

RECEIVED

September 1, 2004

SEP 0 7 2004

OIL CONSERVATION DIVISION

Mr. Wayne Price NM Oil Conservation District P.O. Box 6429 Santa Fe, New Mexico 87505

Re: Key's Saltwater Facility in Hobbs, Lea County, New Mexico and Key's Truck Wash Pad and Sump in Eunice, Lea County, New Mexico

Dear Mr. Price:

Enclosed for your files you will find two reports from Brown and Caldwell dated August 26, 2004 and August 27, 2004 on the above two referenced sites.

If you have any questions, please let me know.

Sincerely,

DIV Sh

Daniel K. Gibson, P.G. Environmental Manager

Enclosures

1415 Louisiana Suite 2500 Houston, Texas 77002

Tel: (713) 759-0999 Fax: (713) 308-3886

www.brownandcaldwell.com

August 26, 2004

Mr. Daniel K. Gibson Key Energy Services, Inc. 6 Desta Drive, Suite 4400 Midland, Texas 79705

Subject:

BROWN AND

CALDWELL

ject: Documentation of Monitoring Well Installation and Sampling Key Energy Services, Inc. Truck Wash Pad and Sump Eunice, Lea County, New Mexico

Dear Mr. Gibson:

Brown and Caldwell completed the installation and sampling of one permanent groundwater monitoring well at the Key Energy Services, Inc. (Key) truck wash pad and sump facility in Eunice, New Mexico on June 9-11, 2004. Key currently operates the truck wash facility at 2105 Avenue O (New Mexico Highway 176) in Eunice, New Mexico (Figure 1). Soil assessment activities were previously performed by ARCADIS G&M, Inc. (ARCADIS) on November 19, 2002 to determine potential soil impact associated with the Key truck wash pad and sump. Findings from the November 19, 2002 field investigation indicated elevated concentrations of chlorides in soil surrounding the cement truck wash pad, detected in the range between 1,060 and 4,520 milligrams per kilogram (mg/kg). Benzene, toluene, ethylbenzene or xylene (BTEX) were not detected above the respective detection limits in samples collected by ARCADIS; consequently, further sampling of soils for BTEX was not performed. Metals concentrations from the investigation conducted by ARCADIS were screened against the New Mexico Environment Department (NMED) Soil Screening Levels (SSLs), February 2004, Revision 2. No metals concentrations were found to exceed the Industrial/Occupational SSLs; consequently, further sampling of soils for metals was not performed. The groundwater assessment was performed to establish groundwater quality and determine if chlorides in soil had potentially caused impact to groundwater in the vicinity of the apparent downgradient, southeast corner of the truck wash pad. Field activities for the June 2004 investigation included monitoring well installation, groundwater sampling, and laboratory analytical results and are discussed in the following paragraphs.

Field Activities

One monitoring well (MW-1) was installed at the southeast corner of the truck wash pad where elevated levels of chlorides in soils were detected during the November 19, 2002 investigation conducted by ARCADIS. One groundwater sample and one duplicate groundwater sample were collected from monitoring well MW-1 for laboratory analysis. Prior to drilling activities, utility clearance was obtained through coordination with site personnel and by contacting New Mexico One-Call. The New Mexico Oil Control Division (OCD) was notified in advance of commencement of field activities.

Monitoring Well Installation

Brown and Caldwell installed permanent groundwater monitoring well MW-1 using an air rotary rig. Soil cores were continuously sampled to a depth of 10 feet and sampled at least once every 10 feet thereafter using decontaminated 2-foot split-spoons and/or shovels for cuttings. Each sample interval was logged for recovery length and lithology, visually observed for impacts, and field screened with a photo-ionization detector (PID). No PID readings were observed from ground surface to the total depth of the borehole. Soil cores and cuttings were logged by a field geologist. The lithologic description and moisture content were described in accordance with ASTM International Standard D 2488, Standard Practice for Description and Identification of Soils (Visual Manual Procedure), and classified in accordance with the Unified Soil Classification System (USCS). The soil boring/monitoring well log for monitoring well MW-1 is included in Attachment 1. The lithology consisted predominantly of fine to medium-grained, rounded, well sorted, brownish-red sand. A significant increase in moisture content was observed at 62 feet below ground surface (bgs), and saturation was observed at approximately 79 feet bgs. The monitoring well borehole was initially drilled to 90 feet bgs, but collapsed in to 80 feet bgs. The borehole was cleaned out, and re-drilled to 100 feet bgs to ensure an adequate water column; however, the hole collapsed a second time due to wet formation sands. The monitoring well was installed to a total depth of 90 feet bgs and was constructed with 30 feet of 2-inch diameter, 0.010 machine slot, flushthreaded, Schedule 40 polyvinyl chloride (PVC) screen, and 2-inch diameter Schedule 40 PVC casing to ground surface. The screened interval intersects the first area where increased moisture was observed, though the water table was found to equilibrate at approximately 80 feet bgs. The monitoring well was completed a few inches bgs and protected with a flush-to-grade manhole set in a 3-foot square concrete pad that is 4 inches thick.

Brown and Caldwell developed the monitoring well using a 1.5-inch disposable PVC bailer. Monitoring well development was considered complete when produced fluids were relatively free of suspended material. Approximately 20 gallons of groundwater was bailed from monitoring well MW-1 during development.

Brown and Caldwell used a handheld Global Positioning System (GPS) device to determine the location of the monitoring well, as required by the New Mexico OCD. The monitoring well location is depicted on Figure 2 and the GPS coordinates are listed on Table 1.

Collection and Analysis of Groundwater Samples

Brown and Caldwell measured the static water level in the monitoring well immediately prior to sampling and purging using a decontaminated oil/water interface probe. The monitoring well was purged using low flow/low stress purging procedures with a 2-inch submersible stainless steel Fultz pump and disposable polyethylene tubing. The oil/water interface probe and pump were decontaminated in the field before and after use by washing with a non-phosphate detergent (Liquinox) and distilled water wash, followed by a distilled water rinse.

The intake of the Fultz pump was placed at 85 feet bgs. A pumping rate of 0.25 liters per minute was sustained while field parameter measurements for pH, specific conductivity, turbidity, and temperature were collected during the purging process. A YSI 600 XL flow cell was used to measure these parameters at approximate 3 minute increments. A total of 6.25 liters of groundwater were produced before parameters indicated groundwater stabilization had occurred. The field data sheet for purging and sampling of monitoring well MW-1 is included as Attachment 2.

Upon completion of purging operations, a groundwater sample and a duplicate groundwater sample were immediately collected from the monitoring well at the pump discharge line after the flow cell had been disconnected. The samples were transferred into laboratory-supplied, 500-milliliter plastic containers, labeled, and placed on ice in an insulated cooler using standard chain-of-custody procedures. The samples were hand delivered to Severn Trent Laboratories, Inc. in Houston, Texas the following morning. The groundwater samples were analyzed for:

- Total Dissolved Solids (TDS) by EPA Method 160.1 and
- Chlorides by EPA Method 300.0

Groundwater Analytical Results

The groundwater sample collected from monitoring well MW-1 indicates a chlorides content of 196 milligrams per liter (mg/L) and a TDS content of 1,010 mg/L. The chloride content is below the 250 mg/L domestic water supply standard for chloride established in the New Mexico Water Quality Control Commission (WQCC) Regulations, Section 20.6.2.3103, Subsection A-C. The New Mexico WQCC has established a limit of 1,000 mg/L for TDS; however, in the event that previous TDS data for the site is not available, the first measured concentration becomes the new groundwater standard by default. Therefore, site activities may not indicate TDS impact to groundwater above approximately 1,010 mg/L during any subsequent monitoring event. Duplicate sample results were comparable to the original sample results. The analytical results are presented in Table 2 and the laboratory analytical report is included as Attachment 3.

Waste Management

Soil cuttings generated during the well installation activities were placed in clean, 55gallon steel drums. Decontamination water, well development water, and purge water produced during well installation and sampling activities were also placed in a clean, 55gallon steel drum. Non-hazardous waste labels were affixed to each drum. A total of three drums containing soil and one drum containing water were produced during investigation activities and staged near the southeast corner of the concrete pad pending offsite disposal.

Conclusions and Recommendations

Analytical results indicate the elevated levels of chlorides present in near surface soils potentially due to truck washing operations do not appear to have impacted groundwater at the southeast corner of the truck wash pad. Further investigation of groundwater in the area is not necessary at this time.

If you have any additional questions regarding the information contained in this correspondence, please contact Madeline Mauk at (713)-646-1119.

Sincerely,

BROWN AND CALDWELL

nanoufer Lomas Il

Madeline S. Mauk, P.E. Supervising Engineer

cc: Brown and Caldwell project file

Figures

- 1 Site Location Map
- 2 Monitoring Well Location Map

Tables

- 1 GPS Coordinates for Monitoring Well
- 2 Groundwater Analytical Results

Attachments

Soil Boring/Monitoring Well Log Groundwater Sampling Field Data Sheet Laboratory Analytical Report

BROWN AND CALDWELL

Lynn M. Wright, P.G. Supervising Geologist

FIGURES

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ckelly



Aug 26, 2004 - 2:44pm Pi\Cad\JOBS\KeyEnerg\25934\EuniceSiteMap.dwg

TABLES

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Table 1

Coordinates for Monitoring Well Key Energy Services, Inc. - Eunice Truck Wash Pad and Sump Facility Eunice, New Mexico

Longitude	-103°10.140'
Latitude	32°26.493'
Monitoring Well	I-MM

Notes:

1) GARMIN brand handheld Global Positioning System unit. North American Datum (1983). (dd°mm.mmm')

2) GPS was not getting adequate satellite coverage during marking of coordinates.

P:/Wp/KEYENRGY/25934/003ta/GPS.xls

Table 2

Groundwater Analytical Results Key Energy Services, Inc. - Eunice Truck Wash Pad and Sump Facility Eunice, New Mexico

Laboratory Analysis			Total Dissolved Solids (mg/L) [EPA Method 160.1]	Chlorides (mg/L) [EPA Method 300.0]
NMWQCC ⁽¹⁾ Groundwat	ter Protection Limit		1,000 ⁽²⁾	250
Sample Location	Sample ID	Sample Date		
I-WM	I-WW	6/11/2004	1,010	196
I-WM	DUP-01	6/11/2004	1,050	561

Notes:

1) NMWQCC = New Mexico Water Quality Control Commission (Regulation 20.6.2.3103, Subsections A-C).

2) Total Dissolved Solids limit established by NMWQCC; default value is first measured value established for site in the event that previous groundwater data for site is unavailable.

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ATTACHMENT 1

Soil Boring/Monitoring Well Log

Monitorina	Well

<u>MW-1</u>

roje	ct Lo	catio	on: 2	105 Avenue O, Eunice, Nev	Mexico			L	ogged B	sy: C. Putr	ney	Approved:
Drilling Contractor: Harrison and Cooper							Date Started: 6/9/04 Date Finished: 6/9/0 Total Boring Depth to Static					
Drilling Equipment: IR TH-60 Driller: Leona									Depth: (f	eet) 100.0)	Water: (feet)
Drilli	ng M	letho	d:	Air Rotary	Borehole Diameter:	8"			OC Elev	vation:		Ground Elevation:
Samp	oling	Met	nod:	split-spoon/shovel				0	f Well C	Casing:	2" PVC	
Com	ment	s:	Wat	er level measured from top	of casing.			S	lot Size:	0.010 "	Filter Ma	terial: 20/40 silica
									Developn	nent Method:	bailer	
Depth (feet)	Depth to Water	USC Soil Type	Lithology	Description		PID Readings	Sampled Interval	Recovery (feet)	Sample ID		М	onitoring Well Remarks
_				Cleared for utlities to 2'. Fill mate medium sand with gravel.	rial and fine to			0			Fh	ish mount completion
2		CD		Silty cand fine trace hard caliche	(calcareous	0	X	.6 .5				
6		SM		cementation at 10 feet, dry.		0		.5 .5				
						0		0				
 18				Caliche/calcareous cementation an brown to light grayish brown w medium sand seams, dry. Very hard cemented sand in split-	nd nodules increase, ith interlayered fine to spoon shoe at 22'.	0	X	.2	1			
20 22 						0	X	∎. <u>5</u>				
24-												
26 - 28 28		SP SM		Silty sand, fine to medium, light n caliche, mostly loose, dry. Cald	eddish-brown, trace arous nodules at 42'.	0		0				
30-						0	X	.3				

MO	nito	rina	Well

MW-1

Proje	ct Na	ame:	E	unice Truck Wash and Sump Facility Monito	r W	ell	Pro	oject Num	ber: 25934.001	Sheet $\underline{2}$ of $\underline{3}$
Depth (feet)	Depth to Water	USC Soil Type	Lithology	Description	PID Readings	Sampled Interval	Recovery (feet)	Sample ID	Monitorin Remai	g Well ks
34- 36- 38-					0	X	.5			
40-					0	X	1.4			
44- 					0		0			
50- 52- 54-					0		0			
56- - 58-		SP		Sand, slight increase in grain size, grading to darker reddish-brown in color. Slightly cemented portion at 59.5'.	0	X	.3		56.0	
60-					0	X	.9		Top of sci	reened interval at 60 ft.
64 - - 66 - - 68 -		SP		Sand, very moist, lt. reddish-brown, trace calcareous/cemented fragments, no odor.	0	I	0			
70 - 72 - 74 -					0	X	1			

