below the subject facility. This well is also located on the west side of the East Canal, an irrigation ditch servicing the area south of US Highway 62-180, and the depth to groundwater and quality of that water mostly likely would be affected by the seepage of the Canal. The depth to groundwater at the subject site is estimated to be from 110' to 120'.

The subject facility is situated on the Rustler geologic formation east of the Pecos River. (Exhibit 4) The groundwater found in this formation moves in a northeast to southwest direction toward the Pecos River. (Exhibit 5) The report, *Geology and Ground-Water Resources of Eddy County, New Mexico* by Hendrickson and Jones dated 1952, states that generally the quality of the water east of the Pecos River is not potable. Specifically, water in the Rustler formation is generally too high in chlorides and sulfates for domestic use and locally is undesirable even for livestock. The study further reports that only 6 of the 15 wells tested east of the Pecos River showed chloride levels below 250 mg/l which is the current Water Quality Control Commission (WQCC) standard.

## VII. Work Performed

An Amended Work Plan for the Carlsbad Clean Out Pit was submitted to the New Mexico Oil Conservation Division (NMOCD) on February 2, 1999. (Exhibit 9) The letter from the NMOCD approving this Work Plan was written on February 17, 1999. (Exhibit 10) Additional time extensions were requested and granted because of the poor economic conditions that prevailed during most of 1999 in oil and gas producing areas of New Mexico.

The Amended Work Plan calls for the excavation and removal of soils that have been impacted by BTEX, TPH or chlorides and transported to an NMOCD approved site for disposal. The excavation, after confirmation testing, will be backfilled with clean soils.

The impacted soils were excavated and transported to Controlled Recovery, Inc. beginning on March 6, 2000. Approximately 5000 cubic yards of impacted soils were removed from the subject site and transported for disposal. The resulting excavation bears the dimensions of 84' X 62' with an average depth of 22'. Mr. Mike Stubblefield of the NMOCD district office in Artesia was on hand on several occasions to witness the excavation process as well as the sampling and field testing.

Field tests were conducted as the site was being excavated by SESI to determine the amount of contamination present in the sides and bottom of the excavation. Once the TPH levels were found to be under 100 ppm, the sample was transported under chain of custody to Cardinal Laboratories in Hobbs, New Mexico for analysis. The results of the analysis (Exhibit 7) is summarized as follows:

Sample	TPH	Cl	Benzene	Toluene	E. Benzene	T. Xylenes
N. Wall	<10	6760	<0.002	<0.002	<0.002	<0.006
E. Wall	38.4	2360	<0.002	<0.002	<0.002	<0.006
S. Wall	2050	5820	<0.002	<0.002	<0.002	<0.006
W. Wall	54.5	4320	<0.002	<0.002	<0.002	<0.006
SE ¼ Bottom	144	1100	<0.002	<0.002	<0.002	<0.006

Sample	TPH	Cl <sup>-</sup>	Benzene	Toluene	E. Benzene	T. Xylenes
W Bench Bottom	<10	3190	<0.002	<0.002	<0.002	<0.006
Middle Bench Bottom	<10	6010	<0.002	<0.002	<0.002	<0.006
N. Bottom	<10	5820	<0.002	<0.002	<0.002	<0.006

The results for TPH and BTEX clearly indicates the removal of all source hydrocarbons with the exception of the South Wall sample which still contained 2050 ppm TPH. The field testing done on this sample indicated 98 ppm TPH. The results of the field testing had compared within 60 ppm of the laboratory results throughout the project. On March 23, 2000, Cardinal Laboratories re-examined that sample with a result of 112 ppm confirming all hydrocarbon have been removed. (Exhibit 7)

The chloride levels in all samples were elevated. It should be noted that the material being left in place on the sides of the excavation consists of red and gray clays with soft caliche-like material being found in stringer layers. All material in the bottom of the excavation is red or gray clay from which the samples were taken for analysis.(Exhibit 11) The high content of chlorides appears both in the sides of the excavation even in samples that were extracted using a hand auger in the bottom. Due to the indications of chlorides in the red and gray clays, additional borings were installed in an attempt to establish background chlorides and the horizontal extent of any migration. (Exhibit 2)

The borings were installed in the locations shown on Exhibit 2 attached to this report. The depths of samples extracted from the borings and the type of soils encountered are detailed in Exhibit 6, Logs of Borings. A summary of the chloride analysis (Exhibit 7) of the samples from the borings is as follows:

Depth	BH #1	BH#2	BH #3	BH #4	BH#5
5'	120	376	2465	2239	4321
10'	120	737	1278	947	6313
15'	180	616	451	1353	3044
20'	NS	1410	857		4058
25'	210	1160	436		
30'		661	NS		
35'		165	616		
40'		225			

Borings 1,2 and 3 were installed uphill of the excavation and borings 4 and 5 were installed near the property line downhill of the excavation. The uphill borings indicate some elevated chloride levels with no apparent source.(Exhibit 3) However, the downhill borings indicate chloride levels consistent with the excavation bottom and sides.

The uphill borings indicate the background chloride levels vary widely and range between 120 ppm and 1410 ppm. Due to the wide range of background, it may be inferred that at least part of the chloride concentrations found in the excavation are naturally occurring.

No free liquids were encountered during the installation of the any borings nor were any free liquids encountered during the excavation activities.

#### **VIII. Summary**

The excavation and disposal activities outlined in the approved Amended Work Plan have been completed. The excavation is open at the writing of this report due to the occurrence of elevated chloride concentrations remaining in the sides and bottom of the excavation. (Exhibit 7) These levels, as detailed above, may be partly naturally occurring at the site. The reasoning for this observation is the results of the uphill borings and the rock stringers that were encountered in boring #2 with the associated high chloride levels.

The excavation has removed all sources of TPH, BTEX and chlorides at the subject site. The remaining sides and bottom of the excavation, although containing elevated chloride concentrations, are dry and the chloride deposits in the clay and soft caliche-like material are not subject to transport. The backfill material is caliche and will be compacted to resist migration of surface waters to the depths required to encounter the chloride concentrations left in place in the excavation. The surface area of runoff that may impact the excavation site is minimal and recontouring and diversions will be used to direct heavy stormwater runoff away from the subject site.

The proximity to groundwater, 110' to 120' and its apparent quality, poor to non-potable; the areas of high naturally occurring chlorides; and the steps taken to prevent the migration of surface waters at the subject site, indicate no further remedial activity should be performed at the subject site.

The likelihood of further contamination of soils and groundwater from the subject site is minimal and therefore, it is requested that the NMOCD approve the closure of the site in its present condition with appropriate backfill.

#### **IX. Exhibits**

- |           |                     |
|-----------|---------------------|
| Exhibit 1 | Vicinity Map        |
| Exhibit 2 | Bore Hole Map       |
| Exhibit 3 | Cross Section       |
| Exhibit 4 | Formation Map       |
| Exhibit 5 | Water Direction Map |

*Clean Out Pit Closure Report*  
*March 23, 2000*

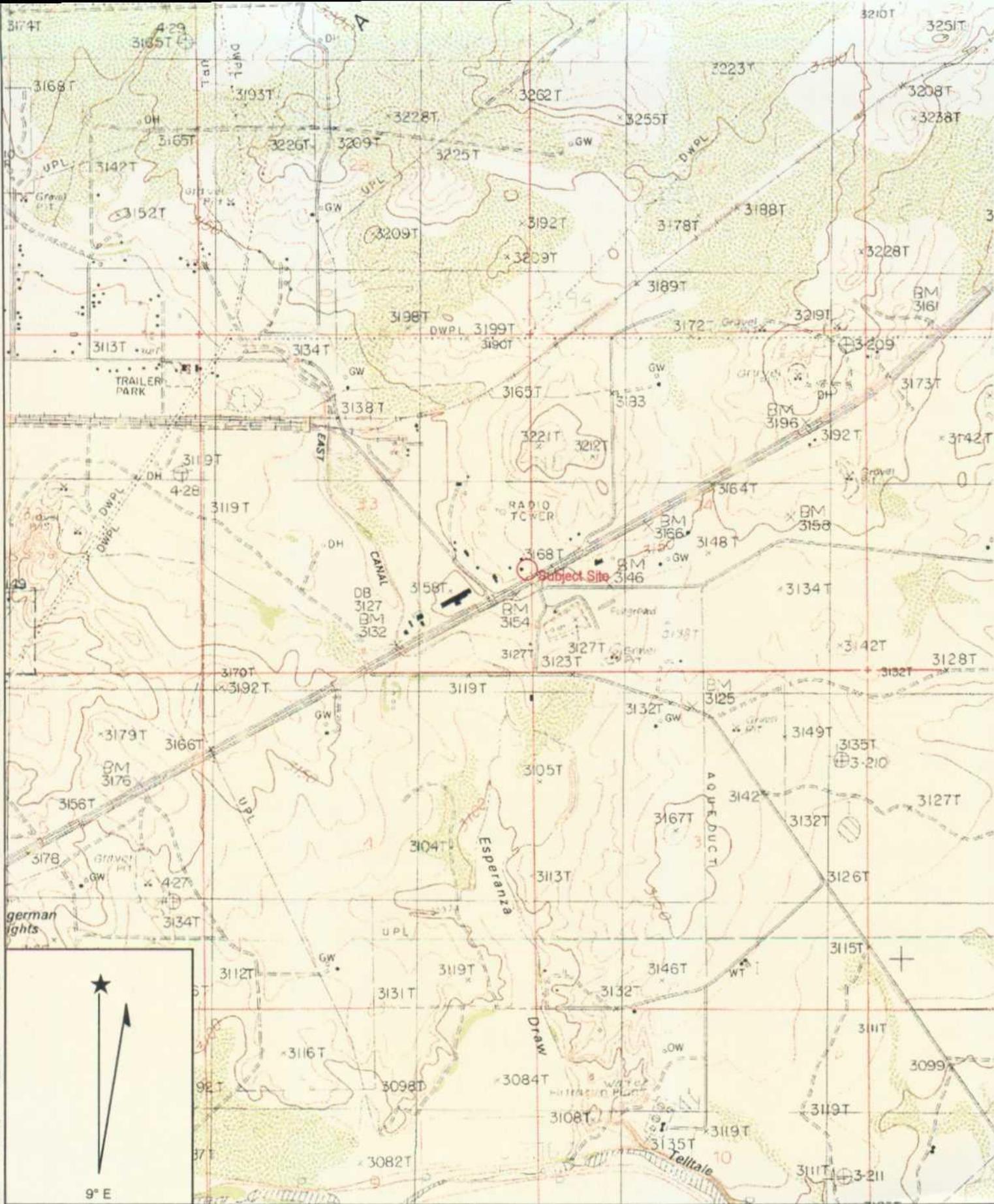
*Key Energy Services, Inc.*  
*Carlsbad, New Mexico*

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Exhibit 6	Log of Borings
Exhibit 7	Analytical Results
Exhibit 8	Site Assessment
Exhibit 9	Amended Work Plan
Exhibit 10	OCD Approval Letter
Exhibit 11	Selected Photos



Exhibit 1  
Vicinity Map

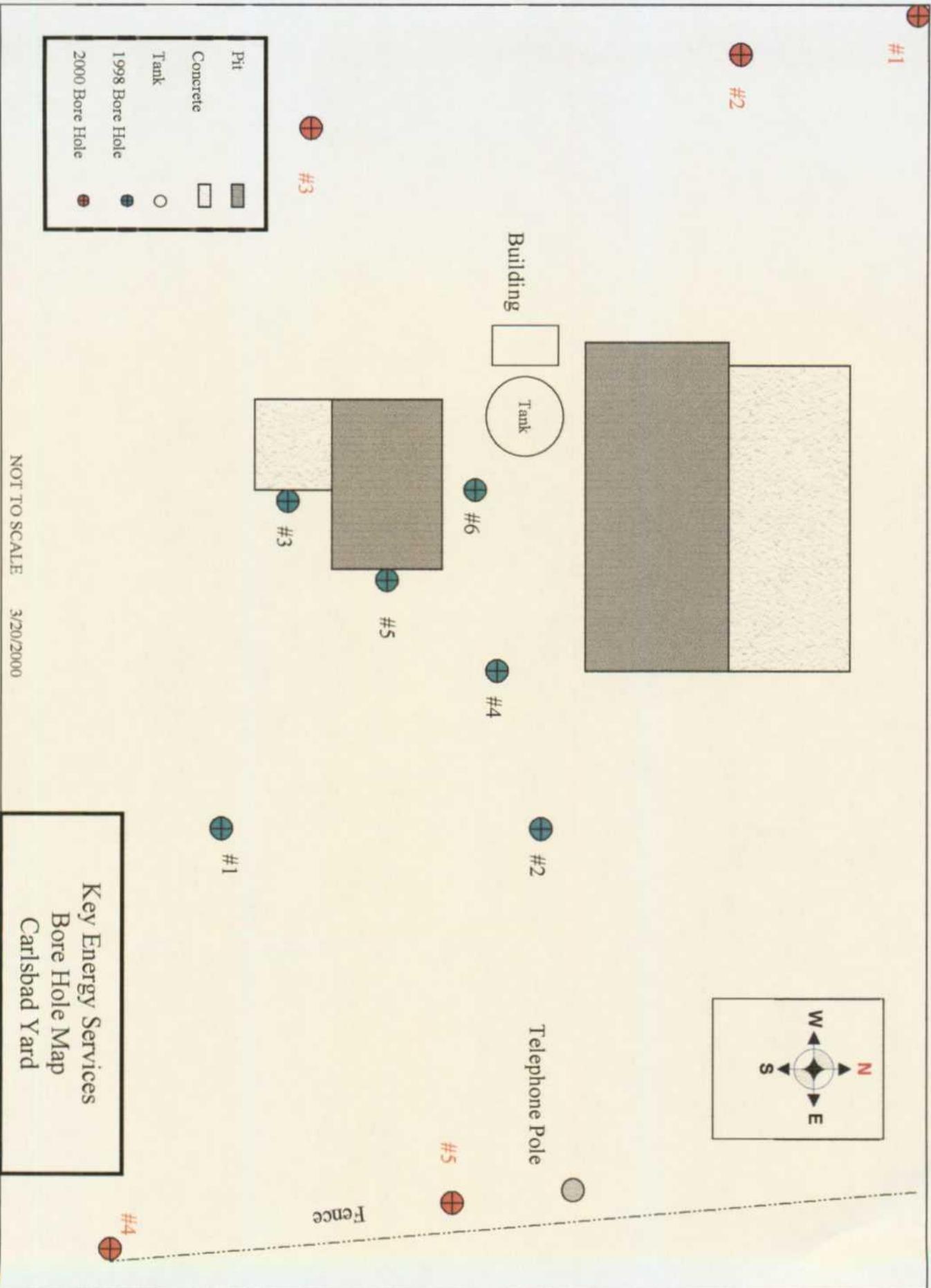


Name: CARLSBAD EAST  
 Date: 3/22/100  
 Scale: 1 inch equals 2000 feet

Location: 032° 25' 55.5" N 104° 11' 14.7" W



Exhibit 2  
Bore Hole Map



NOT TO SCALE 3/20/2000

Key Energy Services  
Bore Hole Map  
Carlsbad Yard



Exhibit 3  
Cross Section

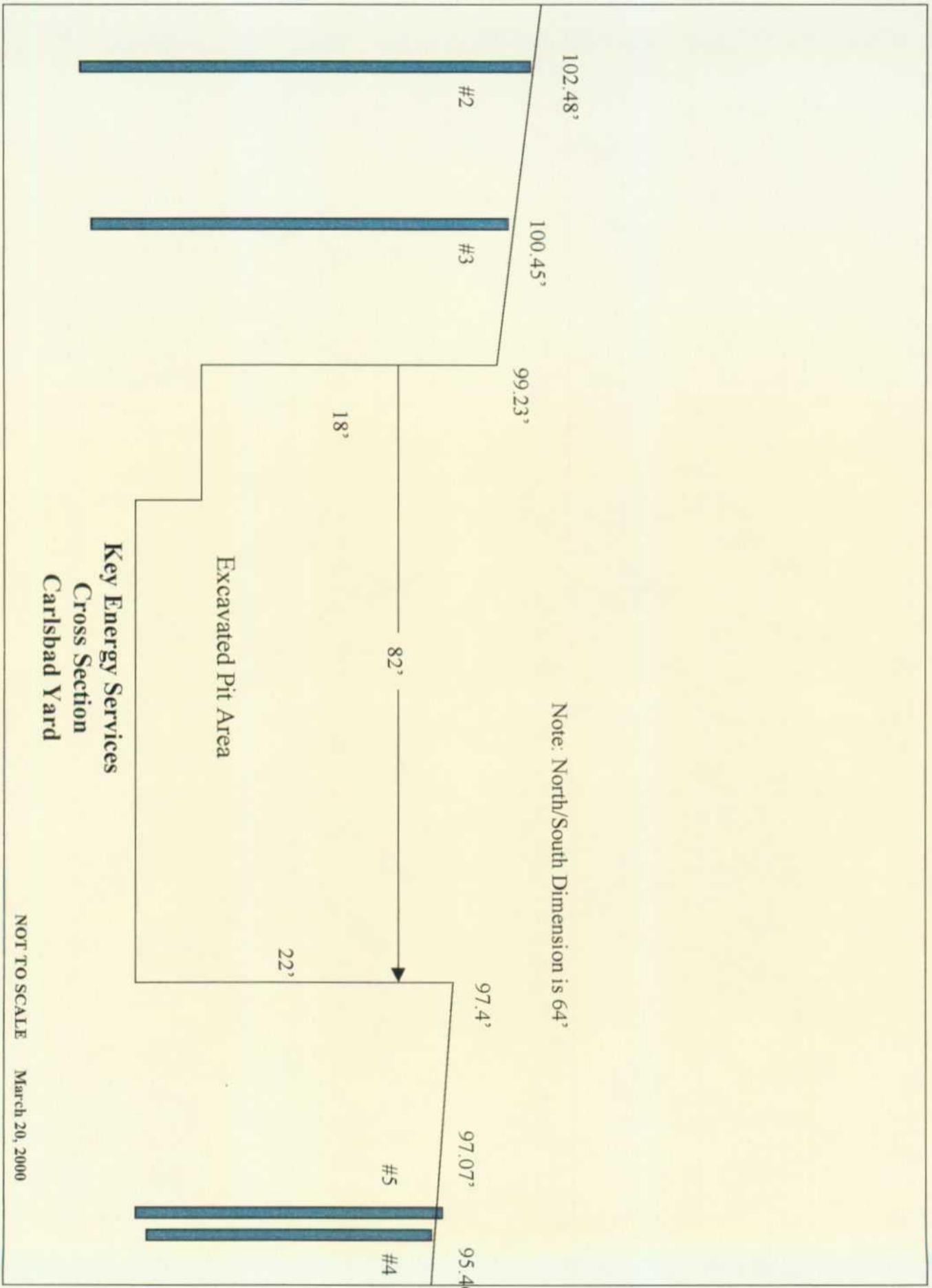
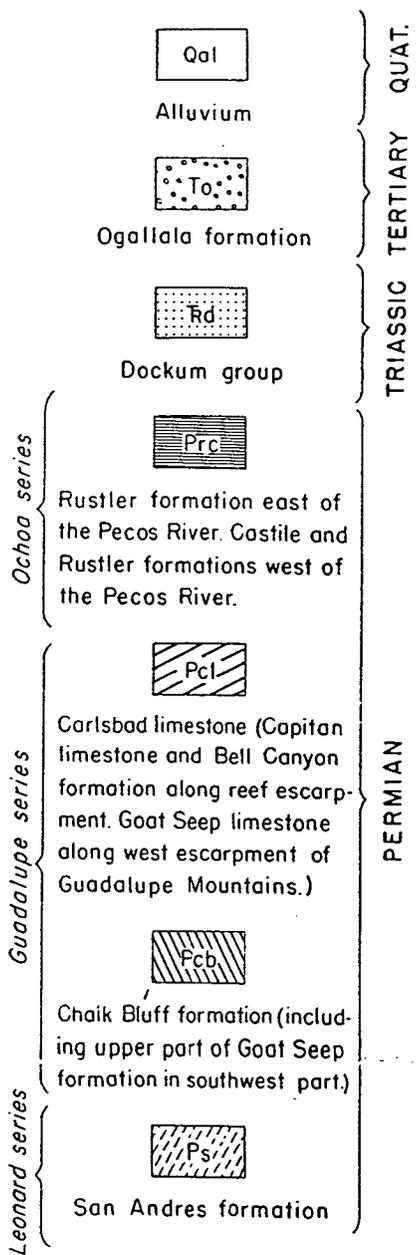