Monitoring Well:

Eunice Truck Wash and Sump Facility Monitor Well Project Number:

Project Name:

MW-1

Sheet $\underline{3}$ of $\underline{3}$ 25934.001



ATTACHMENT 2

Groundwater Sampling Field Data Sheet

CALL	WEL			WELI	_ ID: <u>M</u> /	W-1_	······		
1. PROJE	CT INFC	RMATIC	N						-
Project Nur	nber: <u>25</u> 6	<u>134</u> та:	sk Number: <u>C</u>	∞	Date:	<u>6-11-0</u>	<u>y</u>	Time: 1545	<u>,</u>
Client:	KEY E	NERGU	1		Personnel:	<u>C.</u> +	UTNE	f	
Project Loc	ation: <u> </u>	UNICE	, NM		Weather:	NINDY,	85 F	SUNNY_	
Z. WELL I			Time:						
Casing Dia	neter:	inches	Туре.	ACBAC DIS	tainless 🔲 Galv. S		© U Other:		
Screen Dia		inches	From:						<u></u>
Death to St			From:	Not on of We	I Casing (TOC)		ective Casing	Other:	<u> </u>
Depth to St	alic water.	<u>- foot</u>	From:		Il Casing (TOC)		ective Casing C	Other	
Length of V	Jater Column		et Well \		an Casing (100)	Scrooped In	top al /from GS	100'-9	<u> </u>
Pump intak	e depth	5 (from	GS)	olume	yai	Note: 2	2-inch well = 0.16 g	al/ft 4-inch well	= 0.65
3. PURGE	DATA								
Purge Meth	iod: D Gast	, Size:	Bladder Pump) 2" Submer	sible Pump 0 4"	Submersible P	ump		
Matariata	Cenu	Stainless	Penstalic Pun	refion® Oth	er:			Equipment M	odel(:
Materials:	ump/Baller	Dedicated	Prepared O	f-Site XDField	Cleaned Disp	osable	1. YS	E 1600 X	L_
Materials: I	Rope/fubing		ne U Polyproj Prepared (oyiene ⊔ Letia Off-Site □ Fie	d Cleaned	sposable	2. HAC	H TURBI	DIT
Was well p	urged dry?	U Yes 🗴	Q No F	umping Rate	: <u>p.25</u> li	ters/min	3 2"	FULTZ 7	2,,
Tìme	Cum. Liters	pН	emp Sp	ec. Et	Dissolved	Turbidity	Depth to Water	Commer	nts
1100 1). 255	7777	7.1712	m_{2}^{-41}	1.9 3.02	370	08 00	NER. AI	
1603	1.0	7.312	74112	20-44	9 2 30	278	80.00	11 VERY CI	$D \alpha$
16010	1.75	7.301	7110 1.2	79-42	6.6259	2917	80.87	11	
1609 2	2.5	7.797	7131.2	20-36	7371	273	80.86	SL. CIM	
11012	3.25	7.292	0.851.7	214-31	8 U.DI	181	80.810	41	
11015	4.D :	7.322	6.411.1	84-31	9 4.35	99.2	80.85	મ	
1618	4.75	7.332	0911	71-3	24.58	70.6	80.85	CLEARIN	5
1621	5.5	7.322	6.151.1	75 - 3	3 4.50	40.5	80.84		
1624	0.25	7.337	10.101.1	80 -32	2 4.42	35.9	80.83	~~	
4. SAMPI	ING DA	TA					Geod	hemical Analyses	ì
Method(s)	Bailer, Si	ze: 🖸 B	ladder Pump	2" Submersibl	e Pump 🛛 4" Sul	omersible Pump	Ferro	us Iron: 1	mg
Materials:	Pump/Bailer	Stainless		Tefion® D Oti	ner:				m
		Dedicate	I D Prepared C	ff-Site SC Field	d Cleaned D Dis	posable	00:		(13
Materials:	ubing/Rope	Dedicate		Off-Site D Fie	Id Cleaned 🔂 Di	sposable	- Nitra	te:	mg
Depth to V	ater at Time	of Sampling	80.8	Field F	iltered? 🗅 Yes		Sulfa	ite:	mç
Sample ID	MN-	S	imple Time:	IN KS	_ # of Conta	iners:	– Alkal	inity:	_ mg
Duplicate	Sample Colle	cted?	Yes 🗆 No	10: <u>U</u>	<u>P-0</u>				
5. COMM	ENTS	TD	+ C+	LORIDI	X		· · · · · · · · · · · · · · · · · · ·		
					~ , <u> </u>				
Noto: Include	mmonto cuch	wall condition	odor proces		than itama nat an th	o field data at			
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ATTACHMENT 3

Laboratory Analytical Report

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EUNICE



Signature

Signature

SEVERN

STL

Name: Ed B. Fry Title: Project Manager III E-Mail: efry@stl-inc.com

1/8/04 Date

Severn Trent Laboratories 6310 Rothway Drive Houston, TX 77040

PHONE: (713) 690-4444

07/08/2004

Madeline Mauk Brown and Caldwell 1415 Louisiana Suite 2500 Houston, TX 77002

SEVERN

Reference: Project : Brown and Caldwell-Hobbs Eunice Project No. : 275517 Date Received : 06/12/2004 STL Job : 275517

Dear Madeline Mauk:

Enclosed are the analytical results for your project referenced above. The following samples are included in the report.

- 1. MW-1
- 2. DUP-01

All holding times were met for the tests performed on these samples.

Enclosed, please find the Quality Control Summary. All quality control results for the QC batch that are applicable to the sample(s) are acceptable except as noted in the QC batch reports.

The test results in this report meet all NELAP requirements for STL Houston's NELAP accredited parameters. Any exceptions to NELAP requirements will be noted and included in a case narrative as a part of this report.

If the report is acceptable, please approve the enclosed invoice and forward it for payment.

Thank you for selecting Severn-Trent Laboratories to serve as your analytical laboratory on this project. If you have any questions concerning these results, please feel free to contact me at any time.

We look forward to working with you on future projects.

Sincerely,

Ed B. Fry Project Manager



SAMPLE INFORMATION Date: 07/08/2004

Job Number.: 275517 Customer...: Brown and Caldwell Attn.....: Madeline Mauk Project Number.....: 99004969 Customer Project ID....: KEY ENERGY Project Description....: Brown and Caldwell-Hobbs Eunice

aboratory ample ID	Customer Sample ID	Sample Matrix	Date Sampled	Time Sampled	Date Received	Time Received
275517-1	MW-1	Water	06/11/2004	16:25	06/12/2004	11:52
275517-2	DUP-01	Water	06/11/2004	00:00	06/12/2004	11:52
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	<u> </u>	Page 1	<u></u>	<u> </u>	<u> </u>	I

		TECH	sur	8 8
Wank		DATE/TIME	06/14/04 1800	06/15/04 2029
//08/2004 Madel ine		BATCH D	102935	103052
Date:07		UNITS	mg/L	шg/L
		DILUTION		ę
S	D: 275517-1 .: 06/12/2004 .: 11:52	RL	10	4.0
T RESUL	oratory Sample I e Received e Received	MDL	2.99	0.70
T E S Key energ	Labo Dato Timo	FLAGS		
A B O R A T O R Y PROJECT:		SAMPLE RESULT Q	1010	796
Job Number: 275517	<pre>Sample ID: MW-1 pled: 06/11/2004 pled: 16:25 latrix Water</pre>	PARAMETER/TEST DESCRIPTION	Solids, Total Dissolved (TDS), Water	Chloride, Water
-L -L Current Band	Customer (Date Samp Time Sample Mai	TEST METHOD	EPA 160.1	EPA 300.0

S.F.V.E.R.N. T.R.E.N.T

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	Mauk		DT DATE/TIME	06/14/04 1800	06/15/04 2044	
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L S H	KEY ENERGY	Labor Date Time	FLAGS			ige 3
8 0 R A T 0 R Y	PROJECT:		SAMPLE RESULT	1050	195	Pa
。RENT 0 1 LL ob Number: 275517	and Caldwell	Sample ID: DUP-01 Ned: 06/11/2004 Ned: 00:00 trix: Water	PARAMETER/TEST DESCRIPTION	Solids, Total Dissolved (TDS), Water	Chloride, Water	* In Description = Drv Wgt.
	CUSTOMER: Brown	Customer S Date Sampl Time Sample Sample Mat	TEST METHOD	EPA 160.1 S	C 200.0	

SFVERN

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Job Number.: 275517

QUALITY CONTROL RESULTS

Report Date .: 07/08/2004

STOMER: Brown and Caldwell

PROJECT: KEY ENERGY ATTN: Madeline Mauk

	st Method. thod Descr rameter	: EPA Iption.: Ion : Chlo	300.0 Chromatography oride	Analysis	Units Batch(s)	: 103052	g/L	Analys Test C	t. ode	.: cas :: CHL	
QC	Lab ID	Reagent	QC Result	QC Result	True Value	Orig. Value	Calc. Result *	Limits	F	Date	Time
I ICB MB		WCS31126	19.932 0 0		20.00		99.7	90.0-110.	•	06/15/2004 06/15/2004 06/15/2004	1200 1215 1230
LGG		WCS31126	19.729		20.00		98.6	90.0-110.		06/15/2004	1245
C		WCS31126	20.712 0.2720		20.00		103.6	90.0-110.		06/15/2004 06/15/2004	1501 1516
DU	275458-1		5.6227			5.4458	3.2	20		06/15/2004	1712
MS	275458-1	WCS30882	15.894		10.00000	5.4458	104.5	80-120		06/15/2004	1727
D	275590-1		3.4219			3.4423	0.6	20		06/15/2004	1757
C CCD		WCS31126	19.725 0.2434		20.00		98.6	90.0-110.		06/15/2004 06/15/2004	1813 1828
MS	275590-1	WC\$30882	13.806		10.000000	3.4423	103.6	80-120		06/15/2004	1843
СС) С		WCS31126	19.795 0.2501		20.00		99.0	90.0-110.		06/15/2004 06/15/2004	2114 2129
D	275517-3		5.1628			5.2670	2.0	20		06/15/2004	2144
MS	275517-3	WCS30882	15.791		10.00000	5.2670	105.2	80-120		06/15/2004	2159
CCV C M		WCS31126	20.097 0.2435 0		20.00		100.5	90.0-110.		06/16/2004 06/16/2004 06/16/2004	0015 0031 0046
Lus		WCS31126	19.804		20.00		99.0	90.0-110.		06/16/2004	0101
DU	275334-2		7.5941			7.2345	4.9	20		06/16/2004	0146
MS	275334-2	WCS30882	18.024		10.000000	7.2345	107.9	80-120		06/16/2004	0201
C C		WCS31126	19.584 0		20.00		97.9	90.0-110.		06/16/2004 06/16/2004	0317 0332
DU	275407-2		4.2093			4.1746	0.8	20		06/16/2004	0533
MS	275407-2	WCS30882	14.703		10.000000	4.1746	105.3	80-120		06/16/2004	0548
C C		WCS31126	19.758 0.2345		20.00		98.8	90.0-110.		06/16/2004 06/16/2004	0618
CCE CCE	3	WCS31126	19.904 0.2642		20.00		99.5	90.0-110.		06/16/2004 06/16/2004	0704 0719

Method.....: EPA 160.1 Method Description.: Solids, Total Dissolved (TDS) Parameter.....: Solids, Total Dissolved (TDS) Analyst...: sur Units..... mg/L Test Code.: TDS Batch(s)...: 102935 Lab ID QC Result QC Result True Value Orig. Value Caic. Result * Limits Reagent F Date Time DU 275338-10 1388.00 1359.00 2.1 10.0 06/14/2004 1800 275487-6 1311.00 1256.00 4.3 10.0 06/14/2004 1800 D 1.00 06/14/2004 1800 Ц WCS31351 3506.00 3600 97.4 90.0-110. 06/14/2004 1800 DU 275517-2 1052.00 1012.00 3.9 10.0 06/14/2004 1800 3600 97.8 LCS WCS31351 3520.00 90.0-110. 06/14/2004 1800 1.00 06/14/2004 1800

> Page 4 %=% REC, R=RPD, A=ABS Diff., D=% Diff.



QUALITY ASSURANCE METHODS

Report Date: 07/08/2004

REPORT COMMENTS

REFERENCES AND NOTES

- 1) All pages of this report are integral parts of the analytical data. Therefore, this report should be reproduced only in its entirety.
- 2) Reporting limits are adjusted for sample size used, dilutions and moisture content if applicable.
- 3) According to 40CFR Part 136.3, pH, Chlorine Residual, and Dissolved Oxygen analyses are to be performed immediately after aqueous sample collection. When these parameters are not indicated as field, (e.g. pH Field) they were not analyzed immediately, but as soon as possible on laboratory receipt.
- 4) For all USACE projects, the QC limits are based on "mean +/- 2 sigma", which are the warning limits.

General Information:

- Cresylic Acid is the combination of o,m and p-Cresol. The combination is reportesd as the final result.
- m-Cresol and p-Cresol co-elute. The result of the two is reported as either m&p-cresol or as p-cresol.
- m-Xylene and p-Xylene co-elute. The result of the two is reported as m,p-Xylene.
- N-Nitrosodiphenylamine decomposes in the gas chromatograph inlet forming dipheylamine and, consequently, may be detected as diphenylamine.
- Methylene Chloride and Acetone are recognized potential laboratory contaminants. Its presence in the sample up to five times the amount reported in the blank may be attributed to laboratory contamination.
 Trimethysilyl(Diazomethane) is used to esterify acid herbicides in Method SW-846 8151A.
- For Inorganic analyses, duplicate QC limits are determined as follows: If the sample result is less than or equal to 5 times the reporting limit, the RPD limit is equal to the reporting limit. If the sample result is greater than 5 times the reporting limit, the RPD limit is the method defined RPD.
- Explanation of Qualifiers:
- U This qualifier indicates that the analyte was analyzed but not detected.
- J (Organics only) This qualifier indicates that the analyte is an estimated value between the RL and the MDL.
- B (Inorganics only) This Qualifier indicates that the analyte is an estimated value between the RL and the MDL.
- N (Organics only) This flag indicates presumptive evidence of a compound. This flag is only used for tentatively identified compounds (TICs), where the identification is based on a mass spectral library search. It is applied to all TIC results. For generic charachterization of a TIC, such as "chlorinated hydrocarbon", the "N" flag is not used.

Explanation of General QC Outliers:

- A Matrix interference present in sample.
- a MS/MSD analyses yielded comparable poor recoveries, indicating a possible matrix interference. Method performance is demonstrated by acceptable LCS recoveries.
- b Target analyte was found in the method blank.
- M QC sample analysis yielded recoveries outside QC acceptance criteria. This sample was reanalyzed.
- L LCS analysis yielded high recoveries, indicating a potential high bias. No target analytes were
- observed above the RL in the associated samples.
- G Marginal outlier within 1% of acceptance criteria.
- r RPD value is outside method acceptance criteria.
- C Poor RPD values observed due to the non-homogenous nature of the sample.
- 0 Sample required dilution due to matrix interference.
- D Sample reported from a dilution.
- d Spike and/or surrogate diluted.
- P The recovery of this analyte is outside default QC limits. The data is accepted and will be used to calculate in-house statistical limits.
- E The reported concentration exceeds the instrument calibration.
- F The analyte is outside QC limits. The sample data is accepted since this analyte is not reported in associated samples.
- H Continuing Calibration Verification (CCV) standard is not associated with the samples reported.
- q See the subcontract final report for qualifier explanation.



REFERENCES AND NOTES

Report Date: 07/08/2004

- W The MS/MSD recoveries are outside QC acceptance criteria because the amount spiked is much less than the amount found in the sample.
- C High recovery will not affect the quality of reported results.
- Z See case narrative.

EVERN

Explanation of Organic QC Outliers:

- e Method blank analysis yielded phthalate concentrations above the RL. Phthlates are recognized potential laboratory contaminants. Its presence in the sample up to five times the amount reported in the blank may be attributed to laboratory contamination.
- S Sample reanalyzed/reextracted due to poor surrogate recovery. Reanalysis confirmed original analysis indicating a possible matrix interference.
- T Sample analysis yielded poor surrogate recovery.
- R The RPD between the two GC columns is greater than 40% and no anomalies are present. The higher result is reported as per EPA Method 8000B.
- I The RPD between the two GC columns is greater than 40% and anomalies are present. The lower of the two results has been reported.
- X Gaseous compound. In-house QC limits are advisory.
- Y Ketone compounds have poor purge efficiency. In-house QC limits are advisory.
- f Surrogate not associated with reported analytes.

Explanation of Inorganic QC Outliers:

- Q Method blank analysis yielded target analytes above the RL. Associated sample results are greater than 10 times the concentrations observed in the method blank.
- V The RPD control limit for sample results less than 5 times the RL is +/- the RL value. Sample and duplicate results are within method acceptance criteria.
- e Serial dilution failed due to matrix interference.
- g Sample result quantitated by Method of Standard Additions (MSA) due to the analytical spike recovery being below 85 percent. The correlation coefficient for the MSA is greater than or equal to 0.995.
- s BOD/cBOD seed value is not within method acceptance criteria. Due to the nature of the test method, the sample cannot be reanalyzed.
- i BOD/cBOD LCS value is not within method acceptance criteria. Due to the nature of the test method, sample cannot be reanalyzed.
- n Sample result quantitated by Method of Standard Additions (MSA) due to the analytical spike recovery being below 85 percent. The correlation coefficient for the MSA is less than 0.995.

Abbreviations:

ватсп	-	besignation given to identity a specific extraction, digestion, preparation, or analysis set.
CCV	-	Continuing Calibration Verification
CRA	-	Low level standard check - GFAA, Mercury
CRI	-	Low level standard check - ICP
Dil Fac		Dilution Factor - Secondary dilution analysis
DLFac	-	Detection Limit Factor
EB	-	Extraction Blank (TCLP, SPLP, etc.)
ICAL	•	Initial Calibration
ICB	-	Initial Calibration Blank
ICV	-	Initial Calibration Verification
I SA	-	Interference Check Sample A - ICP
I SB	-	Interference Check Sample B - ICP
LCD	-	Laboratory Control Duplicate
LCS	-	Laboratory Control Sample
MB	-	Method Blank
MD	-	Method Duplicate
MDL	-	Method Detection Limit
MS	-	Matrix Spike



QUALITY ASSURANCE METHODS

REFERENCES AND NOTES

Report Date: 07/08/2004

MSD	- Matrix Spike Duplicate
ND	- Not Detected
₽B	- Preparation Blank
PREPF	- Preparation Factor
RL	- Reporting Limit
RPD	- Relative Percent Difference
RRF	- Pelative Response Eactor

- ĸĸı Relativ /еке onse Factor RT
- Retention Time
- DU - Duplicate

Method References:

- (1) EPA 600/4-79-020 Methods for the Analysis of Water and Wastes, March 1983.
- EPA 600/R-94-111 Methods for the Determination of MEtals in Environmental Samples, Supplement I, May (2) 1994.
- EPA SW846 Test Methods for Evaluating Solid Waste, Third Edition, September 1986; Update I July (3) 1992; Update II, September 1994, Update IIA August 1993; Update IIB, January 1995; Update III, December 1996, Update IVA January 1998, Update IVB November 2000.
- (4) Standard Methods for the Examination of Water and Wastewater, 16th Edition (1985), 17th Edition (1989), 18th Edition (1992), 19th Edition (1995), 20th Edition (1998).
- (5) HACH Water Analysis Handbook 3rd Edition (1997).
- (6) Federal Register, July 1, 1990 (40 CFR Part 136 Appendix A).
- (7) Compendium of Methods for the Determination of Toxic Organic Compounds in Ambient Air, 2nd Edition, January 1997.
- (8) ASTM Annual Book of Methods (Various Years)
- (9) Diagnosis and Improvement of Saline and Alkali Soils, Agriculture Handbook No. 60, United States Department of Agriculture, 1954.



LABORATORY CHRONICLE

Job Number: 275517

Date: 07/08/2004

CUSTOMER: Brown a	nd Caldwell	PROJECT: KEY ENERGY ATTN: Madeline Mauk	
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EPA 160.1	Solids, Total Dissolved (TDS)	1 102935 06/14/2004 1800	
Lab ID: 275517-2	Client ID: DUP-01	Date Recvd: 06/12/2004 Sample Date: 06/11/2004	LUTION
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1415 Louisiana Suite 2500 Houston, Texas 77002

Tel: (713) 759-0999 Fax: (713) 308-3886

www.brownandcaldwell.com

August 27, 2004

BROWN AND CALDWEL

Mr. Daniel K. Gibson Key Energy Services, Inc. 6 Desta Drive, Suite 4400 Midland, Texas 79705

Subject:

Documentation of Monitoring Well Installation, Soil Boring and Sampling Activities at Key Energy Services, Inc. Saltwater Facility in Hobbs, Lea County, New Mexico

Dear Mr. Gibson:

Brown and Caldwell completed the installation and sampling of one permanent groundwater monitoring well and an additional shallow soil boring at the Key Energy Services, Inc. (Key) saltwater facility in Hobbs, Lea County, New Mexico from June 9-11, 2004. Key currently operates the saltwater facility at 1502 West Broadway Place in Hobbs, New Mexico (Figure 1). Soil and groundwater assessment activities were previously performed by ARCADIS G&M, Inc. (ARCADIS) from March 25-28, 2003, to determine potential soil and groundwater impact associated with the Key brine pit and truck loading dock. Findings from the March 2003 field investigation indicated petroleum hydrocarbon impact to surface soil, and elevated concentrations of chlorides in soil surrounding the brine pit and in groundwater samples collected from existing monitoring well MW-1. MW-1, however, is screened across the entire saturated zone from 46 feet to 196 feet below ground surface (bgs). It is unclear where in this interval the sample was collected, and if the sample is representative of chloride impact due to historic facility operations. Benzene, toluene, ethylbenzene, and xylene (BTEX) were not detected above the respective detection limits in samples collected by ARCADIS; consequently, further sampling of soil or groundwater for BTEX was not performed.

This groundwater assessment was performed to establish background groundwater quality and to determine if chlorides from historic operations have potentially impacted groundwater at the site. The soil assessment was performed to delineate TPH in surface soils between 0 and 10 feet of ground surface near the truck loading dock. Monitoring well and soil boring installation activities, groundwater sampling, and laboratory analytical results are discussed in the following paragraphs.

Field Activities

Brown and Caldwell advanced two (2) soil borings using air rotary drilling. One boring was installed for conversion into a permanent monitoring well, MW-2, at

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the apparent upgradient and northwest corner of the property, to determine background water quality for the site. The second boring was advanced to 15 feet bgs just south of the truck loading pad area where TPH concentrations were detected previously. One groundwater sample was collected from the upgradient monitoring well MW-2 for laboratory analysis. One groundwater sample and a duplicate groundwater sample from existing monitoring well MW-1 were collected at 70 feet bgs corresponding to the same depth interval as monitoring well MW-2, and one groundwater sample was collected at 95 feet bgs. Prior to drilling activities, utility clearance was obtained through coordination with site personnel and by contacting New Mexico One-Call. The New Mexico Oil Control Division (OCD) was notified in advance of commencement of field activities.

The monitoring wells were surveyed using rental equipment from a local retailer relative to an arbitrary site elevation datum of 100 feet. The survey indicated that MW-2 is located topographically upgradient, which is consistent with local observations from monitoring wells in the area.

Soil Borings

Soil cores were sampled continuously to approximately 10 feet bgs and at least once every 10 feet thereafter using decontaminated, 2-foot split-spoons and/or shovels for cuttings. All sample cores and soil cuttings were continuously field screened with a photo-ionization detector (PID), logged by a qualified field geologist for recovery length and lithology, and observed for impact. The lithologic description and moisture content were described in accordance with ASTM International Standard D 2488, Standard Practice for Description and Identification of Soils (Visual Manual Procedure), and classified in accordance with the Unified Soil Classification System (USCS). The soil boring/monitoring well log for monitoring well MW-2 is included in Attachment 1. The lithology consisted predominantly of fine to medium grained, rounded, well sorted, light grayish-brown to brown sand with moderate caliche cementation and interlayed sandstone beds.

The soil boring to be converted into monitoring well MW-2 was advanced to a total depth of 76 feet below ground surface. Overhead utilities ran parallel to the western and northern fence lines, thus the boring was placed as far northwest and upgradient of the brine pit as possible within the Key property boundary. No soil samples from monitoring well MW-2 boring were submitted to the laboratory for analysis.

Soil boring SB-3 was installed to a total depth of 15 feet bgs in an area adjacent to the truck loading pad. Previous soil investigation results (ARCADIS, March 2003) indicated TPH concentrations in the diesel range of 114 milligrams per kilogram (mg/kg) at a depth of 2 feet bgs in the area. The subsequent sample collected from the bottom of the boring, at 35 feet bgs, indicated TPH to be nondetect at that depth. Three soil samples from soil boring SB-3 were collected for the purpose of delineating TPH between 2 feet and 10 feet bgs in the area. The first five feet of material in the area was determined to be caliche fill material/road base. Therefore, soil samples were collected from the 5-5.5 feet bgs, 9-9.8 feet bgs and 14-14.5 feet bgs depth intervals. There were no PID detections from ground surface to the total depth of the boring. Partial recovery while using the split-spoons prevented a duplicate sample from being collected at the same times and same depth intervals as the original samples. The soil sample from 5-5.5 feet bgs was submitted to the laboratory for analysis of TPH using Method 8015M. The subsequent samples from 9-9.8 feet bgs and 14-14.5 feet bgs were submitted to the laboratory to be archived pending analysis of TPH using Method 8015M. The soil boring log for SB-3 is included in Attachment 1. Upon completion of sampling activities, the soil boring was plugged by backfilling with hydrated bentonite chips.