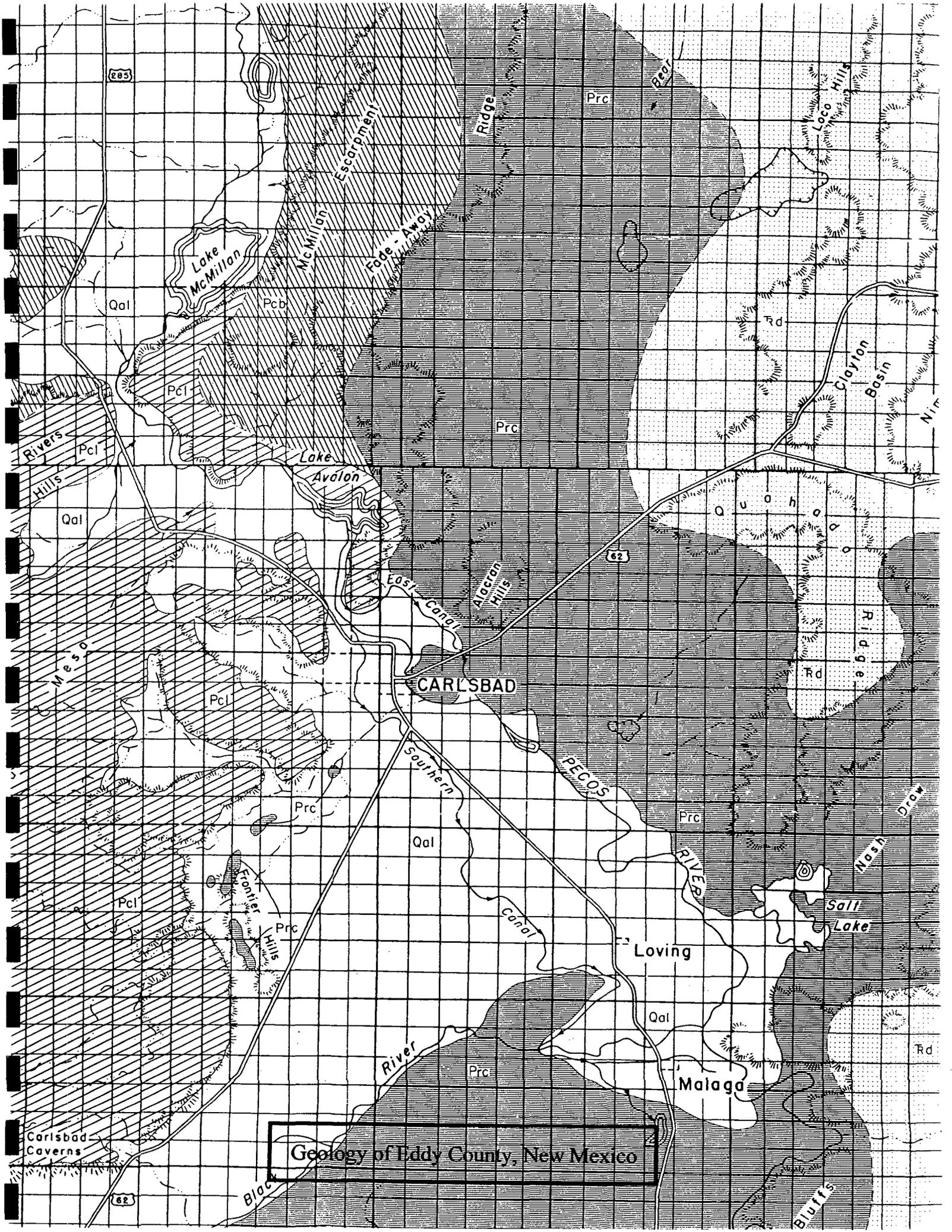


Exhibit 4  
Formation Map

### EXPLANATION



Geology of Eddy County, New Mexico

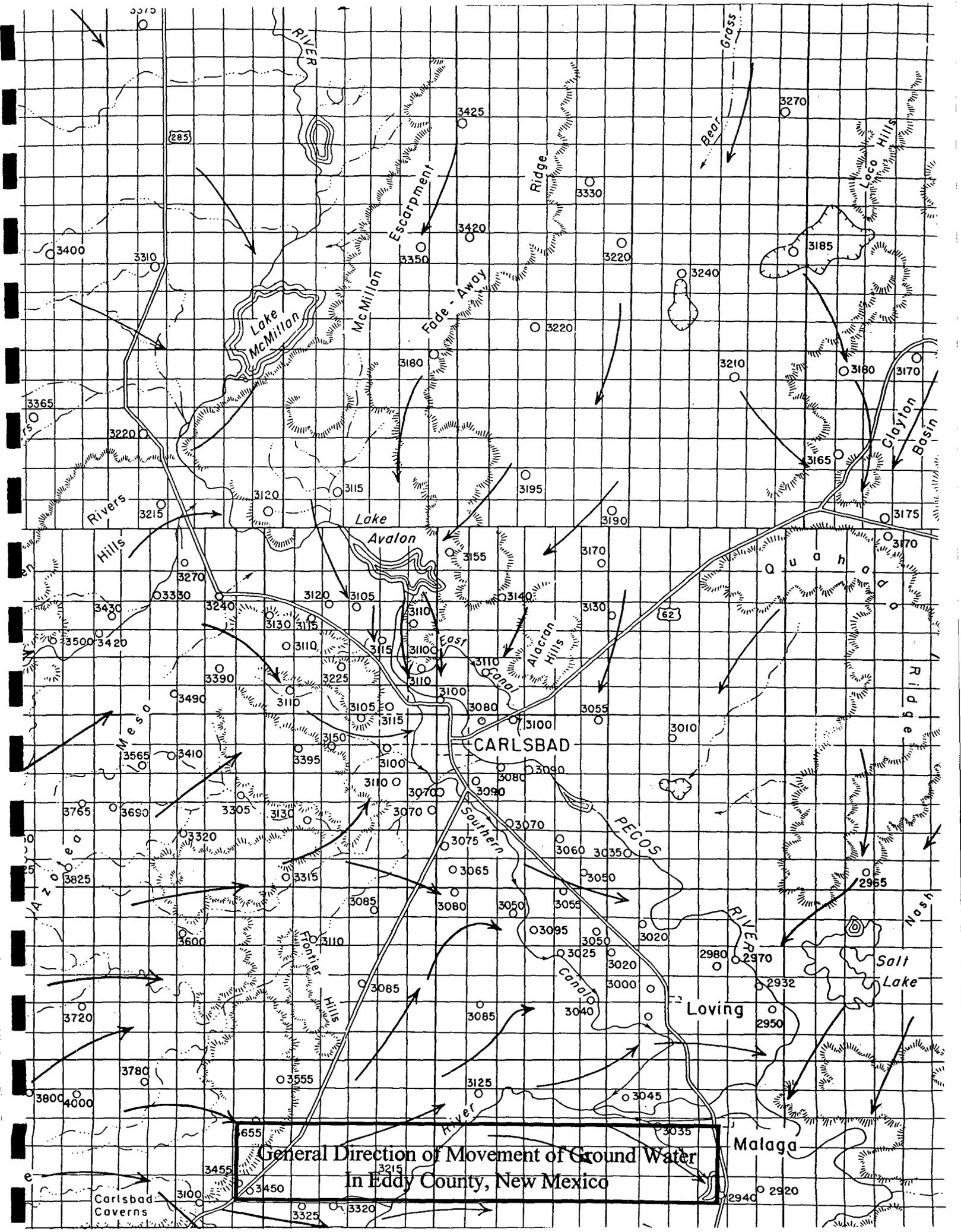


Geology of Eddy County, New Mexico



Exhibit 5

Water Direction Map



General Direction of Movement of Ground Water  
In Eddy County, New Mexico



Exhibit 6  
Log of Borings

Safety & Environmental Solutions, Inc.

Hobbs, New Mexico 88240

LOG OF BORING TB #1

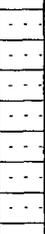
(Page 1 of 1)

Key Energy  
Carlsbad Rowland Yard  
Pit Delineation

Eddy County, NM

Date Completed : 3/10/00  
Drilling Method : C.A.  
Driller : D. Whatley  
Hole Diameter : 4.0 in.  
Sampling Method : Thin Wall Sampling Tube

Company Rep. :  
Boring Location :  
Logged By : B. Aldrich

Depth in Feet	USCS	GRAPHIC	DESCRIPTION	Samples	Lab No.	TPH (mg/Kg)	Benzene (mg/Kg)	Toluene (mg/Kg)	Ethyl Benzene (mg/Kg)	Total Xylenes (mg/Kg)	Chlorides (mg/L)
0			Reddish-Brown Sandy Clay								
3	SC										
6	SS		Brown Sandy Silt w/some Caliche	1	H4710-1	n/a	n/a	n/a	n/a	n/a	120ppm
9	CL		Red Clay	2	H4710-2	n/a	n/a	n/a	n/a	n/a	120ppm
15	CL		Red Clay	3	H4710-3	n/a	n/a	n/a	n/a	n/a	180ppm
21	CL										
27				4	H4710-4	n/a	n/a	n/a	n/a	n/a	210ppm

03-23-2000 C:\MTECH5\ACEGEO\KEY#1.BOR

Safety & Environmental Solutions, Inc.

Hobbs, New Mexico 88240

LOG OF BORING TB #2

(Page 1 of 1)

Key Energy  
Carlsbad Rowland Yard  
Pit Delineation

Eddy County, NM

Date Completed : 3/10/00  
Drilling Method : C.A.  
Driller : D. Whatley  
Hole Diameter : 4.0 in.  
Sampling Method : Thin Wall Sampling Tube

Company Rep. :  
Boring Location :  
Logged By : B. Aldrich

Depth in Feet	USCS	GRAPHIC	DESCRIPTION	Samples	Lab No.	TPH (mg/Kg)	Benzene (mg/Kg)	Toluene (mg/Kg)	Ethyl Benzene (mg/Kg)	Total Xylenes (mg/Kg)	Chlorides (mg/L)
0	SC		Reddish-Brown Sandy Clay w/Caliche								
5	CL		Red Clay	1	H4710-5	n/a	n/a	n/a	n/a	n/a	376ppm
10	CL		Yellow Clay	2	H4710-6	n/a	n/a	n/a	n/a	n/a	737ppm
15	CL		Red Clay	3	H4710-7	n/a	n/a	n/a	n/a	n/a	616ppm
20	CL		Red Clay	4	H4710-8	n/a	n/a	n/a	n/a	n/a	1410ppm
25	CL		Red Clay	5	H4710-9	n/a	n/a	n/a	n/a	n/a	1160ppm
30			White Chalk	6	H4715-1	n/a	n/a	n/a	n/a	n/a	661ppm
35			White Chalk w/Clay	7	H4715-2	n/a	n/a	n/a	n/a	n/a	165ppm
40				8	H4715-3	n/a	n/a	n/a	n/a	n/a	225ppm

03-23-2000 C:\MTECH\BAC\GEO\KEY#2.BOR

Safety & Environmental  
Solutions, Inc.  
Hobbs, New Mexico 88240

LOG OF BORING TB #3

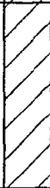
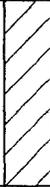
(Page 1 of 1)

Key Energy  
Carlsbad Rowland Yard  
Pit Delineation

Date Completed : 3/14/00  
Drilling Method : C.A.  
Driller : D. Whatley  
Hole Diameter : 4.0 in.  
Sampling Method : Thin Wall Sampling Tube

Company Rep. :  
Boring Location :  
Logged By : B. Aldrich

Eddy County , NM

Depth in Feet	USCS	GRAPHIC	DESCRIPTION	Samples	Lab No.	TPH (mg/Kg)	Benzene (mg/Kg)	Toluene (mg/Kg)	Ethyl Benzene (mg/Kg)	Total Xylenes (mg/Kg)	Chlorides (mg/L)
0	SC		Red Sandy Clay								
5	CL		Red Clay	1	H4717-1	n/a	n/a	n/a	n/a	n/a	2465ppm
10	CL		Red Clay	2	H4717-2	n/a	n/a	n/a	n/a	n/a	1278ppm
15	CL		Red Clay	3	H4717-3	n/a	n/a	n/a	n/a	n/a	451ppm
20	CL		Red/Yellow Clay	4	H4717-4	n/a	n/a	n/a	n/a	n/a	857ppm
25	CL		Red Clay	5	H4717-5	n/a	n/a	n/a	n/a	n/a	436ppm
30	CL		Red/Yellow Clay	6	Field test	n/a	n/a	n/a	n/a	n/a	440ppm
35				7	H4720-1	n/a	n/a	n/a	n/a	n/a	616ppm

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Safety & Environmental Solutions, Inc.

Hobbs, New Mexico 88240

LOG OF BORING TB #4

(Page 1 of 1)

Key Energy  
Carlsbad Rowland Yard  
Pit Delineation  
Eddy County, NM

Date Completed : 3/16/00  
Drilling Method : C.A.  
Driller : D. Whatley  
Hole Diameter : 4.0 in.  
Sampling Method : Thin Wall Sampling Tube

Company Rep. :  
Boring Location :  
Logged By : B. Aldrich

Depth in Feet	USCS	GRAPHIC	DESCRIPTION	Samples	Lab No.	TPH (mg/Kg)	Benzene (mg/Kg)	Toluene (mg/Kg)	Ethyl Benzene (mg/Kg)	Total Xylenes (mg/Kg)	Chlorides (mg/L)
0			White Caliche								
5			White Caliche	1	H4725-1	n/a	n/a	n/a	n/a	n/a	2239ppm
10			White/Pink Caliche	2	H4725-2	n/a	n/a	n/a	n/a	n/a	947ppm
15				3	H4725-3	n/a	n/a	n/a	n/a	n/a	1353ppm

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Safety & Environmental Solutions, Inc.

Hobbs, New Mexico 88240

LOG OF BORING TB #5

(Page 1 of 1)

Key Energy  
Carlsbad Rowland Yard  
Pit Delineation

Eddy County, NM

Date Completed : 3/16/00  
Drilling Method : C.A.  
Driller : D. Whatley  
Hole Diameter : 4.0 in.  
Sampling Method : Thin Wall Sampling Tube

Company Rep. :  
Boring Location :  
Logged By : B. Aldrich

Depth in Feet	USCS	GRAPHIC	DESCRIPTION	Samples	Lab No.	TPH (mg/Kg)	Benzene (mg/Kg)	Toluene (mg/Kg)	Ethyl Benzene (mg/Kg)	Total Xylenes (mg/Kg)	Chlorides (mg/L)
0			White Caliche								
5			Caliche w/ Red Clay	1	H4725-4	n/a	n/a	n/a	n/a	n/a	4321ppm
10	CL		Red Clay	2	H4725-5	n/a	n/a	n/a	n/a	n/a	6313ppm
15	CL		Red/Yellow Clay	3	H4725-6	n/a	n/a	n/a	n/a	n/a	3044ppm
20				4	H4725-7	n/a	n/a	n/a	n/a	n/a	4058ppm



Exhibit 7  
Analytical Results



PHONE (915) 673-7001 • 2111 BEECHWOOD • ABILENE, TX 79603

PHONE (505) 393-2326 • 101 E. MARLAND • HOBBS, NM 88240

ANALYTICAL RESULTS FOR  
 SAFETY & ENVIRONMENTAL SOLUTIONS, INC.  
 ATTN: BOB ALLEN  
 703 E. CLINTON, SUITE #103  
 HOBBS, NM 88240  
 FAX TO:

Receiving Date: 03/06/00  
 Reporting Date: 03/07/00  
 Project Owner: KEY ENERGY  
 Project Name: KEY CARLSBAD  
 Project Location: CARLSBAD, NM

Analysis Date: 03/06/00  
 Sampling Date: 03/06/00  
 Sample Type: SOIL  
 Sample Condition: COOL & INTACT  
 Sample Received By: BC  
 Analyzed By: AH

LAB NUMBER	SAMPLE ID	Cl <sup>-</sup> (mg/Kg)
H4693-1	NORTH WALL 5'	22546
Quality Control		996
True Value QC		1000
% Recovery		100
Relative Percent Difference		0.4

METHOD: Standard Methods      4500-Cl<sup>-</sup>B

NOTE: Analysis performed on a 1:4 w:v aqueous extract.