Monitoring Well Installation

Brown and Caldwell converted the boring installed to a total depth of 76 feet bgs into a permanent groundwater monitoring well, MW-2, to assess background levels of chloride and TDS in groundwater that had not been potentially affected by operations at the saltwater facility. Groundwater was encountered at approximately 63 feet bgs. The monitoring well was constructed with 20 feet of 2-inch diameter, 0.010 machine slot, flush-threaded, Schedule 40 polyvinyl chloride (PVC) screen, and 2-inch diameter Schedule 40 PVC casing to ground surface. The well screen intersects the saturated interface in the formation. The well was completed a few inches below ground surface and protected with a flush-to-grade manhole set in a 3-foot square, 4-inch thick, concrete pad. The well was completed in accordance with New Mexico Environment Department (NMED) Ground Water Quality Bureau and Oil Conservation Division (OCD) guidance and standards.

Brown and Caldwell developed the monitoring well using a 1.5-inch disposable PVC bailer. Monitoring well development was considered complete when produced fluids were relatively free of suspended material. Approximately 25 gallons of groundwater was bailed from monitoring well MW-2 during development. A period of at least 24 hours was allowed to pass prior to groundwater sampling of monitoring well MW-2.

Brown and Caldwell used a handheld Global Positioning System (GPS) device to determine the location of the monitoring well, as required by the New Mexico OCD. The monitoring well location is depicted on Figure 2 and coordinates for monitoring wells at the site are listed on Table 3.

Collection and Analysis of Groundwater Samples

Brown and Caldwell measured the static water level in each monitoring well, immediately prior to sampling and purging, using a decontaminated oil/water interface probe. The monitoring wells were purged using low flow/low stress purging procedures with a 2-inch submersible stainless steel Fultz pump and disposable polyethylene tubing. The oil/water interface probe and pump were decontaminated in the field before and after use by washing with a non-phosphate detergent (Liquinox) and water wash, followed by two distilled water rinses.

At monitoring well MW-1, the intake of the Fultz pump was placed at 70 feet bgs. A pumping rate of 0.40 liters per minute was sustained and field parameter measurements for pH, specific conductivity, turbidity, and temperature were collected during the purging process. A YSI 600 XL flow cell was used to measure these parameters at 3 minute increments. A total of approximately 5.0 liters of groundwater were produced before parameters indicated groundwater stabilization had occurred. Upon completion of purging operations, a groundwater sample and a duplicate groundwater sample were immediately collected from the monitoring well at the pump discharge line, after the flow cell had been disconnected.

The pump was then lowered approximately 25 feet down the screened interval to 95 feet bgs. The same procedures as described above were utilized to sample monitoring well MW-1 at 95 feet bgs. A pumping rate of 0.45 liters per minute was sustained during the purging process and a total of approximately 6.5 liters of groundwater were produced before parameters indicated groundwater stabilization had occurred. Upon completion of purging operations, a groundwater sample was immediately collected from the monitoring well at the pump discharge line, after the flow cell had been disconnected.

At monitoring well MW-2, the intake of the Fultz pump was placed at 70 feet bgs, consistent with the first interval sampled at monitoring well MW-1. The same procedures as described above were utilized to sample MW-2 at 70 feet bgs. A pumping rate of 0.30 liters per minute was sustained during the purging process and a total of approximately 8 liters of groundwater were produced before parameters indicated groundwater stabilization had occurred. Upon completion of

purging operations, a groundwater sample was immediately collected from the monitoring well at the pump discharge line, after the flow cell had been disconnected.

The field data sheets for purging and sampling of monitoring wells MW-1 at 70 feet and at 95 feet, and MW-2 at 70 feet are included as Attachment 2.

Each sample was transferred into laboratory-supplied, 500-milliliter plastic containers, labeled, and placed on ice in an insulated cooler using standard chain-of-custody procedures. The samples were shipped to Severn Trent Laboratories, Inc. in Houston, Texas. The groundwater samples were analyzed for:

- Total Dissolved Solids (TDS) by EPA Method 160.1
- Chlorides by EPA Method 300.0

Groundwater Analytical Results

The groundwater sample collected from monitoring well MW-1 at 70 feet bgs indicates a TDS content of 1,260 milligrams per liter (mg/L) and a chlorides content of 327 mg/L. The groundwater sample collected from monitoring well MW-1 at 95 feet bgs indicates a TDS content of 1,510 mg/L and a chlorides content of 476 mg/L. The groundwater sample collected from monitoring well MW-2 at 70 feet bgs indicates an even greater TDS content of 2,090 mg/L and a chlorides content of 527 mg/L. Chloride concentrations in both wells exceed the 250 mg/L domestic water supply standard for chloride established by the New Mexico Water Quality Control Commission (WQCC). TDS concentrations in both monitoring wells exceed the 1,000 mg/L limit for TDS established by the New Mexico WQCC.

Tabulated groundwater analytical results are included as Table 1. The laboratory analytical reports are included as Attachment 3.

Soil Analytical Results

Soil analytical results indicate a minor detection of gasoline range TPH in the 5-5.5 foot bgs sample interval from soil boring SB-3, but the concentration of 0.313 mg/kg, which is an estimated value between the reporting limit of 1 mg/kg and the method detection limit of 0.04297 mg/kg, is below the allowable limit of 100 mg/kg for TPH as established by the New Mexico Environment Department (NMED). Diesel range TPH was not detected. The TPH analysis for the initial sample was requested within a 5-day turnaround time. Upon receipt of initial laboratory analytical results, it was determined that the two remaining delineation
August 27, 2004 Mr. Daniel K. Gibson Page 6

sample intervals that were archived by the laboratory pending analysis could be discarded.

Tabulated soil analytical results are included as Table 2. The laboratory analytical reports are included as Attachment 3.

Waste Management

Soil cuttings generated during soil boring and monitoring well installation activities were placed in clean, 55-gallon steel drums. Decontamination water, well development water, and purge water produced during well installation and sampling activities were also placed in a clean, 55-gallon steel drum. Nonhazardous waste labels were affixed to each drum. A total of two drums containing soil and one drum containing water were produced during the investigation activities and staged near the northwest corner of the property, near monitoring well MW-2, pending offsite disposal.

Conclusions and Recommendations

Based on the New Mexico WQCC regulations, if the first measured values at a site exceed the established limits (Section 20.6.2.3103 NMAC, Subsections A-C) and historic groundwater data for the site is unavailable, the first measured concentrations default as the allowable limits. Subsequently, measured concentrations at a site may not exceed these limits. Given that monitoring well MW-2 is upgradient, based on both local topographic information and the site-specific survey data, elevated chlorides and TDS may be either: 1) naturally occurring; or 2) present due to an offsite source. A meeting with the New Mexico OCD is recommended to determine if chlorides and TDS concentrations observed in the upgradient well may be used as background water quality, or if further investigation to address potential offsite sources will be necessary.

Minor TPH concentrations near the truck loading dock appear to be present within the fill material only (up to approximately 5 feet bgs). Concentrations indicate that TPH does not exceed the NMED allowable limit of 100 mg/kg, and TPH has not impacted native soils south of and adjacent to the truck loading dock area. No further action is recommended for soils in the area of the truck loading dock. August 27, 2004 Mr. Daniel K. Gibson Page 7

If you have any additional questions regarding the information contained in this correspondence, please contact Madeline Mauk at (713)-646-1119.

Sincerely,

BROWN AND CALDWELL

Maringen mas

Madeline S. Mauk, P.E. Supervising Engineer

cc: Brown and Caldwell Project File

Figures

- 1 Site Location Map
- 2 Monitoring Well Location Map

Tables

- 1 Groundwater Analytical Results
- 2 Soil Analytical Results
- 3 GPS Coordinates for Monitoring Wells

Attachments

- 1 Soil Boring/Monitoring Well Logs
- 2 Groundwater Sampling Field Data Sheets
- 3 Laboratory Analytical Report

BROWN AND CALDWELL

Lynn M. Wright, P.G. Supervising Geologist

FIGURES

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Table 1

Groundwater Analytical Results Key Energy Services, Inc. - Hobbs Saltwater Facility Hobbs, New Mexico

Laboratory Analysis			Total Dissolved Solids (mg/L) [EPA Method 160.1]	Chlorides (mg/L) [EPA Method 300.0]
NMWQCC ⁽¹⁾ Groundwat	er Protection Limit		1,000 ⁽²⁾	250
Sample Location	Sample ID	Sample Date		
MW-1 (70 feet)	MW-1-70	6/10/2004	1,260	327
MW-1 (70 feet)	DUP-01	6/10/2004	1,310	331
MW-1 (95 feet)	MW-1-95	6/10/2004	1,510	476
MW-2 (70 feet)	MW-2	6/11/2004	2,090	527

Notes:

1) NMWQCC = New Mexico Water Quality Control Commission (Regulation 20.6.2.3103, Subsections A-C).

2) Total Dissolved Solids limit established by NMWQCC; default value is first measured value established for site in the event that previous groundwater data for site is unavailable.

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Table 2

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Soil Analytical Results Key Energy Services, Inc. - Hobbs Saltwater Facility

Hobbs, New Mexico

Laboratory Analysis			TPH (METHO	mg/kg) D 8015B]
Constituent of Concern			Gasoline-Range Organics (GRO)	Diesel-Range Organics (DRO)
NMED Soil-to-Groundw	ater Protection Limit		100	100
Sample Location	Sample ID	Sample Date		
SB-03	SB-03 (5-5.5)	6/9/2004	0.313 J	< 0.04297 ⁽¹⁾

Notes:

NMED = New Mexico Environment Department

mg/kg = milligrams per kilogram

J = Result is estimated value between the MDL and PQL.

(1) Analyte not detected above method detection limit (MDL) of 0.04297 mg/kg.

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Table 3

Coordinates for Monitoring Wells Key Energy Services, Inc. - Hobbs Saltwater Facility Hobbs, New Mexico

Longitude	- 103° 09' 15.44"	- 103° 09' 18.79"	- 103° 09' 16.66"
Latitude	32° 41' 56.35"	32° 42' 00,77"	32° 41' 56.00"
Monitoring Well	1-MW	MW-2	SB-3

Notes:

(1) GARMIN brand handheld Global Positioning System unit. North American Datum (1983). (dd°mm'ss.ss")

ATTACHMENT 1

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Soil Boring/Monitoring Well Logs

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Monitoring Well:

Project Name: Hobbs Saltwater Facility Monitor Well and Soil BoringProject Number: 25935.001

<u>MW-2</u>

Sheet 2 of 3

Depth (feet)	Depth to Water	USC Soil Type	Lithology	Description	PID Readings	Sampled Interval	Recovery (feet)	Sample ID	Monitoring Well Remarks	
				SANDSTONE; brown, very hard, dry. (chips from cuttings).	0		0			
50- 52- 54-		SP SM		SAND; fine to medium, lt. reddish brown, mostly loose, moisture increasing at 60', caliche/calcareous cementation at 58' and at 66'. Saturated sand at 65'. No odor. Trace clayey sand at 71.5.	0	X	.7		54.0	
56- 58- 60- 62-					0	X	1.7		Top of screened interval at 56 ft.	
64 - 					0	Χ	1.5			
70- 72- 74-					0		2		Pump intake at 70'. Collected groundwater sample MW-2 for chlorides and TDS.	

				Monitoring Well:				<u>MW-</u> ;	2
Proje	ect N	ame:	H	obbs Saltwater Facility Monitor Well and So	oil Bo	oriı	1g _{Pr}	oject Nu	mber: <u>25935.001</u> Sheet <u>3</u> of <u>3</u>
Depth (feet)	Depth to Water	USC Soil Type	Lithology	Description	PID Readings	Sampled Interval	Recovery (feet)	Sample ID	Monitoring Well Remarks
76-									76.0
							l		
1									

Project	t Loc	atio	1: 1	502 West Broadway Place	Hobbs, New Mex	ico		L	ogged B	y: C. Putney	Approved:
Drillin	g Co	ntra	tor:	Harrison and Cooper					Date Star	ted: 6/9/04	Date Finished: 6/9/04
Drilling	g Eq	uipn	nent:	IR TH-60	Driller: Leonard	1			Depth: (fe	tet) 15.0	Water: (feet)
Drillin	g Me	tho	l:	Air Rotary	Borehole Diameter:	8"]	OC Elev	vation:	Ground Elevation:
Sampli	ing N	ſeth	od:	split-spoon				0	of Well C	asing:	
Comm	ents:								Slot Size: Developm	Filt nent Method:	er Material:
Depth (feet)	Depth to Water	USC Soil Type	Lithology	Descriptio	аум <i>инин на на</i>	PID Readings	Sampled Interval	Recovery (feet)	Sample ID		Soil Boring Remarks
2- 2- 4-				Cleared to 3' for utilities. Fill ma brown w/ gravel, dk. brown sil below 3', slightly moist, no odd	terial/road base, light ty clay with gravel r.			.6	0		
6		SM	~~~	Silty Sand, light to moderate calc some portions, dry, no odor.	areous cementation in			.5 2	0 0 0		Sample SB-3-5-5.5 (Analyzed f TPH-GRO/DRO)
	2	SM		Silty sand, trace clay, light reddis light calcareous cementation.	h-brown, crumbly, dry,			.8 .7	0 0		Sample SB-3-9-9.8 (Not analyz by lab)
- 14 -								1.8	0		Sample SB-3-14-14.8 (Not ana by lab) Boring backfilled with bentonit chips hydrated in lifts.