*Amy Hill*  
 Chemist

03/07/00  
 Date

H4693.XLS

PLEASE NOTE: Liability and Damages. Cardinal's liability and client's exclusive remedy for any claim arising, whether based in contract or tort, shall be limited to the amount paid by client for analyses. All claims, including those for negligence and any other cause whatsoever shall be deemed waived unless made in writing and received by Cardinal within thirty (30) days after completion of the applicable service. In no event shall Cardinal be liable for incidental or consequential damages, including, without limitation, business interruptions, loss of use, or loss of profits incurred by client, its subsidiaries, affiliates or successors arising out of or related to the performance of services hereunder by Cardinal, regardless of whether such claim is based upon any of the above-stated reasons or otherwise.





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ANALYTICAL RESULTS FOR  
 SAFETY & ENVIRONMENTAL SOLUTIONS, INC.  
 ATTN: BOB ALLEN  
 703 E. CLINTON, SUITE #103  
 HOBBS, NM 88240  
 FAX TO: (505) 393-4388

Receiving Date: 03/09/00  
 Reporting Date: 03/09/00  
 Project Number: NOT GIVEN  
 Project Name: KEY-CARLSBAD PIT  
 Project Location: NOT GIVEN

Sampling Date: 03/09/00  
 Sample Type: SOIL  
 Sample Condition: COOL & INTACT  
 Sample Received By: GP  
 Analyzed By: BC/AH

LAB NUMBER	SAMPLE ID	TPH (mg/Kg)	CI* (mg/Kg)
ANALYSIS DATE:		03/09/00	03/09/00
H4706-1	W.WALL 13'	54.5	4320
Quality Control		216	996
True Value QC		240	1000
% Recovery		89.8	99.6
Relative Percent Difference		6.9	0.4

METHODS: TPH-EPA 600/4-79-020 418.1; CI-Std. Methods 4500-CI'B  
 \*Analysis performed on a 1:4 w:v aqueous extract.

*Burges J. Rook*  
 Chemist

*3/9/00*  
 Date

H4706.XLS

PLEASE NOTE: Liability and Damages. Cardinal's liability and client's exclusive remedy for any claim arising, whether based in contract or tort, shall be limited to the amount paid by client for analyses. All claims, including those for negligence and any other cause whatsoever shall be deemed waived unless made in writing and received by Cardinal within thirty (30) days after completion of the applicable service. In no event shall Cardinal be liable for incidental or consequential damages, including, without limitation, business interruptions, loss of use, or loss of profits incurred by client, its subsidiaries, affiliates or successors arising out of or related to the performance of services hereunder by Cardinal, regardless of whether such claim is based upon any of the above-stated reasons or otherwise.





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PHONE (505) 393-2326 • 101 E. MARLAND • HOBBS, NM 88240

ANALYTICAL RESULTS FOR  
 SAFETY & ENVIRONMENTAL SOLUTIONS, INC.  
 ATTN: BOB ALLEN  
 703 E. CLINTON, SUITE #103  
 HOBBS, NM 88240  
 FAX TO: (505) 393-4388

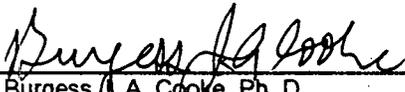
Receiving Date: 03/09/00  
 Reporting Date: 03/10/00  
 Project Owner: KEY ENERGY  
 Project Name: CARLSBAD YARD  
 Project Location: NOT GIVEN

Sampling Date: 03/09/00  
 Sample Type: SOIL  
 Sample Condition: COOL & INTACT  
 Sample Received By: GP  
 Analyzed By: BC/AH

LAB NO.	SAMPLE ID	TPH (mg/Kg)	CI* (mg/Kg)	BENZENE (mg/Kg)	TOLUENE (mg/Kg)	ETHYL BENZENE (mg/Kg)	TOTAL XYLENES (mg/Kg)
ANALYSIS DATE:		03/09/00	03/10/00	03/09/00	03/09/00	03/09/00	03/09/00
H4707-1	#3 BTM. W. BENCH	<10	3190	<0.002	<0.002	<0.002	<0.006
H4707-2	#4 BLACK MATERIAL	<10	6200	<0.002	<0.002	<0.002	<0.006
H4707-3	#5 29' BOTTOM NORTH	<10	5820	<0.002	<0.002	<0.002	<0.006
H4707-4	#6 24' MIDDLE BENCH	<10	6010	<0.002	<0.002	<0.002	<0.006
Quality Control		216	996	0.103	0.101	0.104	0.316
True Value QC		240	1000	0.100	0.100	0.100	0.300
% Recovery		89.8	99.6	103	101	104	105
Relative Percent Difference		6.9	0.4	3.9	5.7	7.0	8.7

METHODS: TRPHC-EPA 600/4-79-020 418.1; CI-Std. Methods 4500-CIB; BTEX-EPA SW-846 8260

\*Analyses performed on 1:4 w:v aqueous extracts.

  
 Burgess A. Cooke, Ph. D.

3/10/00  
 Date

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PHONE (915) 673-7001 • 2111 BEECHWOOD • ABILENE, TX 79603

PHONE (505) 393-2326 • 101 E. MARLAND • HOBBS, NM 88240

ANALYTICAL RESULTS FOR  
SAFETY & ENVIRONMENTAL SOLUTIONS, INC.  
ATTN: BOB ALLEN  
703 E. CLINTON, SUITE #103  
HOBBS, NM 88240  
FAX TO:

Receiving Date: 03/10/00  
Reporting Date: 03/14/00  
Project Owner: KEY ENERGY  
Project Name: KEY-CARLSBAD  
Project Location: NOT GIVEN

Sampling Date: 03/10/00  
Sample Type: SOIL  
Sample Condition: COOL & INTACT  
Sample Received By: BC  
Analyzed By: BC/AH

LAB NUMBER	SAMPLE ID	TPH (mg/Kg)	Cl* (mg/Kg)
ANALYSIS DATE:		03/10/00	03/13/00
H4710-11	A (GREY)	<10	7140
H4710-12	B (TAN)	26.2	3570
H4710-13	C (RED-BROWN)	<10	6200
Quality Control		216	958
True Value QC		240	1000
% Recovery		89.8	95.8
Relative Percent Difference		6.9	4.0

METHODS: TPH-EPA 600/4-79-020 418.1; Cl-Std. Methods 4500-ClB  
\*Analyses carried out on 1:4 w:v aqueous extracts.

Burgess J. Cash  
Chemist

3/14/00  
Date

H4710C.XLS

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ANALYTICAL RESULTS FOR  
 SAFETY & ENVIRONMENTAL SOLUTIONS, INC.  
 ATTN: BOB ALLEN  
 703 E. CLINTON, SUITE #103  
 HOBBS, NM 88240  
 FAX TO:

Receiving Date: 03/13/00  
 Reporting Date: 03/23/00  
 Project Owner: KEY ENERGY  
 Project Name: CARLSBAD YARD  
 Project Location: NOT GIVEN

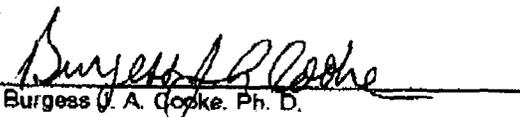
Sampling Date: 03/13/00  
 Sample Type: SOIL  
 Sample Condition: COOL & INTACT  
 Sample Received By: BC  
 Analyzed By: BC/AH

LAB NUMBER	SAMPLE ID	TPH (mg/Kg)	CI* (mg/Kg)	BENZENE (mg/Kg)	TOLUENE (mg/Kg)	ETHYL BENZENE (mg/Kg)	TOTAL XYLENES (mg/Kg)
ANALYSIS DATE:		03/13/00	03/14/00	03/13/00	03/13/00	03/13/00	03/13/00
H4711-1	SE 1/4 BOTTOM	144	1100	<0.002	<0.002	<0.002	<0.006
H4711-2	5 PT. EAST WALL	38.4	2360	<0.002	<0.002	<0.002	<0.006
H4711-3	5 PT. SOUTH WALL	112**	5820	<0.002	<0.002	<0.002	<0.006
H4711-4	5 PT. NORTH WALL	<10	6760	0.003	0.004	<0.002	<0.006
Quality Control		243	958	0.107	0.100	0.102	0.302
True Value QC		240	1000	0.100	0.100	0.100	0.300
% Recovery		101	95.8	107	99.5	102	101
Relative Percent Difference		6.5	4.0	8.7	5.4	6.5	5.7

METHODS: TRPHC-EPA 600/4-79-020 418.1; CI-Std. Methods 4500-CIB; BTEX-EPA SW-846 8260

\*Analyses performed on 1:4 w:v aqueous extracts.

\*\*Reexamined on 03/23/00.

  
 Burgess J. A. Cooke, Ph. D.

3/23/00  
 Date

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 SAFETY & ENVIRONMENTAL SOLUTIONS, INC.  
 ATTN: BOB ALLEN  
 703 E. CLINTON, SUITE #103  
 HOBBS, NM 88240  
 FAX TO:

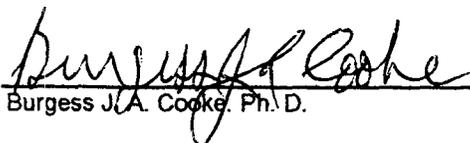
Receiving Date: 03/13/00  
 Reporting Date: 03/14/00  
 Project Owner: KEY ENERGY  
 Project Name: CARLSBAD YARD  
 Project Location: NOT GIVEN

Sampling Date: 03/13/00  
 Sample Type: SOIL  
 Sample Condition: COOL & INTACT  
 Sample Received By: BC  
 Analyzed By: BC/AH

LAB NUMBER	SAMPLE ID	TPH (mg/Kg)	CI* (mg/Kg)	BENZENE (mg/Kg)	TOLUENE (mg/Kg)	ETHYL BENZENE (mg/Kg)	TOTAL XYLENES (mg/Kg)
ANALYSIS DATE:		03/13/00	03/14/00	03/13/00	03/13/00	03/13/00	03/13/00
H4711-1	SE 1/4 BOTTOM	144	1100	<0.002	<0.002	<0.002	<0.006
H4711-2	5 PT. EAST WALL	38.4	2360	<0.002	<0.002	<0.002	<0.006
H4711-3	5 PT. SOUTH WALL	2050	5820	<0.002	<0.002	<0.002	<0.006
H4711-4	5 PT. NORTH WALL	<10	6760	0.003	0.004	<0.002	<0.006
Quality Control		243	958	0.107	0.100	0.102	0.302
True Value QC		240	1000	0.100	0.100	0.100	0.300
% Recovery		101	95.8	107	99.5	102	101
Relative Percent Difference		6.5	4.0	8.7	5.4	6.5	5.7

METHODS: TRPHC-EPA 600/4-79-020 418.1; CI-Std. Methods 4500-CfB; BTEX-EPA SW-846 8260

\*Analyses performed on 1:4 w:v aqueous extracts.

  
 Burgess J.A. Cooke, Ph.D.

3/14/00  
 Date

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ANALYTICAL RESULTS FOR
SAFETY & ENVIRONMENTAL SOLUTIONS, INC.
ATTN: BOB ALLEN
703 E. CLINTON, SUITE #103
HOBBS, NM 88240
FAX TO:

Receiving Date: 03/10/00
Reporting Date: 03/14/00
Project Owner: KEY ENERGY
Project Name: KEY-CARLSBAD
Project Location: NOT GIVEN

Analysis Date: 03/13/00
Sampling Date: 03/10/00
Sample Type: SOIL
Sample Condition: COOL & INTACT
Sample Received By: BC
Analyzed By: AH

Table with 3 columns: LAB NUMBER, SAMPLE ID, and Cl- (mg/Kg). Rows include borehole samples (H4710-1 to H4710-9) and quality control data (Quality Control, True Value QC, % Recovery, Relative Percent Difference).

METHOD: Standard Methods 4500-ClB

NOTE: Analyses carried out on 1:4 w:v aqueous extracts.

Signature of Cheryl H. Foster, Chemist

Date: 03/14/2000

H4710A.XLS

PLEASE NOTE: Liability and Damages. Cardinal's liability and client's exclusive remedy for any claim arising, whether based in contract or tort, shall be limited to the amount paid by client for analyses.