ATTACHMENT 2

Groundwater Sampling Field Data Sheets

	DWEL	L		V	/ELL IC): <u>M</u> v	2-1			
DDO	ECT INEC									
. "KUJ	251	125		001		5 . 1			- 10 A	
Project N	lumber: <u>200</u>	100		ber <u>CC</u>		Date:e~	10-04		Time: <u>150</u>	<u> </u>
Client:	_ MEY_E		THIN	1		Personnel:	C TC	TNEY	· · an	· ©
WELL		17.665				weather:	<u>Clem</u>	, <u>SILVN</u>	$\overline{\mathbf{q}}$, $\overline{\mathbf{q}}$	<u> </u>
		d inch	05		C D Stainlag	se Di Galy Si				
Sereen F		inch							¥1	USH INT
Total De		106 6	ot	From: To				ctive Casica D.C		form
Depth to	Statia Water:	210	foot	From: Ser To	p of Well Casi		Top of Prote	ctive Casing D.C.		
Depth to	Broduct:	foot	ieet		on of Well Cas		Top of Prote	ctive Casing)ther:	
Length	f Water Colum	: 12lo.	31	Well:Volume	× 87.		Sereened In	ton (from CS)	410-101	
Pump int	ake depth	$()^{i}$ (fro	GS)	weir volume	· <u> </u>	ya	Note: 2	inch well = 0.16 ga	al/ft 4-inch w	ell = 0.65 gal/ft
	E DATA									
	ethod:	r, Size:	_ 🗘 Bladd	er Pump 🔏 2"	Submersible I	Pump 🗖 4" S	Submersible P	ump		
Fuige In	Centu	ifugal Pump		Itic Pump 🖾 In	ertial Lift Pum	p 🗘 Other:			Equipment	Model(s)
Materials	:: Pump/Bailer	D Dedica	ated C Prep	ared Off-Site	Field Clear	ned 🖾 Dispo	sable	1. <u>VS</u>	r 600 :	X L
Material	s: Rope/ ubing	Dedica	hylene 🛛 l ated 🔾 Pre	olypropylene	C Teflon® C	Other:	osable	2 HA4	HTUPE	Dr.
Was wel	I purged dry?	□ Yes	SEL No	Purprir		4 5	Imin			
	Cum Gallens			Spec		Dissolved	///////	3. <u>FUL</u> Denth to Water	126	PUMP
Time	Removed	рH	Temp	Cond.	Eh	Oxygen	Turbidity	(TOC)	Comn	nents
1325	0.5	10.47	25.07	1.638	451.0	3.24	4.14	63.69	CIEA	2
328	2.0	10.43	26.07	1.675	4100.7	2.14	4.82	103.70		
1331	_3.0_	10.20	25.68	1.670	478.3	1.70	4.83	103.71		
1.334	4.0_	6.10	26.22	1.705	486.0	1.80	4.80	103.72		
337	S.D	6.31	26.08	1.695	482.0	1.18	4.81	63.72		
. SAM	LING DA	TA						Geoc	nemical Analys	ies
Method/	s): Desider, Si	ze: (Bladder P	ump 2" Sut	mersible Pum	np 🗖 4" Subi	nersible Pump	Ferro	is Iron:	mo/l
incuion(CPump ⊔i ∭rStainle	ess ΩPV	ump U Otner:	D Other:			T Child		
Metarial	stPunip/Baner		ated D Prep	ared Off-Site	Field Clea	ned Disp	osable	DO:		mg/L
Material	Too	, ÇAVE UIYEL	ated D Pre	pared Off-Site		aned Ciner.	posable	- Nitrati	ə:	mg/L
Material Material	s: Tubing	Dedic:		~			🛛 No	Sulfat	:e:	mg/L
Material Material Depth to	s: Tubing Top	Dedica of Sampli	ng: <u>63</u>	£2	Field Filtere	a? La res				
Material Material Depth to Sample	s: Tubing Water at Time ID: <u>MW</u> -	of Sampli - 70	ng: <u>63</u> . Sample T	_ <u>+2</u> ime: <u> </u> 3	Field Filtere	# of Contain	ners:	- Alkeli	nit <i>u</i>	
Material: Material: Depth to Sample Duplicat	s: Tubing Water at Time ID: <u>MW</u> - e Sample Colle	of Sampli	ng: <u> </u>	12 ime: <u>[3</u> No ID:	Field Filtere 545 DUP-0	# of Contair	ners:	- Alkali	nity:	mg/L
Material Material Depth to Sample Duplicat	s: Tubing Water at Time ID: <u>MW</u> - e Sample Colle	of Sampli - 70 cted?	ng: <u> 1⁄2 3.</u> Sample T X ^{. Yes} ⊡	_ <u>+2_</u> ime: <u> 3</u> No ID:	Field Filtere 945 DUP-0	# of Contain	ners:	- Alkali	nity:	mg/L
Material Material Depth to Sample Duplicat	s: Tubing Water at Time ID: <u>MW</u> - e Sample Colle	of Sampli - 70 cted?	ng: <u>0</u> 3. Sample T X ^{. Yes} D	<u>+2</u> ime: <u> </u> 3 No ID:	Field Filtere	# of Contair	ners:	Alkali	nity:	mg/L
Material Material Depth to Sample Duplicat	s: Tubing Water at Time ID: <u>MW</u> - e Sample Colle MENTS	© Dedic: of Sampli 7O cted? <i>S</i> A M	ng: <u> </u>	<u>+2</u> ime: <u>3</u> No ID:	Field Filtere	# of Contain	ners:	Alkali	nity:	mg/L
Material Material Depth to Sample Duplicat	s: Fubing Water at Time ID: <u>MW</u> - e Sample Colle MENTS 20PPE D	Dedica of Sampli - 70 cted? <u>SAM</u> Pi	ng: <u>63</u> Sample T Y Yes D PLE1	<u>+2</u> ime: <u> </u> 3 No ID: <u>M</u>	Field Filtere 945 DUP - 0 A) - 1 -95	# of Contain	ners:	- Alkali BTOC,	THEN	mg/L
Material Material Depth to Sample Duplicat	s: Tubing Water at Time ID: <u>MW</u> - e Sample Colle MENTS <u>EOPPED</u>	of Sampli of Sampli -70 cted? <u>SAM</u> PL	ng: <u>63</u> Sample T X ^{Yes} D PLE1 (MP T) S	+2 ime: <u>13</u> No ID: > <u>M</u> > <u>M</u>	Field Filtere <u>945</u> DUP- <u>0</u> 0 DUP- 0 C DUP-	# of Contain D AT BTOC ES	ners: 701 A_A	- Alkali BTOC, AD SAN	THEN THEN	mg/L
Material Material Depth to Sample Duplicat	s: Fubing Water at Time ID: <u>MW</u> - e Sample Colle MENTS <u>20PPED</u> comments such a	of Sampli of Sampli - 70 cted? <u>S A M</u> <u>P L</u> s well cond	ng:3. Sample T X Yes D V Yes D L D L M D S ition, odor, p	<u>+2</u> ime: <u> 3</u> No ID: <u>M</u> <u>M</u> <u>F</u> <u>H</u> H	Field Filtere 945 DUP - 0 DUP - 0 DP - 1 OP - 1 DP - 1	# of Contain O AT BTOO ES arms not on the	ners:	Alkali BTOC, AD SAN	THEN THEN IPLED	mg/L

	DWEL	L		1/	/FII Ir	י M.	111-1		
				V		J. <u></u>			
. PROJ	ECT INFC	RMAT	ION						
Project N	umber: <u>25</u> 4	135	Task Num	ber: <u>00</u>	L	Date: <u>[0</u> -	10-0	<u>y</u>	Time: <u>1400</u>
Client:	KEY En	JERG	Y			Personnel:	C. Pi	ANBY	
Project L	pcation: <u>H</u>	BBS,	NM	يود فروند الم		Weather: (CLEAR,	SUNNY.	<u>90°F</u>
WELL	DATA	1	·····-						
Casing D	iameter:	inct	nes	Type: Type	C 🖸 Stainle	ss 🛛 Galv. Si	teel 🛛 Teflon	B D Other:	- pust
Screen D	iameter:	inch	nes	Type: ÇXQ∌∖	C D Stainle	ss 🖸 Galv. Si	teel D Teflon	B 🗆 Other:	- Morit
Total Dep	oth of Well: ~		et		op of Well Cas	ing (TOC)	Top of Prote	ctive Casing DO	ther:
Depth to	Static Water: [[<u>3. +(</u>	feet		op of Well Cas	ing (TOC)	Top of Prote	ctive Casing 00	ther
Depth to	Product:	feet	2		p of Well Cas	ing (TOC)	Top of Prote	ctive Casing D C	ther
Length o	water Column	5 "	∠ teet	weii Volume	e: 06	gal	Screened In Note: 2	terval (from GS): -inch well = 0.16 aa	176 170
			om GS)			<u></u>			
		r, Size:	_ 🗆 Bladde	er Pump 1272	Submersible	Pump 🗆 4" S	Submersible Pi	amp	
Purge M	ethod: Centr	ifugal Pum	p 🖸 Perista	Itic Pump 🖬 Ir	nertial Lift Pur	p 🛛 Other:		• 	Equipment Model(s)
Materials	: Pump/Bailer	Stainle Dedica	ess □ PVC ated □ Prep	ared Off-Site	Other.	ned Dispo	osable	1. 1157	- 600 XI
Materials	: Rope/fubing		hylene DF	Polypropylene		Other:			11 TUDDINET!
Was wel	purged drv?							2 HAC	H JUKEDIN
	Cum Collons			Pumpir	ig Kate:_()	Dissolver	1/min	3. FUI	TZZ PUMP
Time	Removed	рН	Temp	Cond.	Eh	Oxygen	Turbidity	(TOC)	Comments
1400	0.5	5.78	20.88	1.737	512.1	0.03	7.58	63.70	CLEAR
1403	1.75	5.46	20.38	1.831	535.7	-2.7	7.51	63.71	
1406	3.50	5.43	20.43	1.840	538.4	-0.29	7.96	103.71	
1409	4.75	5.45	20.53	1.85%	540.1	0.35	7.29	103.72	
412	6.50	5.46	20.47	1.862	541.1.	-0.39	7.72	63.73	
									•••
									·····
									<u>,</u>
									······································
4. SAMF	PLING DA	TA						<u>Geoct</u>	nemical Analyses
Method(5): D Bailer, Siz	ze: (Pump D (Bladder Po Inertial Lift Po	ump 🗡 2" Sui ump 🛛 Other	omersible Pun	np 🖸 4" Subi	mersible Pump	Ferrou	us Iron: mg/L
Material	:Pumo/Bailer		ess 🛛 PVC	C D Teflon@	Other:				mal
NA-1-1-1	2	Dedic	ated 🛛 Prep thylene 🕞 I	ared Off-Site Polypropylene	E-Field Clea	ned 📮 Disp 🗆 Other:	osable	D U.,	
Materials		Dedic	ated D Pre	epared Off-Site	D Field Cle	aned Pois	posable	- Nitrate	e: mg/L
Depth to	Water at Time	of Sampl	ing: <u> 03</u>	.+3	Field Filtere	ed? 🗆 Yes	D No	Sulfat	e:mg/L
Sample	ID: <u>MW-</u>	1-93	7Sample T	ime: <u>14</u>	20	# of Contain	ners:	- Alkali	nity: ma/L_`
Duplicat	e Sample Colle	cted?	• Yes 🛠	No ID:		-			
						_			
5. COM	MENTS	SAM	2LED	Mu)-1 A	7-70		EN DRON	OPED PUMP
TO	95' E	STOC,	AN.	D SAL	MPLE) AGE	HN.		· ·
			TDS_	+ CH	ZORI	DES)			\sim
1-1-1-1-1-1								-1	
Vote: Include	comments such a	s well cond	lition, odor, p	resence of NA	PL, or other it	ems not on the	field data she	et.	

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BROWN AND GRO	OUNDWATER S	SAMPLING FI	ELD DATA	SHEET
CALDWELL	WELL II): MIN-2		
PROJECT INFORMATION Project Number: 25935 Task Nu Client: K51 EAJERGA	imber: <u>() </u>	Date: $(e - 11 - 0)$	Tim	ne:_1245_
Project Location: HOBBS, N	M	Weather: CLEAR	SUNNY	90'F
. WELL DATA				
Casing Diameter: 2 inches	Type: CrPVC D Stainle	ss 🛛 Galv. Steel 🗅 Teflon	@ □ Other:	_ (FLUSH
Screen Diameter:2 inches	Type: D PVC D Stainle	ss 🖾 Galv. Steel 🖾 Teflon	® □ Other:	MOUNT
Total Depth of Well: feet	From: 🔊 Top of Well Cas	ing (TOC) D Top of Prote	ective Casing D Other	
Depth to Static Water: <u>U3.96</u> feet	From: E Top of Well Cas	ing (TOC) Top of Prote	ective Casing Other	•
Depth to Product: feet	From: D Top of Well Cas	sing (TOC) D Top of Prote	ective Casing D Othe	r
Length of Water Column: $(2, \partial Q_{\text{feet}})$	Well Volume:	gal Screened Ir	iterval (from GS):	<u>56'-76'</u>
Pump intake depth <u>10</u> (from GS)	·····	NOTE: 2	2-inch weil = 0.16 gai/π	4-inch well = 0.65 ga
Purge Method: Bailer, Size: Bailer, Size:	dder Pump ∵ 94 2" Submersible stattic Pump ☐ Inertial Lift Pun VC ☐ Teflon® ☐ Other:	Pump 🖬 4" Submersible P np 🖨 Other:	ump	Equipment Model(s)
Materials: Pump/Baller Dedicated D P	epared Off-Site Sterield Clea	ned Disposable	1. <u> </u>	IMOOXL
Materials: Roper ubino Dedicated	Polypropylene Teflon® Prepared Off-Site Field Cle	aned ACDisposable	2. HACH	TURBIDIT
Was well purged dry? D Yes A No	Pumping Rate:	30 gai/min	3. FUE	ž <u>2"SUB. PU</u>
Time Culli Gallons pH Temp	Cond. Eh	Oxygen Turbidity	(TOC)	Comments
305 0.5 5.65 22.5	5 2170 330.3	-10.04 32.8	104.08	CLEAR
1308 2.25 5.14 21.8	8 2.112 426.0	-1.62 23-1	64.08	
1311 3.5 5.13 22.0	3 2.088 448.4	0.2014.4	64.09	
1314 4.75 5.09 21.7	7 1.057 964.2	1.18 9.72	64.10	
1317 10.0 5.01 21.5	42.017 479.2	2.02 5.15	64.12	
1320 8.25 5.16 21.2	5 1.999 482.1	2.68 3.73	64.13	
				······································
I. SAMPLING DATA			Geocherr	ical Analyses
Method(s):	Pump 22" Submersible Pun	np 🛛 4" Submersible Pump	Ferrous I	ron: 1 ma/L
Materials: Rump/Bailer Stainless DF	VC D Teflon® D Other:		DO	0
	repared Off-Site	ned Disposable	DO.	mg/L
Materials: Tubing/Rope	Prepared Off-Site Field Cle	aned Disposable	- Nitrate:	mg/L
Depth to Water at Time of Sampling: 0	<u>4.15</u> Field Filtere	ed? 🗆 Yes 🕵 No	Sulfate:	mg/L
Sample ID: MW-L Sample	Time: 1322	# of Containers:	Alkalinity	: mg/L
Duplicate Sample Collected?	X No ID:	-	•	1
5. COMMENTS CHORE	DES, TDS			
	presence of NAPL, or other it	ems not on the field data she	et.	
'OLE' INCLUDE COMMENTS SUCH as well condition - ono.				-

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FORM GW-1	(Rev 2/26/02 - dg)
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ATTACHMENT 3

Laboratory Analytical Report

P:\Wp\KEYENRGY\25935\002ir.doc



HOBBES

JOB NUMBER: 275487

Prepared For:

Brown and Caldwell 1415 Louisiana Suite 2500 Houston, TX 77002

Attention: Madeline Mauk

Date: 06/21/2004

Signature

Name: Ed B. Fry Title: Project Manager III E-Mail: efry@stl-inc.com

6/22/NA Dat

Severn Trent Laboratories 6310 Rothway Drive Houston, TX 77040

PHONE: (713) 690-4444

TOTAL NO. OF PAGES.

06/21/2004



Madeline Mauk Brown and Caldwell 1415 Louisiana Suite 2500 Houston, TX 77002

Reference: Project : Brown and Caldwell-Hobbs Eunice Project No. : 275487 Date Received : 06/11/2004 STL Job : 275487

Dear Madeline Mauk:

Enclosed are the analytical results for your project referenced above. The following samples are included in the report.

SB-3 (5-5.5)
 SB-3 (9-9.8)
 SB-3 (14-14.5)
 MW-1-70
 MW-1-95
 DUP-01

All holding times were met for the tests performed on these samples.

Enclosed, please find the Quality Control Summary. All quality control results for the QC batch that are applicable to the sample(s) are acceptable except as noted in the QC batch reports.

The test results in this report meet all NELAP requirements for STL Houston's NELAP accredited parameters. Any exceptions to NELAP requirements will be noted and included in a case narrative as a part of this report.

If the report is acceptable, please approve the enclosed invoice and forward it for payment.

Thank you for selecting Severn-Trent Laboratories to serve as your analytical laboratory on this project. If you have any questions concerning these results, please feel free to contact me at any time.

We look forward to working with you on future projects.

Sincerely,

Ed B. Fry Project Manager



SAMPLE INFORMATION Date: 06/21/2004

Job Number.: 275487 Customer...: Brown and Caldwell Attn.....: Madeline Mauk

Laboratory Sample ID	Customer Sample ID	Sample Matrix	Date Sampled	Time Sampled	Date Received	Time Received
275487-1	SB-3 (5-5.5)	Soil	06/09/2004	12:00	06/11/2004	08:39
275487-2	SB-3 (9-9.8)	Soil	06/09/2004	12:08	06/11/2004	08:39
275487-3	SB-3 (14-14.5)	Soil	06/09/2004	12:15	06/11/2004	08:39
275487-4	MW-1-70	Water .	06/10/2004	13:45	06/11/2004	08:39
275487-5	MW-1-95	Water	06/10/2004	14:20	06/11/2004	08:39
275487-6	DUP-01	Water	06/10/2004	00:00	06/11/2004	08:39
•						
			- 			
·····	L	Page 1	I	L	<u> </u>	<u> </u>

				ECH	be	ıra	laz		
				/TIME	04 1336 c	04 1000 E	04 1526 <mark>n</mark>		
		Mauk		T DATE	06/18/	06/15/	06/17/		
	/21/2004	Madel ine		BATCH D	103342	103188	103263		
	Date:06	ATTN:		UNITS	ng/Kg		mg/Kg		
				DILUTION	1.0000				
	S		: 275487-1 : 06/11/2004 : 08:39	RL	1000.00		8.3		
	RESULT	CE	atory Sample ID Received Received	HDL	42.97		2.094468		
	TEST	HOBBS EUNI	Labor Date Time	FLAGS				е у	
	VBORATORY	PROJECT :		SAMPLE RESULT	313	Complete	2.094468 U	C.	
	L A Job Number: 275487	un and Caldwell	r Sample ID: SB-3 (5-5.5) mpled: 06/09/2004 mpled: 12:00 Matrix: Soil	PARAMETER/TEST DESCRIPTION	Total Volatile Petrolèum Hydrocarbons TVPH as GRO, Soil	Extraction (Ultrasonic) DRO Ultrasonic Extraction, Soil	Total Extractable Petroleum Hydrocarbons TEPH - as Diesel, Soil	* In Description = Dry Wgt.	
S		CUSTOMER: Brow	Customer Date Sam Time Sam Sample M	TEST METHOD	SH-846 80158	SW-846 3550B	SW-846 8015B		

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	Date:06/21/2004	ATIN: Madeline Mauk		NITS BATCH DT DATE/TIME TECH	19/L 102935 06/14/04 1800 sur	Ig/L 102945 06/15/04 0607 cas	
						2	
•	T S		ID: 275487-4 : 06/11/2004 : 08:39	S S S S S S S S S S S S S S S S S S S	10	4	
	T RESUL	NICE	oratory Sample ce Received e Received	MDL	2.99	0.70	
	TES	HOBBS EL	Lat Dat Tin	D FLAGS			age 3
	ABORATORY	PROJECT:		SAMPLE RESULT	1260	327	č
E V E R N	Job Number: 275487	wn and Caldwell	r Sample ID: MW-1-70 mpled 06/10/2004 mpled 13:45 Matrix Water	PARAMETER/TEST DESCRIPTION	Solids, Total Dissolved (TDS), Water	Chloride, Water	* In Description = Dry Wgt.
		CUSTOMER: Brow	Customer Date Sam Time Sam Sample M	TEST METHOD	EPA 160.1	EPA 300.0	

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•			ECH	IJ	St.	
		~	DATE/TIME	5/14/04 1800 s	5/15/04 0622 c	
	/21/2004	Madel ine Mauk	BATCH DT	102935 06	102945	
	Date:06	ATTN:	INITS	mg/L	Л/бш	
			DILUTION	-	6	
	T S	D: 275487-5 .: 06/11/2004 .: 08-30	Tr.	10	4.0	
	. RESUL	CE atory Sample II Received	WDL	2.99	0.70	
	ΤΕS	HOBBS EUN Labo Date Timo	0 FLAGS			age 4
	АВОКАТОКҮ	PROJECT :	SAMPLE RESULT	1510	476	τ
V L R N	bb Number: 275487	and Caldweil Sample ID: MW-1-95 Led: 06/10/2004	trix Water Parameter/TEST DESCRIPTION	Solids, Total Dissolved (TDS), Water	Chloride, Water	* In Description = Dry Wgt.
SE	9	CUSTOMER: Brown Customer S Date Sampl	Time sample Mat	EPA 160.1 S	EPA 300.0	

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				DATE/TIME TECH	6/14/04 1800 sur	6/15/04 0637 cas		
	:06/21/2004	: Madeline Maul		BATCH DT	102935 06	102945 00		
•	Date:	ATTN:		TION UNITS	mg/L	mg/L		
			487-6 11/2004 39		10	4.0 10		
	RESULTS		y Sample ID: 275 ived 06/ ived 08:	MDL	2.99	0.70		
	TEST	: HOBBS EUNICE	Laborator Date Rece Time Rece	a Flags			-	age 5
	ABORATORY	PROJECT:		SAMPLE RESULT	1310	331		
	Job Number: 275487	n and Caldweil	Sample ID: DUP-01 pled: 06/10/2004 pled: 00:00 atrix: Water	PARAMETER/TEST DESCRIPTION	Solids, Total Dissolved (TDS), Water	Chloride, Water		* In Description = Dry Wgt.
S		CUSTOMER: Brown	Customer Date Samp Time Sample Ma	TEST METHOD	EPA 160.1	EPA 300.0		

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EVERN

Job Number.: 275487

QUALITY CONTROL RESULTS

Report Date.: 06/21/2004

CUSTOMER: Brown and Caldwell

PROJECT: HOBBS EUNICE

ATTN: Madeline Mauk

Te: Me Pai	st Method. thod Descr rameter	iption.: EPA	300.0 Chromatography oride	Analysis	Units Batch(s)	: 102945	Analyst: cas Test Code.: CHL				
oc	Lab ID	Reagent	QC Result	QC Result	True Value	Orig. Value	Calc. Result *	Limits	F	Date	Time
сν		WCS31126	19.753		20.00		98.8	90.0-110.		06/14/2004	1701
ICB			0.2653							06/14/2004	1716
MB			0.2621							06/14/2004	1731
LCS		WCS31126	19.568		20.00		97.8	90.0-110.		06/14/2004	1746
ប	275458-1		54.164			54.071	0.2	20		06/14/2004	1816
S	275458-1	WCS30882	58.397		10.000000	54.071	43.3	80-120		06/14/2004	1831
CCV		WCS31126	19.686		20.00		98.4	90.0-110.		06/14/2004	2002
<u>_</u> CCB			0.2566							06/14/2004	2017
C۷		WC\$31126	19.919		20.00		99.6	90.0-110.		06/14/2004	2304
СВ			0							06/14/2004	2319
υU	275514-3		7.5783			5.9711	23.7	20	С	06/14/2004	2349
MS	275514-3	WCS30882	16.555		10.000000	5.9711	105.8	80-120		06/15/2004	0004
ЪB			0.2293							06/15/2004	0135
CS		WCS31126	20.034		20.00		100.2	90.0-110.		06/15/2004	0150
CV		WCS31126	19.617		20.00		98.1	90.0-110.		06/15/2004	0205
CCB			0							06/15/2004	0220
<u>_c</u> cv		WCS31126	19.720		20.00		98.6	90.0-110.		06/15/2004	0507
СВ			0.2680							06/15/2004	0522
U	275451-1		1.8166			1.7858	0.0308	0.4000		06/15/2004	0723
мS	275451-1	WCS30882	11.657		10.000000	1.7858	98.7	80-120		06/15/2004	0738
CCV		WCS31126	20.050		20,00		100.2	90.0-110.		06/15/2004	0808
CCB			0.2601							06/15/2004	0823
cv		WCS31126	19.637		20.00		98.2	90.0-110.		06/15/2004	0908
СВ			0.2266							06/15/2004	0924

Test Method.....: EPA 160.1 Method Description.: Solids, Total Dissolved (TDS) Parameter....... Solids, Total Dissolved (TDS)

Analyst...: sur Test Code.: TDS

С	Lab ID	Reagent	QC Result	QC Result	True Value	Orig. Value	Calc. Result *	Limits	F	Date	Time
U LCS MB	275517-2	WCS31351	1052.00 3520.00 1.00		3600	1012.00	3.9 97.8	10.0 90.0-110.	_	06/14/2004 06/14/2004 06/14/2004	1800 1800
UB	275487-6		1311.00			1256.00	4.3	10.0		06/14/2004	1800 1800 1800
LCS DU	275338-10	WCS31351	3506.00 1359.00		3600	1388.00	97.4 2.1	90.0-110. 10.0		06/14/2004 06/14/2004	1800 1800

Units..... mg/L Batch(s)...: 102935

* %=% REC, R=RPD, A=ABS Diff., D=% Diff.