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ANALYTICAL RESULTS FOR  
 SAFETY & ENVIRONMENTAL SOLUTIONS, INC.  
 ATTN: BOB ALLEN  
 703 E. CLINTON, SUITE #103  
 HOBBS, NM 88240  
 FAX TO:

Receiving Date: 03/10/00  
 Reporting Date: 03/14/00  
 Project Owner: KEY ENERGY  
 Project Name: KEY-CARLSBAD  
 Project Location: NOT GIVEN

Sampling Date: 03/10/00  
 Sample Type: SOIL  
 Sample Condition: COOL & INTACT  
 Sample Received By: BC  
 Analyzed By: AH

LAB NUMBER	SAMPLE ID	Na (mg/L)	Ca (mg/L)	Mg (mg/L)	K (mg/L)	Conductivity (u mhos/cm)	T-Alkalinity (mgCaCO <sub>3</sub> /L)
ANALYSIS DATE:		03/14/00	03/14/00	03/14/00	03/14/00	03/13/00	03/13/00
H4710-10	BTM. HOLE PIT COMP.	2635	137.5	18045	1560	14268	144
Quality Control		0.906	4.907	5.022	1.809	1392	NR
True Value QC		1.000	5.000	5.000	2.000	1413	NR
% Recovery		91	98	100	90	98.5	NR
Relative Percent Difference		1.8	1.4	0.7	1.8	0.2	NR

METHODS:	273.1	215.1	242.1	258.1	120.1	310.1
----------	-------	-------	-------	-------	-------	-------

	Cl <sup>-</sup> (mg/Kg)	SO <sub>4</sub> (mg/L)	CO <sub>3</sub> (mg/L)	HCO <sub>3</sub> (mg/L)	pH (s.u.)	
ANALYSIS DATE:	03/13/00	03/13/00	03/13/00	03/13/00	03/13/00	
H4710-10	BTM. HOLE PIT COMP.	2840	51.7	0	177	8.16
Quality Control		958	50.5	NR	971	6.99
True Value QC		1000	50.0	NR	100	7.00
% Recovery		95.8	101	NR	97	100
Relative Percent Difference		4.0	0.2	NR	-	0.4

METHODS:	SM4500-Cl-B	375.4	310.1	310.1	150.1
----------	-------------	-------	-------	-------	-------

NOTE: Anion analyses carried out on a 1:4 w:v aqueous extract.  
 Cation analyses performed by AAS.

Gayle A. Potter, Chemist

03/14/2000  
 Date

**CHAIN-OF-CUSTODY AND ANALYSIS REQUEST**

Page \_\_\_\_\_ of \_\_\_\_\_

**CARDINAL LABORATORIES, INC.**

2111 Beechwood, Abilene, TX 79603 101 East Marland, Hobbs, NM 88240  
 (915) 673-7001 Fax (915) 673-7020 (505) 393-2326 Fax (505) 393-2476

<b>ANALYSIS REQUEST</b>	
Company Name: SAFETY-BELOW SOLUTIONS, I.U. Project Manager: BOB ALLEN Address: 701 G. CALVERTON, SUITE #103 City: HOBBS State: NM Zip: 88240 Phone #: _____ Fax #: _____ Project #: _____ Project Owner: VEY ENERGY Project Name: KEY-CARLSBAD Project Location: _____ Sampler Name: _____	P.O. #: _____ Company: _____ Attn: _____ Address: _____ City: _____ State: _____ Zip: _____ Phone #: _____ Fax #: _____
<b>Lab I.D.</b>	<b>Sample I.D.</b>
N4704 BOREHOLE # 5	N4704 BOREHOLE # 5
-2	10'
-3	15'
-4	27'
-5	BOREHOLE # 2
-6	10'
-7	15'
-8	20'
-9	25'
-10	BTM HOLE AT COMP.
FOR LAB USE ONLY	DATE TIME
(G)RAB OR (C)OMP.	3/10/00
# CONTAINERS	X
MATRIX	X
WASTEWATER	X
GROUNDWATER	X
SOIL	X
CRUDE OIL	X
SLUDGE	X
OTHER:	X
ACID/BASE:	X
ICE / COOL	X
OTHER:	X
PRESERV:	X
SAMPLING	X
TERMS AND CONDITIONS: Interest will be charged on all accounts more than 30 days past due at the rate of 24% per annum from the original date of invoice, and all costs of collections, including attorney's fees.	

**BILL TO**

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Date: _____ Time: _____ Date: _____ Time: _____ Date: _____ Time: _____	Received By: _____ Received By: (Lab Staff) _____ Sample Condition: Cool Intact <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	Phone Result: <input type="checkbox"/> Yes <input type="checkbox"/> No Fax Result: <input type="checkbox"/> Yes <input type="checkbox"/> No Add'l Phone #: _____ Add'l Fax #: _____
Relinquished By: _____ Delivered By: (Circle One) _____ Sampler - UPS - Bus - Other: _____		
REMARKS: _____		

† Cardinal cannot accept verbal changes. Please fax written changes to 505-393-2476.



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PHONE (505) 393-2326 • 101 E. MARLAND • HOBBS, NM 88240

ANALYTICAL RESULTS FOR  
 SAFETY & ENVIRONMENTAL SOLUTIONS, INC.  
 ATTN: BOB ALLEN  
 703 E. CLINTON, SUITE #103  
 HOBBS, NM 88240  
 FAX TO:

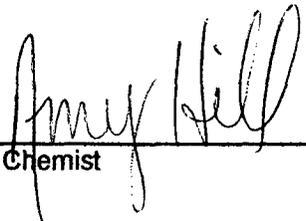
Receiving Date: 03/14/00  
 Reporting Date: 03/15/00  
 Project Owner: KEY ENERGY  
 Project Name: CARLSBAD YARD  
 Project Location: CARLSBAD, NM

Analysis Date: 03/15/00  
 Sampling Date: 03/14/00  
 Sample Type: SOIL  
 Sample Condition: COOL & INTACT  
 Sample Received By: GP  
 Analyzed By: AH

LAB NUMBER	SAMPLE ID	Cl <sup>-</sup> (mg/Kg)
H4715-1	BORE HOLE #2 30'	661
H4715-2	BORE HOLE #2 35'	165
H4715-3	BORE HOLE #2 40'	225
Quality Control		958
True Value QC		1000
% Recovery		95.8
Relative Percent Difference		4.0

METHOD: Standard Methods	4500-Cl <sup>-</sup> B
--------------------------	------------------------

NOTE: Analyses performed on 1:4 w:v aqueous extracts.

  
 \_\_\_\_\_  
 Chemist

3/15/00  
 \_\_\_\_\_  
 Date

H4715.XLS

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ANALYTICAL RESULTS FOR  
SAFETY & ENVIRONMENTAL SOLUTIONS, INC.  
ATTN: BOB ALLEN  
703 E. CLINTON, SUITE #103  
HOBBS, NM 88240  
FAX TO:

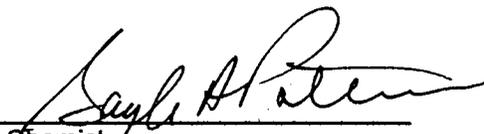
Receiving Date: 03/15/00  
Reporting Date: 03/16/00  
Project Owner: NOT GIVEN  
Project Name: KEY ENERGY  
Project Location: CARLSBAD YARD

Analysis Date: 03/16/00  
Sampling Date: 03/15/00  
Sample Type: SOIL  
Sample Condition: COOL & INTACT  
Sample Received By: AH  
Analyzed By: AH

LAB NUMBER	SAMPLE ID	Cl <sup>-</sup> (mg/Kg)
H4717-1	BORE HOLE #3 5'	2465
H4717-2	BORE HOLE #3 10'	1278
H4717-3	BORE HOLE #3 15'	451
H4717-4	BORE HOLE #3 20'	857
H4717-5	BORE HOLE #3 25'	436
Quality Control		939
True Value QC		1000
% Recovery		93.9
Relative Percent Difference		2.0

METHOD: Standard Methods	4500-Cl <sup>-</sup> B
--------------------------	------------------------

NOTE: Analyses performed on 1:4 w:v aqueous extracts.

  
Chemist

03/16/2000  
Date

H4717.XLS



# CARDINAL LABORATORIES, INC.

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(915) 873-7001 Fax (915) 873-7020 (505) 393-2326 Fax (505) 393-2476

## CHAIN-OF-CUSTODY AND ANALYSIS REQUEST

Company Name: SEST		BILL TO PO #:	
Project Manager: Bob Allen		Company: SAME	
Address: 703 E. CLINTON, #103		Attn:	
City: HOBBS		Address:	
Phone #: (505) 397-0510		City:	
Fax #: (505) 393-4388		State:	
Project #:		Zip:	
Project Name: Key Energy		Phone #:	
Project Location: CARLSBAD YARD		Fax #:	
FOR LAB USE ONLY		PRES. SAMPLING	
LAB I.D.	Sample I.D.	OTHER:	DATE
H4717-1	Borehole #3.5	ICE/COOL	3/13
-2	" "	ACID	" "
-3	" "	OTHER:	" "
-4	" "	SLUDGE	" "
-5	" "	OF	" "
		SOL	
		WASTEWATER	
		GROUNDWATER	
		# CONTAINERS	
		(G)RAB OR (COMP.	
		MATRIX	
		ANALYSIS REQUEST	

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Terms and Conditions: Interest will be charged on all accounts more than 30 days past due at the rate of 2% per annum from the original date of invoice, and all costs of collections, including attorney's fees.

Sampler Relinquished: *DAF Boy* Date: 3/13/00 Received By: *Amie Hill*

Time: 1:30

Date: 3/15/00

Time: 1:30

Received By: (Lab Staff)

Checked By: (Initials)

Delivered By: (Circle One)

Sampler:  GPS  Bus  Other:

Phone Result:  Yes  No

Fax Result:  Yes  No

Additional Fax #:  Yes  No

REMARKS: 5- Chlorides in Soil @ 22 = 110  
No Tax

† Cardinal cannot accept verbal changes. Please fax written changes to 915-873-7020.



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PHONE (505) 393-2326 • 101 E. MARLAND • HOBBS, NM 88240

ANALYTICAL RESULTS FOR  
SAFETY & ENVIRONMENTAL SOLUTIONS, INC.  
ATTN: BOB ALLEN  
703 E. CLINTON, SUITE #103  
HOBBS, NM 88240  
FAX TO:

Receiving Date: 03/15/00  
Reporting Date: 03/16/00  
Project Owner: NOT GIVEN  
Project Name: KEY ENERGY YARD  
Project Location: CARLSBAD YARD

Analysis Date: 03/16/00  
Sampling Date: 03/15/00  
Sample Type: SOIL  
Sample Condition: COOL & INTACT  
Sample Received By: BC  
Analyzed By: AH

LAB NUMBER	SAMPLE ID	Cl <sup>-</sup> (mg/Kg)
H4720-1	BORE HOLE #3 35'	616
Quality Control		939
True Value QC		1000
% Recovery		93.9
Relative Percent Difference		2.0

METHOD: Standard Methods      4500-Cl<sup>-</sup>B

NOTE: Analyses performed on 1:4 w:v aqueous extracts.

Chemist

03/16/2000  
Date

H4720.XLS





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LABORATORIES**

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PHONE (505) 393-2326 • 101 E. MARLAND • HOBBS, NM 88240

ANALYTICAL RESULTS FOR  
SAFETY & ENVIRONMENTAL SOLUTIONS, INC.  
ATTN: BOB ALLEN  
703 E. CLINTON, SUITE #103  
HOBBS, NM 88240  
FAX TO: (505) 393-4388

Receiving Date: 03/16 & 3/17/00  
Reporting Date: 03/17/00  
Project Owner: NOT GIVEN  
Project Name: KEY ENERGY  
Project Location: CARLSBAD

Analysis Date: 03/17/00  
Sampling Date: 03/16/00  
Sample Type: SOIL  
Sample Condition: COOL & INTACT  
Sample Received By: GP  
Analyzed By: GP/AH

LAB NUMBER	SAMPLE ID	Cl <sup>-</sup> (mg/Kg)
H4725-1	BORE HOLE #4, 5 FT	2239
H4725-2	BORE HOLE #4, 10 FT	947
H4725-3	BORE HOLE #4, 15 FT	1353
H4725-4	BORE HOLE #5, 5 FT	4321
H4725-5	BORE HOLE #5, 10 FT	6313
H4725-6	BORE HOLE #5, 15 FT	3044
H4725-7	BORE HOLE #5, 20 FT	4058
Quality Control		939
True Value QC		1000
% Recovery		93.9
Relative Percent Difference		2.0

METHOD: Standard Methods	4500-Cl <sup>-</sup> B
--------------------------	------------------------

NOTE: Analyses performed on 1:4 w:v aqueous extracts.

  
Chemist

03/17/2000  
Date

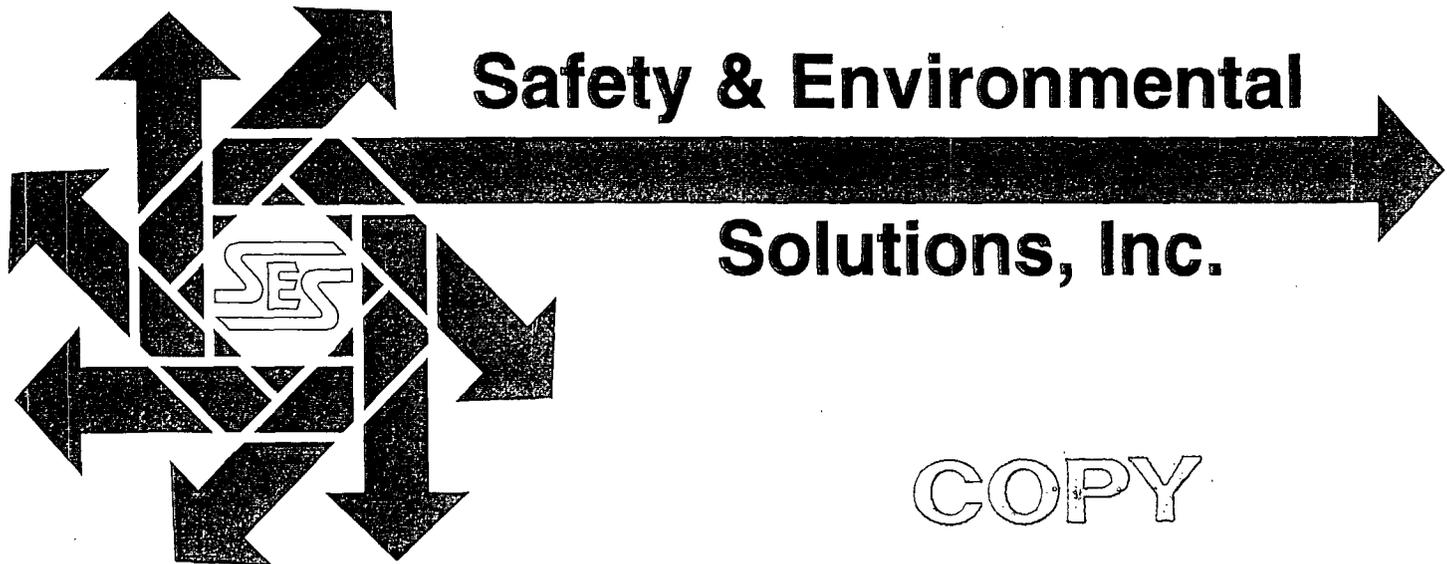
H4725B.XLS





Exhibit 8

Site Assessment



**Safety & Environmental**

**Solutions, Inc.**

COPY

**Site Assessment**

**Carlsbad Clean Out Pit  
Rowland Trucking Company, Inc.**

**Section 34 Township 21 S Range 27 E  
Eddy County, New Mexico**

*Safety & Environmental Solutions, Inc.  
703 E. Clinton Suite 103  
Hobbs, New Mexico 88240  
(505) 397-0510*

## TABLE OF CONTENTS

<b>Background</b> .....	2
<b>Work Performed</b> .....	2
<b>Vertical and Horizontal Extent of Contamination</b> .....	3
<b>Figures</b> .....	6

## I. Background

Safety & Environmental Solutions, Inc. (SES) was engaged on August 27, 1998 by Rowland Trucking Co., Inc. to perform a site assessment of an abandoned clean out pit which is to be closed pursuant to the New Mexico Oil Conservation Division discharge plan. The subject area is located in Section 34, Township 21 S Range 27 E in Eddy County, New Mexico. (Figure 1) The abandoned clean out pit is situated in the lower yard level near the east side of the property. (Figure 2)

## II. Work Performed

SES contracted Atkins Engineering & Associates from Roswell, New Mexico to perform drilling services for this project. Cardinal Laboratories of Hobbs, New Mexico was also contracted to perform the laboratory analytical testing required for this project. Atkins Engineering used an hollow stem auger rig for the drilling and a hand auger and split spoon for sampling. Six (6) test holes were drilled throughout the subject site to depths that represent the vertical extent of contamination or the top of the red bed clay found above the water table in the area. The regulatory limits found in "**Unlined Surface Impoundment Closure Guidelines**" *New Mexico Oil Conservation Division* - February 1993 address Total Petroleum Hydrocarbons (TPH), Benzene, Ethyl Benzene, Toluene and Total Xylenes (BTEX). The vertical extent of contamination was found when Total Petroleum Hydrocarbon levels of 100 ppm were encountered.

On August 27, 1998, SES sampled the test holes at various intervals and performed field analytical tests to determine the extent of contamination of each sample. The field analytical tests performed were Total Petroleum Hydrocarbons (TPH) (EPA Method 418.1) using a Buck Total Petroleum Hydrocarbon Analyzer Model 404 Serial # 403, and Benzene, Toluene, Ethylbenzene, and Xylene (BTEX) using headspace analysis with a Photovac Microtip MP 100 Photoionization Detector (PID) Serial # NA89005 calibrated with 100 ppm Isobutylene. Soil sampling was performed on soils from each test hole using SOPs found in **Environmental Protection Agency, 1984, Characterization of Hazardous Waste Site - A Methods Manual: Vol II**. The bottom hole samples were preserved on ice and delivered along with Chain of Custody to Cardinal Laboratories for testing. The samples were analyzed for Total Petroleum Hydrocarbons (EPA Method 600/4-79-020, 418.1) and BTEX (EPA Method SW-846-8260) and Chlorides (EPA Method 600/4-79-020 325.3). (Appendix A)

The test holes were plugged with bentonite and back filled with cuttings to the surface. (Appendix B)

### III. Vertical and Horizontal Extent Investigation

A summary of each test hole is presented in the following tables:

#### Test Hole # 1

The first test hole was drilled on August 27, 1998 from 7:45 A.M. to 9:20 A.M. the east side of the ditch. The hole was drilled to a depth of 25' and sampled at 5', 10' and 25' and found to be virtually free of contaminants at that depth with the exception of the elevated chloride level.

ID/Depth	Lithology	TPH	BTEX	Chlorides
1 5'	Silty Sand	267	N/D	
2 10'	Sand	67	N/D	
3 25'	Sand/Clay	60	N/D	
25' (Lab)		233	<0.002-<0.006	2086

#### Test Hole # 2

The second test hole was drilled on August 27, 1998 from 9:25 A.M. to 10:30 A.M. on the east side of the ditch. The hole was drilled to a depth of 25' and sampled at 10' and 25' and found to be virtually free of contaminants at that depth. No laboratory analysis was run on the bottom hole sample.

ID/Depth	Lithology	TPH	BTEX	Chlorides
1 10'	Sand	67	N/D	
2 25'	Clay	67	N/D	
No Lab				

**Test Hole # 3**

The third test hole was drilled on August 27, 1998 from 10:35 A.M. to 11:35 A.M. on the south side of the pit. The hole was drilled to a depth of 25' and sampled at 5', 10' and 25' and found to be virtually free of TPH and BTEX however, elevated chloride levels were encountered.

ID/Depth	Lithology	TPH	BTEX	Chlorides
1	Silty Sandy	12552	1120	
5'	Clay			
2	Silty Clayey	413	N/D	
10'	Sand			
3	Clay	N/D	N/D	
25'				
25' (Lab)		180	<0.002-<0.006	3549

**Test Hole # 4**

The fourth test hole was drilled on August 27, 1998 from 12:05 P.M. to 2:45 P.M. on the west side of the ditch. The hole was drilled to a depth of 35' and sampled at 10', 20', 25' and 35' and found to be virtually free of TPH and BTEX with elevated levels of chlorides.

ID/Depth	Lithology	TPH	BTEX	Chlorides
1	Silty Clay	3172.6	N/D	
10'				
2	Sandy Clay	N/D	N/D	
20'				
3	Sandy Clay	N/D	N/D	
25'				
4	Clay	N/D	N/D	
35'				
35' (Lab)		159	<0.002-<0.006	4235

**Test Hole #5**

The fifth test hole was drilled on August 27, 1998 from 2:55 P.M. to 4:05 P.M. on the east side of the pit. The hole was drilled to a depth of 25' and sampled at 20' and 25'. The field tests found no contaminants, however, the laboratory results indicated low levels of TPH and BTEX (slightly elevated Xylene) and a higher level of chlorides.

ID/Depth	Lithology	TPH	BTEX	Chlorides
1 20'	Clay	N/D	N/D	
2 25'	Clay	N/D	N/D	
25' (Lab)		244	<0.002-0.016	3567

**Test Hole # 6**

The sixth test hole was drilled on August 27, 1998 from 4:20 P.M. to 5:30 A.M. on the north side of the pit. The hole was drilled to a depth of 25' and sampled at 10', 20' and 25' and field tests were unable to detect any contaminants at that depth. Laboratory results indicate low TPH and BTEX and high chloride levels.

ID/Depth	Lithology	TPH	BTEX	Chlorides
1 10'	Silty Clay	N/D	N/D	
2 20'	Sand	N/D	N/D	
3 25'	Clay	N/D	N/D	
25' (Lab)		222	<0.002-<0.006	7579

**IV. Summary**

This site assessment has revealed the vertical extent of TPH, BTEX, and Chloride contamination extends to the top of the red clay layer encountered at depths of 21' to 26'. (See Figure 3) The red clay layer was encountered in each borehole under the pit site. It is anticipated that the layer extends the full length and breadth of the pit area. (See Figure 4) Bore hole #2 proved the red clay layer to be in excess of 4' in thickness. It would appear the red clay layer has formed a natural barrier to protect the groundwater from contamination from the pit or other sources above the layer due to the high concentrations of chlorides on top of the clay layer. The high Chlorides levels seen in the bottom hole samples are indicative of the type of contamination one could expect from an old clean out pit.

**V. Figures and Appendices**

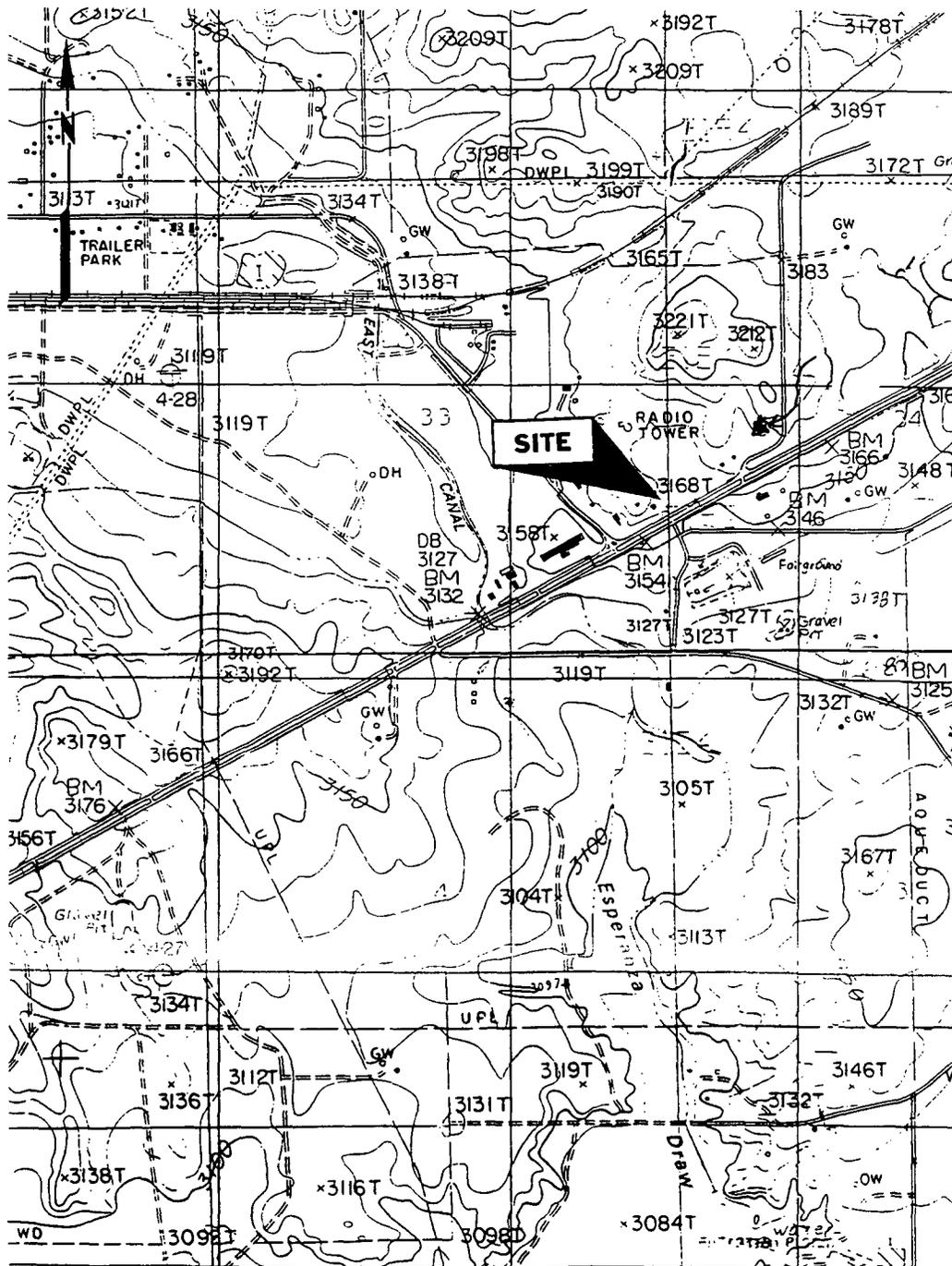
**Figures:**

- Figure 1 - Vicinity Map
- Figure 2 - Site Plan
- Figure 3 - Test Results
- Figure 4 - Red Clay Layer Position