Job Number.: 27548	QUALITY 7	CONTRO	L RESULTS	Report	Date.: 06/21	/2004
USTOMER: Brown and Caldwell	PROJE	CT: HOBBS EUNI	CE	ATTN:	Madeline Mauk	
QC Type Desc	ription	Reag. Cod	e Lab ID	Dilut	ion Factor	Date Tim
Test Method: SW-846 801 Nethod Description.: Total Vola	5B tile Petroleum Hydrocarb	Units ons Batch(s	: ug/L): 103342	. ,	Analyst	: cad
CV Continuing Calibra	tion Verification	SCCV970	103342-1			06/18/2004 08
Parameter/Test Descripti	on QC Result	QC Result	True Value Or	ig. Value	Calc. Result	* Limits
PH as GRO, Water	239.472		250		95.8	85.0-115.0
CCV Continuing Calibra	tion Verification	SCCV970	103342-2			06/18/2004 15
Parameter/Test Descripti	on QC Result	QC Result	True Value Or	ig. Value	Calc. Result	* Limits
H as GRO, Water	262.056		250		104.8	85.0-115.0
.CS Laboratory Control	Sample	BXS061704A	103342-1			06/18/2004 10
Parameter/Test Descripti	on QC Result	QC Result	True Value Or	ig. Value	Calc. Result	* Limits
PH as GRO, Soil	285.683	<u></u>	250.000000		114.3	49-151
1B Method Blank			103342-1			06/18/2004 1'
Parameter/Test Descripti	on QC Result	QC Result	True Value Or	ig. Value	Calc. Result	* Limits
PH as GRO, Soil	ND					
AS Matrix Spike		BX110503A	275487-1			06/18/2004 12
Parameter/Test Descripti	on QC Result	QC Result	True Value Or	ig. Value	Calc. Result	* Limits
PH as GRO, Soil	247.273		500	15.6384	46.3	50-150
Matrix Spike Dupli	cate	BX110503A	275487-1			06/18/2004 1
Parameter/Test Descripti	on QC Result	QC Result	True Value Or	rig. Value	Calc. Result	: * Limits
PH as GRO, Soil	246.769	247.273	250.000000	15.6384	92.5 0.2	50-150 20
Fest Method: SW-846 801 Method Description.: Total Extr	5B Pactable Petroleum Hydrod	Units carbons Batch(s	: mg/L ;): 103263		Analys	t: maz
CS Laboratory Control	Sample	GC020404	103263-1			06/17/2004 1
Parameter/Test Descripti	ion QC Result	QC Result	True Value O	rig. Value	Calc. Resul	t * Limits
PH - as Diesel, Soil	1216.6435		1000.000000	,	121.7	70-130
		Page 7	★ %=% REC. R=	RPD. A=ABS	Diff., D=% Di	ff.

SEVERN STL

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-		Job Number.: 275487	QUALITY	CONTRO	LRE	SULT	s	Report	t Date.: 06/2	1/2004	
CUST	OMER: B	rown and Caldwell	PROJ	ECT: HOBBS EUNI	CE			ATTN:			
QC	Туре	Description		Reag. Cod	e	Lab	ID	Dilu	tion Factor	Date	Time
мв		Method Blank		GC040904		103263-1				06/17/2	004 1400
	Para	meter/Test Description	QC Result	QC Result	True	Value	Orig.	Value	Calc. Resul	t * Liı	nits F
EPH -	as Die	sel, Soil	ND							<u> </u>	
MS		Matrix Spike		GC052704		275487-1				06/17/2	004 1400
	Para	meter/Test Description	QC Result	QC Result	True	Value	Orig.	Value	Calc. Resul	t * Lii	nits F
ТЕРН -	as Die	sel, Soil	1087.6501	······	100	0.000000	N	D	108.8	7	0-130
MSD		Matrix Spike Duplicate		GC052704		275487-1				06/17/2	004 1443
	Para	meter/Test Description	QC Result	QC Result	True	Value	Orig.	Value	Calc. Resul	t * Liı	nits F
PH -	as Die	sel, Soil	1323.3977	1087.6501	100	0.00000		D	132.3 19.6		0-130

SEVERN STL

* %=% REC, R=RPD, A=ABS Diff., D=% Diff. Page 8

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SURROGATE RECOVERIES REPORT

Report Date.: 06/21/2004

CUSTOMER: Brown and Caldwell PROJECT: HOBBS EUNICE

Job Number.: 275487

SEVERN STL

ATTN: Madeline Mauk

B	Method Total Extractable Petroleum Hydrocarbo Batch(s): 103263				nod Code: 8015D : Matrix: Soil	Prep Batch: 103188 Equipment Code: EXIGC01
Lab ID		DT	Sample ID	Date	OTERPH	
103263-	1 LC	 S		06/17/2004	101.5	
103263-	1 MB			06/17/2004	110.6	
275487-	1		SB-3 (5-5.5)	06/17/2004	95.2	
275487-	1 MS		SB-3 (5-5.5)	06/17/2004	105.4	
275487-	1 MSI)	SB-3 (5-5.5)	06/17/2004	116.7	
Test	Te	st De	scription	Limits		

60 - 140

OTERPH

o-Terphenyl

		JC											
CUSTOMER	: :	Brown	n anc	l Caldwell			PRO	JECT: HC	BBS EUNICE			ATTN: Madeline Mauk	
Me Be	eth atc	od h(s)		.: Total Volati .: 103342	e Petro	leum Hy	ydroc	arbons	Metho Test	od Code. Matrix.	: 8015G : Water	Prep Batch: Equipment Code: BTEX07	
Lab ID			DT	Sample ID					Date	ATFT	BFB		
03342- 03342-	1 2	CCV CCV							06/18/2004 06/18/2004	93.6 99.2	88.5 92.8		
Test		Test	Desc	ription				Limits					
ATFT SFB	-	a,a, BFB	a-Tr: (Suri	ifluorotoluene rogate)			1	58 - 143 70 - 139	5				
M	eth ato	iod :h(s)		: Total Volati : 103342	le Petro	leum H	ydroc	arbons	Metho Test	od Code. Matrix.	: 8015G : Soil	Prep Batch: Equipment Code: BTEX07	,
Lab ID			DT	Sample ID				<u></u>	Date	ATFT	BFB		
103342- 03342- 275487- 275487- 275487-	1 1 1 1	LCS MB MS MSD		SB-3 (5-5.5) SB-3 (5-5.5) SB-3 (5-5.5)					06/18/2004 06/18/2004 06/18/2004 06/18/2004 06/18/2004	91.4 84.8 89.0 98.4 96.4	89.1 83.0 87.0 90.8 89.2		
Test		Test	Des	cription				Limits					
AT F T I F B	•	a,a, BFB	a-Tr (Sur	ifluorotoluene rogate)				50 - 150 50 - 150))				

SEVERN TRENT STL

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REFERENCES AND NOTES

Report Date: 06/21/2004

REPORT COMMENTS

- 1) All pages of this report are integral parts of the analytical data. Therefore, this report should be reproduced only in its entirety.
- 2) Reporting limits are adjusted for sample size used, dilutions and moisture content if applicable.
- 3) According to 40CFR Part 136.3, pH, Chlorine Residual, and Dissolved Oxygen analyses are to be performed immediately after aqueous sample collection. When these parameters are not indicated as field, (e.g. pH Field) they were not analyzed immediately, but as soon as possible on laboratory receipt.
- 4) For all USACE projects, the QC limits are based on "mean +/- 2 sigma", which are the warning limits.

General Information:

SEVERN

- Cresylic Acid is the combination of o,m and p-Cresol. The combination is reported as the final result.
- m-Cresol and p-Cresol co-elute. The result of the two is reported as either m&p-cresol or as p-cresol.
- m-Xylene and p-Xylene co-elute. The result of the two is reported as m,p-Xylene.
- N-Nitrosodiphenylamine decomposes in the gas chromatograph inlet forming dipheylamine and, consequently, may be detected as diphenylamine.
- Methylene Chloride and Acetone are recognized potential laboratory contaminants. Its presence in the sample up to five times the amount reported in the blank may be attributed to laboratory contamination.
- Trimethysilyl(Diazomethane) is used to esterify acid herbicides in Method SW-846 8151A.
 For Inorganic analyses, duplicate QC limits are determined as follows: If the sample result is less than or equal to 5 times the reporting limit, the RPD limit is equal to the reporting limit. If the sample result is greater than 5 times the reporting limit, the RPD limit is the method defined RPD.

Explanation of Qualifiers:

- U This qualifier indicates that the analyte was analyzed but not detected.
- J (Organics only) This qualifier indicates that the analyte is an estimated value between the RL and the MDL.
- B (Inorganics only) This Qualifier indicates that the analyte is an estimated value between the RL and the MDL.
- N (Organics only) This flag indicates presumptive evidence of a compound. This flag is only used for tentatively identified compounds (TICs), where the identification is based on a mass spectral library search. It is applied to all TIC results. For generic charachterization of a TIC, such as "chlorinated hydrocarbon", the "N" flag is not used.

Explanation of General QC Outliers:

- A Matrix interference present in sample.
- a MS/MSD analyses yielded comparable poor recoveries, indicating a possible matrix interference. Method performance is demonstrated by acceptable LCS recoveries.
- b Target analyte was found in the method blank.
- M QC sample analysis yielded recoveries outside QC acceptance criteria. This sample was reanalyzed.
- L LCS analysis yielded high recoveries, indicating a potential high bias. No target analytes were
- observed above the RL in the associated samples. G - Marginal outlier within 1% of acceptance criteria.
- pp value is subside method secondaries eniteria.
- r RPD value is outside method acceptance criteria.C Poor RPD values observed due to the non-homogenous nature of the sample.
- C Poor KPD values observed due to the non-nomogenous nature
- 0 Sample required dilution due to matrix interference.
- D Sample reported from a dilution.d Spike and/or surrogate diluted.
- P The recovery of this analyte is outside default QC limits. The data is accepted and will be used to calculate in-house statistical limits.
- E The reported concentration exceeds the instrument calibration.
- F The analyte is outside QC limits. The sample data is accepted since this analyte is not reported in associated samples.
- H Continuing Calibration Verification (CCV) standard is not associated with the samples reported.
- q See the subcontract final report for qualifier explanation.

QUALITY ASSURANCE METHODS

REFERENCES AND NOTES

Report Date: 06/21/2004

- W The MS/MSD recoveries are outside QC acceptance criteria because the amount spiked is much less than the amount found in the sample.
- High recovery will not affect the quality of reported results.
- Z See case narrative.

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Explanation of Organic QC Outliers:

- e Method blank analysis yielded phthalate concentrations above the RL. Phthlates are recognized potential laboratory contaminants. Its presence in the sample up to five times the amount reported in the blank may be attributed to laboratory contamination.
- S Sample reanalyzed/reextracted due to poor surrogate recovery. Reanalysis confirmed original analysis indicating a possible matrix interference.
- T Sample analysis yielded poor surrogate recovery.
- R The RPD between the two GC columns is greater than 40% and no anomalies are present. The higher result is reported as per EPA Method 8000B.
- 1 The RPD between the two GC columns is greater than 40% and anomalies are present. The lower of the two results has been reported.
- X Gaseous compound. In-house QC limits are advisory.
- Y Ketone compounds have poor purge efficiency. In-house QC limits are advisory.
- f Surrogate not associated with reported analytes.

Explanation of Inorganic QC Outliers:

- Q Method blank analysis yielded target analytes above the RL. Associated sample results are greater than 10 times the concentrations observed in the method blank.
- V The RPD control limit for sample results less than 5 times the RL is +/- the RL value. Sample and duplicate results are within method acceptance criteria.
- e Serial dilution failed due to matrix interference.
- g Sample result quantitated by Method of Standard Additions (MSA) due to the analytical spike recovery. being below 85 percent. The correlation coefficent for the MSA is greater than or equal to 0.995.
- s BOD/cBOD seed value is not within method acceptance criteria. Due to the nature of the test method, the sample cannot be reanalyzed.
- l BOD/cBOD LCS value is not within method acceptance criteria. Due to the nature of the test method, sample cannot be reanalyzed.
- n Sample result quantitated by Method of Standard Additions (MSA) due to the analytical spike recovery being below 85 percent. The correlation coefficient for the MSA is less than 0.995.