**Appendices:**

- Appendix A - Analytical Results
- Appendix B - Logs of Boring

Figure 1  
Vicinity Map



*Rowland Trucking  
Company, Inc.*

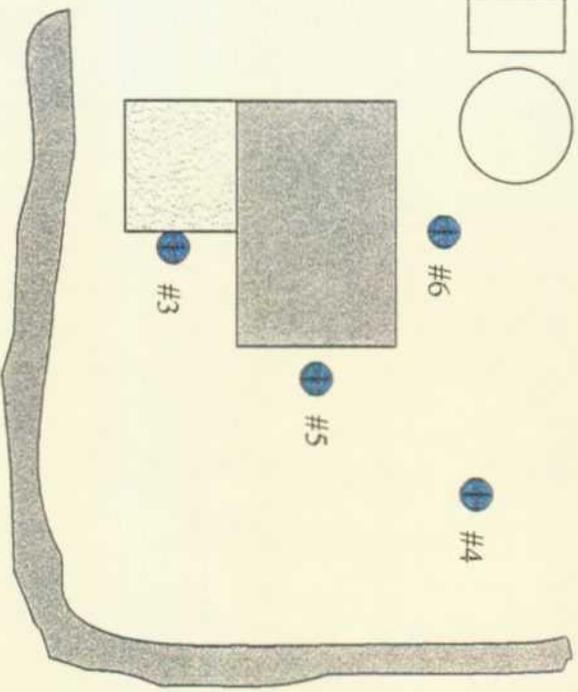
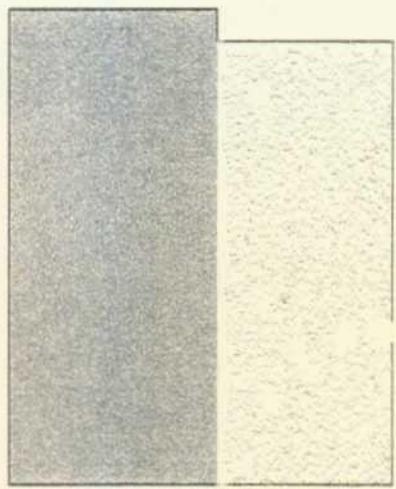
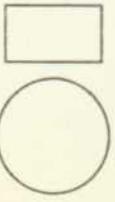
**Carlsbad Clean Out Pit  
Vicinity Map**

*Safety & Environmental  
Solutions, Inc.  
Hobbs, NM*

Figure 2  
Site Plan

Pit	
Concrete Tank	
Ditch	
Here Hole	

Building

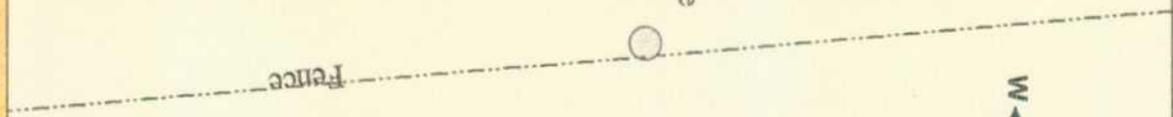


- #6
- #5
- #4
- #3
- #2
- #1

Telephone Pole

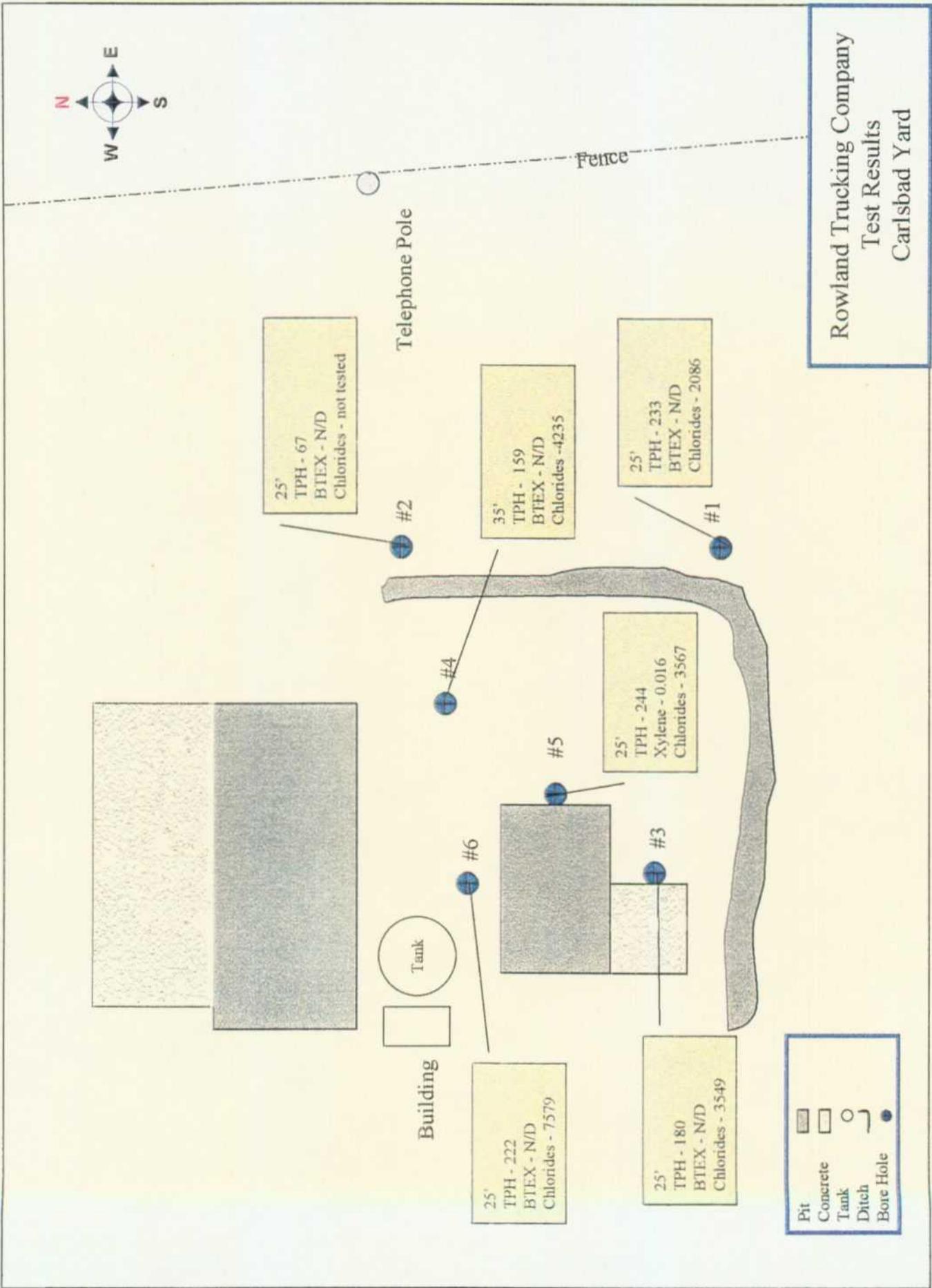


Fence



Rowland Trucking Company  
Site Plan  
Carlsbad Yard

Figure 3  
Test Results



Rowland Trucking Company  
Test Results  
Carlsbad Yard

Figure 4  
Red Clay Layer Position



27' Brown Clay  
30' Gray Clay  
34' Red Clay

Telephone Pole

21' to 26' Red Clay

Building

25' Red Clay

Confirmed Position  
of Red Clay Layer

Anticipated  
Extended  
Position of Red  
Clay Layer

23' Red Clay

23' Red Clay

23' Red Sand

- Pit
- Concrete
- Tank
- Ditch
- Bore Hole

Rowland Trucking Company  
Red Clay Formation  
Carlsbad Yard

Fence

## Appendix A

# Analytical Results



PHONE (915) 673-7001 • 2111 BEECHWOOD • ABILENE, TX 79603

PHONE (505) 393-2326 • 101 E. MARLAND • HOBBS, NM 88240

ANALYTICAL RESULTS FOR  
 SAFETY & ENVIRONMENTAL SOLUTIONS, INC.  
 ATTN: DEE WHATLEY  
 703 E. CLINTON SUITE 103  
 HOBBS, NM 88240  
 FAX TO: (505) 393-4388

Receiving Date: 08/28/98  
 Reporting Date: 09/01/98  
 Project Number: R-1  
 Project Name: ROWLAND TRUCKING CARLSBAD PIT  
 Project Location: ROWLAND CARLSBAD YARD

Sampling Date: 08/27/98  
 Sample Type: SOIL  
 Sample Condition: COOL & INTACT  
 Sample Received By: GP  
 Analyzed By: BC/AH

LAB NUMBER	SAMPLE ID	TPH (mg/Kg)	CI (mg/Kg)	BENZENE (mg/Kg)	TOLUENE (mg/Kg)	ETHYL BENZENE (mg/Kg)	TOTAL XYLENES (mg/Kg)
ANALYSIS DATE:		08/28/98	08/28/98	08/28/98	08/28/98	08/28/98	08/28/98
H3823-1	BORE HOLE #1 25'	233	2086	<0.002	<0.002	<0.002	<0.006
H3823-2	BORE HOLE #3 25'	180	3549	<0.002	<0.002	<0.002	<0.006
H3823-3	BORE HOLE #4 30'	159	4235	<0.002	<0.002	<0.002	<0.006
H3823-4	BORE HOLE #4 35'	244	3567	0.016	<0.002	<0.002	<0.006
H3823-5	BORE HOLE #6 25'	222	7579	<0.002	<0.002	<0.002	<0.006
Quality Control		240	1209	0.105	0.100	0.101	0.304
True Value QC		234	1319	0.100	0.100	0.100	0.300
% Recovery		102	91.7	105	100	101	103
Relative Percent Difference		3.0	4.4	1.1	1.7	3.1	4.0

METHODS: TRPHC-EPA 600/4-79-020, 418.1; CI-EPA 600/4-79-020 325.3 BTEX-EPA SW-846-8260

*Burgess J. A. Cooke*  
 Burgess J. A. Cooke, Ph. D.

*9/1/98*  
 Date

H3823-1.XLS

PLEASE NOTE: Liability and Damages. Cardinal's liability and client's exclusive remedy for any claim arising, whether based in contract or tort, shall be limited to the amount paid by client for analyses, including those for negligence and any other cause whatsoever shall be deemed waived unless made in writing and received by Cardinal within thirty (30) days after completion of the applicable service. In no event shall Cardinal be liable for incidental or consequential damages, including, without limitation, business interruptions, loss of use, or loss of profits incurred by client, its subsidiaries, affiliates or successors arising out of or related to the performance of services hereunder by Cardinal, regardless of whether such claim is based upon any of the above-stated reasons or otherwise.