Abbreviations:

Batch	- Designation given to identify a specific extraction, digestion, preparation, or analysis set.
CCV	- Continuing Calibration Verification
CRA	- Low level standard check - GFAA, Mercury
CRI	- Low level standard check - ICP
Dil Fac	- Dilution Factor - Secondary dilution analysis
DLFac	- Detection Limit Factor
EB	- Extraction Blank (TCLP, SPLP, etc.)
ICAL	- Initial Calibration
ICB	- Initial Calibration Blank
1 C V	- Initial Calibration Verification
ISA	- Interference Check Sample A - ICP
I SB	- Interference Check Sample B - ICP
LCD	- Laboratory Control Duplicate
LCS	- Laboratory Control Sample
MB	- Method Blank
MD	- Method Duplicate
MDL	- Method Detection Limit
MS	- Matrix Spike



QUALITY ASSURANCE METHODS

REFERENCES AND NOTES

Report Date: 06/21/2004

- Matrix Spike Duplicate MSD
- ND - Not Detected
- Preparation Blank ΡВ
- Preparation Factor PREPF
- Reporting Limit RL
- Relative Percent Difference RPD
- Relative Response Factor RRF
- Retention Time RT
- DU - Duplicate

Method References:

- (1) EPA 600/4-79-020 Methods for the Analysis of Water and Wastes, March 1983.
- (2) EPA 600/R-94-111 Methods for the Determination of MEtals in Environmental Samples, Supplement I, May 1994.
- EPA SW846 Test Methods for Evaluating Solid Waste, Third Edition, September 1986; Update I July (3) 1992; Update II, September 1994, Update IIA August 1993; Update IIB, January 1995; Update III, December 1996, Update IVA January 1998, Update IVB November 2000.
- (4) Standard Methods for the Examination of Water and Wastewater, 16th Edition (1985), 17th Edition (1989), 18th Edition (1992), 19th Edition (1995), 20th Edition (1998).
- (5) HACH Water Analysis Handbook 3rd Edition (1997).
- (6) Federal Register, July 1, 1990 (40 CFR Part 136 Appendix A).
 (7) Compendium of Methods for the Determination of Toxic Organic Compounds in Ambient Air, 2nd Edition, January 1997.
- (8) ASTM Annual Book of Methods (Various Years)
- (9) Diagnosis and Improvement of Saline and Alkali Soils, Agriculture Handbook No. 60, United States Department of Agriculture, 1954.



Job Number: 275487

SEVERN TRENTS STL

Date: 06/21/2004

CUSTOMER: Brown a	nd Caldwell Pi	ROJECT: HOBBS	EUNICE			ATTN: Madeline Mauk	
Lab ID: 275487-1 METHOD	Client ID: SB-3 (5-5.5) DESCRIPTION	Date Re RUN#	cvd: 06/ BATCH#	11/2004 PREP BT	Sample #(S)	Date: 06/09/2004 DATE/TIME ANALYZED	DILUTION
SW-846 8015B SW-846 8015B SW-846 8015B	Total Extractable Petroleum Hydrocarbox Total Volatile Petroleum Hydrocarbox	ns 1 1	103188 103263 103342	103188		06/15/2004 1000 06/17/2004 1526 06/18/2004 1336	1.0000
Lab ID: 275487-4 METHOD EPA 300.0 EPA 160.1	Client ID: MW-1-70 DESCRIPTION Ion Chromatography Analysis Solids, Total Dissolved (TDS)	Date Re RUN# 1 1	cvd: 06/ BATCH# 102945 102935	11/2004 PREP BT	Sample #(S)	Date: 06/10/2004 DATE/TIME ANALYZED 06/15/2004 0607 06/14/2004 1800	DILUTION 10
Lab ID: 275487-5 METHOD EPA 300.0 EPA 160.1	Client ID: MW-1-95 DESCRIPTION Ion Chromatography Analysis Solids, Total Dissolved (IDS)	Date Re RUN# 1 1	cvd: 06/ BATCH# 102945 102935	'11/2004 PREP BT	Sample #(S)	Date: 06/10/2004 DATE/TIME ANALYZED 06/15/2004 0622 06/14/2004 1800	DILUTION 10
Lab ID: 275487-6 METHOD EPA 300.0 EPA 160.1	Client ID: DUP-01 DESCRIPTION Ion Chromatography Analysis Solids, Total Dissolved (TDS)	Date Re RUN# 1 1	cvd: 06/ BATCH# 102945 102935	'11/2004 PREP BT	Sample #(S)	Date: 06/10/2004 DATE/TIME ANALYZED 06/15/2004 0637 06/14/2004 1800	DILUTION 10

RECORD	LAB JOB NO.	REMARKS/PRECAUTIONS	5 DAY TAT HOLD HOLD			ER DATE	ANY: TIME DATE	ANY: TIME 81L8222H600 (0803)
	SOLS M- CONTANTERS				AIRBILL NO.:	10 days	IME PRINTED NAME/COMP ATE 3. RECEIVED BY: SIGNATURE:	ME PRINTED NAME/COMP
SEVERN STL BERN	COMPANY: CONTRANTION PROJECT INFORMATION COMPANY: PROJECT NAME AUMBER: EVAIL SEND REPORT TO MADEULANE MAILL ADDRESS LOALS LAALS AND ST BILLING INFORMATION STE 200 ADDRESS: ADDRESS: STE 200	PHONE: J_J_S_G_OGG PHONE: FAX: J_S_C_S_S_C FAX: PAX: J_S_C_S_S_C FAX: PANPLE SAMPLE SAMPLE SAMPLE NO. SAMPLE SAMPLE	- 5B-3/5-55 69-04 1700 5 400 2 5B-3/9-98 69-04 1208 5 400 3 5 B-3/14-145/69-04 1208 5 400	1-955 MW-1-70 6-10-04 1345 W1 Plast. 9 6 DUP-01 - 90 6-10-04 1420 W Plast 10 DUP-01 6-10-04 - W Plast	SHIPMENT METHOD:	REQUIRED TURNAROUND* SAME BAY 24 HOURS 48 HOURS 72 HOURS 5 DAYS 1 I. RELINQUISHED BY: DATE 2. RELINQUISHED BY: D 0 0 0 SIGNATURE: 6 Houcal SIGNATURE: 6 Houcal SIGNATURE: 0	RINKED HAME COMPANYS COMPANYS COMPANYS COMPANY: TIME DO PRINTED NAME/COMPANY: TIME DO PRINTED NAME/COMPANY: TIME DI PRINTENCI DI PRI	BRINTED NAME COMPANY: 1575 TORE OF PRINTED NAME/COMPANY: TI STL HOUSTON 6310 Rothway Drive Houston, TX 77040

] 1 I
rpjsckl	Job Sample Receipt Checklist Report	V2
Job Number.: 275487 Location.: 57216 Customer Job ID: Project Number.: 99004969 Project Descr Customer: Brown and Caldwell	Check List Number.: 1 Description.: Job Check List Date.: 06/11/2004 iption.: Brown and Caldwell-Hobbs Eunice Contact.: Madeline Mauk	Date of the Report: 06/11/2004 Project Manager: ebf
Questions ?	(Y/N) Comments	
Chain of Custody Received?	Y	
If "yes", completed properly?	Y	
Custody seal on shipping container?	Y	
If "yes", custody seal intact?	Y	
Custody seals on sample containers?	N	
If "yes", custody seal intact?		
Samples chilled?	Y	
Temperature of cooler acceptable? (4 deg	C +/- 2). Y 2.6	
If "no", is sample an air matrix?(no t	emp req.)	
Thermometer ID	Y 405	
Samples received intact (good condition)?	γγ	
Volatile samples acceptable? (no headspac	ce)	
Correct containers used?	Y	
Adequate sample volume provided?	Υ	
Samples preserved correctly?	Υ	
Samples received within holding-time?	Y	
Agreement between COC and sample labels?.	Y	
Radioactivity at or below background leve	els? Y	
Additional		
Comments		. 1
Sample Custodian Signature/Date		: UAV

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?:	mu n		05.30		2014 武歌	11 4 9:29	· · ·
		<u> </u>	10.01	UNPACK	ED STAMP'_	•	
OTAL # COCLERS RECEIVE	D:			CKLIST			
COOLER ID COC	i C	USTODY TAPE	COOLER	THERM	TEMP SLY	List Sample Bottles in Each	Cocier if
(PRESCNI				U!	(MRESENT		
	-753	na Mana					
SW	1 c \	X-X-		AC	V	· · · · · · · · · · · · · · · · · · ·	
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J				· ·			
			- <u> </u>	i			
	8				-		
= COOLER B = BOTTLES							
DOLER(S) SCREENED FOR F	RADIAT	ION? Yas_CM	юIF П	EMP BLK.	N, HOW WAS	G TEMP' (AKEN:	
	 TION	USH SAMPLES					
PECIFIC PROJECT INFORMA DLA TILE HEADSPACE ACCE ANY headscace is present, list de I OF WATER SAMPLES	TION TABLE	USH SAMPLES	NA		DE NUMBER arked As Pre umber of VO,	served? Yes No +	7
PECIFIC PROJECT INFORMA DLATILE HEADSPACE ACCE ANY headscace is present, list de 1 DF WATER SAMPLES PRESERVATION		PUSH SAMPLES	NA Section)		DE NUMBER arked As Pre umber of VO, If N, List sa	Litime delivered)	J z g pH
PECIFIC PROJECT INFORMA DLATILE HEADSPACE ACCE ANY headscace is present, list de 1 DF WATER SAMPLES PRESERVATION 2504 (<2)	<u>TION</u> TABLE	USH SAMPLES	NA S section) CORRECT p (Y/N)		DE NUMBER arked As Pre umber of VO,	served? Yes No J Vials: No J mple ID and Correspondin	1 i ng pit
PECIFIC PROJECT INFORMA DLA TILE HEADSPACE ACCE: ANY headscace is present, list de 1 DF WATER SAMPLES PRESERVATION 2SO4 (<2) NO3 (<2)		USH SAMPLES	NA Section)		DE NUMBER arked As Pre umber of VO, If N, List sa	Litime delivered)	27 г
PECIFIC PROJECT INFORMA DLATILE HEADSPACE ACCES ANY headscace is present, list de 1 DF WATER SAMPLES PRESERVATION 2SO4 (<2) NO3 (<2) DL (<2) (Not VOA Vizis) 10H - Cyanide (>12)		USH SAMPLES	NA S section) CORRECT p (Y/N)		DE NUMBER arked As Pre umber of VO, If N, List sa	A Vials:	2; ng рн
PECIFIC PROJECT INFORMA DLATILE HEADSPACE ACCES ANY headspace is present, list de 1 OF WATER SAMPLES PRESERVATION 2SO4 (<2) NO3 (<2) 2L (<2) (Not VOA Vieis) 10H - Cyanide (>12) 10H/Zn - Acetate - Sulfide (>9)		USH SAMPLES	NA S section) CORRECT p (Y/N)		DE NUMBER arked As Pre umber of VO, If N, List sa	served? YesNo No No No No mple ID and Correspondin	22- к парн
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Signature

Name: Ed B. Fry Title: Project Manager III E-Mail: efry@stl-inc.com

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Severn Trent Laboratories 6310 Rothway Drive Houston, TX 77040

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07/08/2004

Madeline Mauk Brown and Caldwell 1415 Louisiana Suite 2500 Houston, TX 77002

SEVERN TRENT

Reference: Project : Brown and Caldwell-Hobbs Eunice Project No. : 275517 Date Received : 06/12/2004 STL Job : 275517

Dear Madeline Mauk:

Enclosed are the analytical results for your project referenced above. The following samples are included in the report.

3. MW-2

All holding times were met for the tests performed on these samples.

Enclosed, please find the Quality Control Summary. All quality control results for the QC batch that are applicable to the sample(s) are acceptable except as noted in the QC batch reports.

The test results in this report meet all NELAP requirements for STL Houston's NELAP accredited parameters. Any exceptions to NELAP requirements will be noted and included in a case narrative as a part of this report.

If the report is acceptable, please approve the enclosed invoice and forward it for payment.

Thank you for selecting Severn-Trent Laboratories to serve as your analytical laboratory on this project. If you have any questions concerning these results, please feel free to contact me at any time.

We look forward to working with you on future projects.

Sincerely,

Ed B. Fry Project Manager



SAMPLE INFORMATION Date: 07/08/2004 Job Number.: 275517 Project Number...: 99004969

Customer...: Brown and Caldwell Attn.....: Madeline Mauk Project Number.....: 99004969 Customer Project ID....: KEY ENERGY Project Description....: Brown and Caldwell-Hobbs Eunice

Laboratory Sample 1D	Customer Sample ID	Sample Matrix	Date Sampled	Time Sampled	Date Received	Time Received
275517-3	MW-2	Water	06/11/2004	13:22	06/12/2004	11:52
						1
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QUALITY CONTROL RESULTS

Report Date.: 07/08/2004

CUSTOMER: Brown and Caldwell PROJECT: KEY ENERGY

Job Number.: 275517

STL

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ATTN: Madeline Mauk

Tes Met Par	t Method hod Descri ameter	iption.: EPA	300.0 Chromatography oride	Analysis	