Appendix B  
Log of Borings

Atkins Engineering Associates, Inc.  
P.O. Box 3156  
Roswell, New Mexico 88202

# LOG OF BORING Rowland TH #1

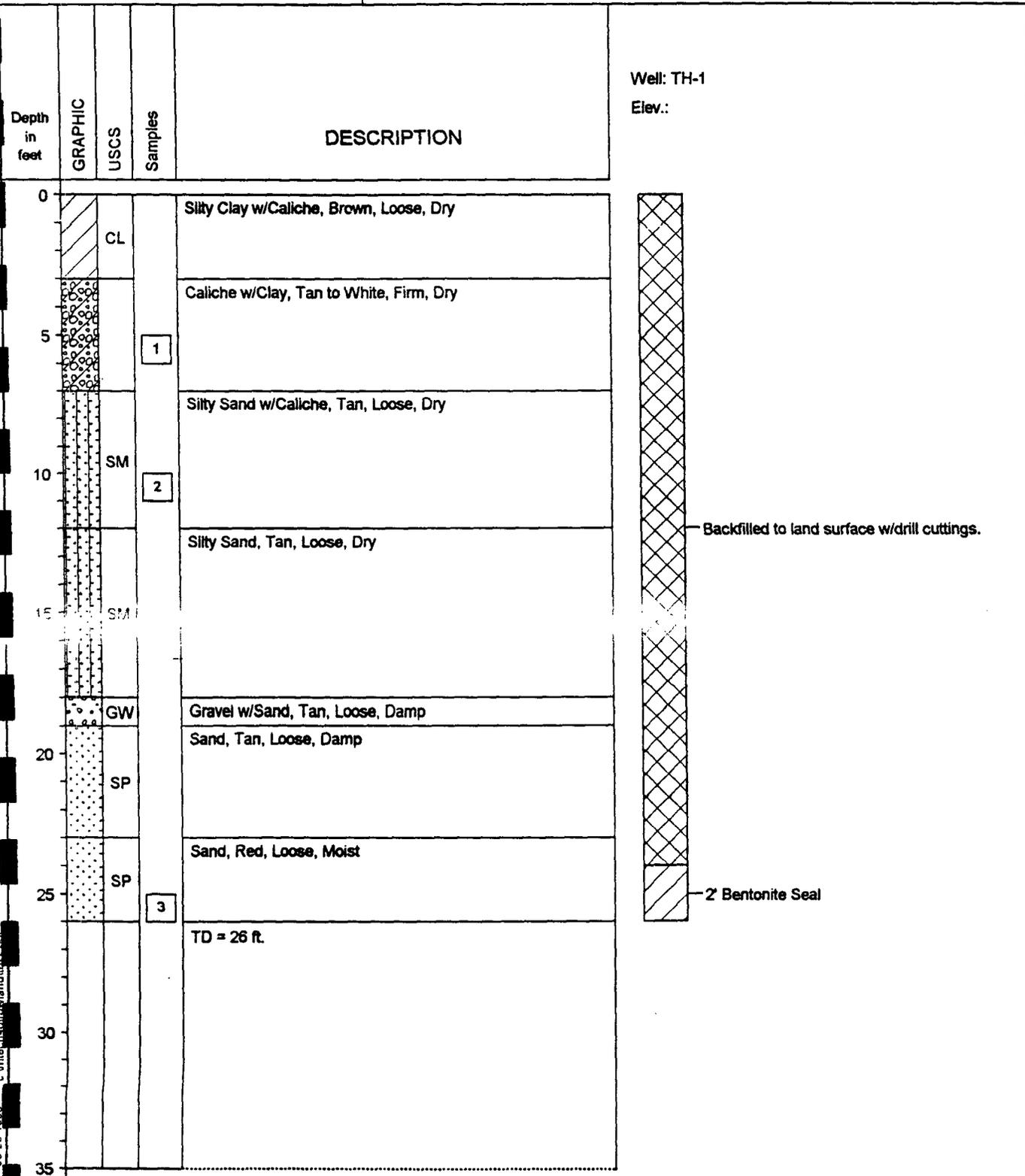
(Page 1 of 1)

Rowland Trucking Co., Inc.  
P.O. Box 99  
Eunice, NM 88231

Date : 8-27-98  
Drill Start : 7:45 A.M.  
Drill End : 9:20 A.M.  
Boring Location : S.E. Corner, outside of pit.

Site Location : E. Carlsbad Hobbs Hwy.  
Auger Type : Hollow Stem  
Logged By : Mort Bates

Contact: Bob Patterson  
Job #: 98298.00



c:\intech\blow\annual\blow

Atkins Engineering Associates, Inc.  
P.O. Box 3156

Roswell, New Mexico 88202

Rowland Trucking Co., Inc.

P.O. Box 99

Eunice, NM 88231

Contact: Bob Patterson

Job #: 98298.00

# LOG OF BORING Rowland TH #2

(Page 1 of 1)

Date : 8-27-98  
Drill Start : 9:25 A.M.  
Drill End : 10:30 A.M.  
Boring Location : N.E. Corner, outside of pit.

Site Location : E. Carlsbad Hobbs Hwy.  
Auger Type : Hollow Stem  
Logged By : Mort Bates

Depth in feet	GRAPHIC	USCS	Samples	DESCRIPTION
0		CL		Silty Clay w/Caliche, Tan, Loose, Dry
0-5		SM		Silty Sand, Tan, Loose, Damp
5-6				Caliche, Tan, Firm, Dry
6-8				Sand, Red, Loose, Damp
8-10		SP	1	Clayey Sand, Red, Firm, Damp
10-12		SC		Sand, Tan, Loose, Damp
12-15		SP		Sandy w/ clay, red, loose, damp
15-20		CL		Silty Sandy Clay, Red, Loose, Moist
20-25		CL		Clay, Red, Stiff, Moist
25-26		CL	2	
26				TD = 26 ft.
30				
35				

Well: TH-2

Elev.:



Backfilled to land surface w/drill cuttings.

2' Bentonite Seal

UC-31-1000

Atkins Engineering Associates, Inc.  
 P.O. Box 3156  
 Roswell, New Mexico 88202

# LOG OF BORING Rowland TH #3

(Page 1 of 1)

Rowland Trucking Co., Inc.  
 P.O. Box 99  
 Eunice, NM 88231

Date : 8-27-98  
 Drill Start : 10:35 A.M.  
 Drill End : 11:35 A.M.  
 Boring Location : Southside of pit, Midway.

Site Location : E. Carlsbad Hobbs Hwy.  
 Auger Type : Hollow Stem  
 Logged By : Mort Bates

Contact: Bob Patterson  
 Job #: 98298.00

Depth in feet	GRAPHIC	USCS	Samples	DESCRIPTION
0		GC		Gravel w/Clay Fill, Tan, Loose, Damp
		CL		Silty Sandy Clay, Tan, Loose, Damp
		CL		Silty Sandy Clay, Black, Loose, Damp
5		SC	1	Silty Clayey Sand, Gray, Loose, Damp
10		CL		Clay w/Caliche, Tan, Stiff, Damp
15		GC		Gravel w/Silty Clay, Tan, Stiff, Damp
20		CL		Silty Clay, Tan, Stiff, Damp
25		CL	3	Clay, Red, Stiff, Moist
26				TD = 26 ft.

Well: TH-3  
 Elev.:



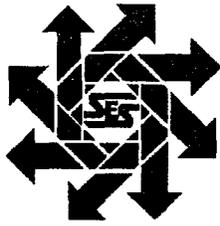
Backfilled to land surface w/drill cuttings.

2 Bentonite Seal

US 26-1000  
 C:\mtech\atkins\rowland\th\_3 bor



Exhibit 9  
Amended Work Plan



P.O. Box 1613  
703 E. Clinton Suite 103  
Hobbs, New Mexico 88240  
505/397-0510  
fax 505/393-4388

## **Safety & Environmental Solutions, Inc.**

February 2, 1999

Mr. Wayne Price  
New Mexico Oil Conservation Division  
2040 S. Pacheco Street  
Santa Fe, New Mexico 87505

RE: Rowland Trucking Co., Inc. Carlsbad Clean Out Pit

Dear Wayne:

Enclosed please find an Amended Work Plan for the closure of the pit. We feel that this amended plan will protect the public as well as the environment and is cost effective for Rowland Trucking. Please review this proposal at your convenience and contact me should you have questions or require further information.

Thank you for your attention in this matter.

Sincerely,

Bob Allen REM, CET, CES  
President

BA/baa

# **Amended Work Plan Carlsbad Clean Out Pit Rowland Trucking Co., Inc.**

## **Purpose**

The purpose of this Work Plan is to cause the closure of the abandoned clean out pit located at the Rowland Trucking Company yard in Carlsbad, New Mexico in a manner that will protect the population, environment and groundwater of the area surrounding the location.

## **Background**

On August 27, 1998, Rowland Trucking Company secured the services of Safety and Environmental Solutions, Inc. to complete all necessary sampling and testing to determine the horizontal and vertical extent of contamination in the area of the old clean out pit in the yard located in Carlsbad, New Mexico.

Six (6) boreholes were drilled at various locations in the pit area. The analytical results have been previously reported to the New Mexico Oil Conservation Division in the report dated September 1, 1998, *Site Assessment, Carlsbad Clean Out Pit, Rowland Trucking Company, Inc.* The results revealed a four (4) foot layer of "red bed clay" located at a depth of approximately 21' to 26' completely underlying the subject pit area. In addition, the results indicated the vertical extent of the contamination to be between 6' and 10' above the clay layer.

Knowledge of process indicates that the material in the pit is exempt oil field waste.

## **Method**

Rowland Trucking Company proposes to determine the vertical and horizontal extent of contamination in the pit area, excavate said contaminated soils and transport to a New Mexico Oil Conservation Division approved site, such as Controlled Recovery Inc. (CRI) or Sundance Services (Parabo).

After the excavation of the contaminated material, the sides and bottom of the excavated area will be tested to verify that the TPH, BTEX and Chlorides levels are below the NMOCD guidelines, i.e., 100 ppm for TPH, 50 ppm for BTEX and 250 ppm for Chlorides.

The excavated area will be backfilled with clean soils, with additional testing performed to verify that the TPH, BTEX and Chloride levels are below the NMOCD guidelines. The appropriate pit closure forms will be filed with the NMOCD.

## Groundwater

The results of the vertical extent investigation indicate that the contamination did not reach the confining layer of clay and no groundwater was encountered above the clay layer. Therefore, we do not propose any further groundwater investigation.



Exhibit 10

OCD Approval Letter



**NEW MEXICO ENERGY, MINERALS  
& NATURAL RESOURCES DEPARTMENT**

OIL CONSERVATION DIVISION  
2040 South Pacheco Street  
Santa Fe, New Mexico  
(505) 827-7131

**Certified Mail P 288 259 097**  
**Return Receipt Requested:**

February 17, 1999

Mr. Bob Patterson  
Rowland Trucking Co., Inc. (RTCI)  
P.O. Box 99  
Eunice, New Mexico 88231

Re: Pit Closure Sec 34-Ts21s-R27e  
Carlsbad Facility GW-278  
Eddy Co, NM

Dear Mr. Patterson:

New Mexico Oil Conservation Division (NMOCD) is in receipt of the Amended Work Plan submitted by Safety & Environmental Solutions, Inc. Dated February 2, 1999 for the above referenced project.

The plan is hereby approved subject to the following additional conditions:

1. RTCI shall notify the OCD Artesia District II office 48 hours in advance of collecting bottom hole samples so as OCD may witness or split samples.
2. RTCI shall submit a detail closure report by April 2, 1999.

Please be advised that NMOCD approval of this plan does not relieve RTCI of liability should their operations fail to adequately investigate and remediate contamination that pose a threat to ground water, surface water, human health or the environment. In addition, NMOCD approval does not relieve RTCI of responsibility for compliance with any other federal, state, or local laws and/or regulations.

If you require any further information or assistance please do not hesitate to write or call me at (505) 827-7155).

Sincerely Yours,

Wayne Price-Environmental Bureau

cc: OCD Artesia

Exhibit 11

Selected Photos

**Selected Photos**

## SELECTED PHOTOS

- |         |  |
|---------|--|
| Photo 1 | Final Excavation North Wall                  |
| Photo 2 | Final Excavation South Wall                  |
| Photo 3 | Final Excavation East Wall                   |
| Photo 4 | Final Excavation West Wall                   |
| Photo 5 | Final Excavation Down Ramp Looking Southwest |
| Photo 6 | Final Excavation From South                  |



Photo 1 - Final Excavation North Wall



Photo 2 - Final Excavation South Wall



Photo 3 - Final Excavation East Wall



Photo 4 - Final Excavation West Wall



Photo 5 - Final Excavation Down Ramp Looking Southwest



Photo 6 - Final Excavation From South

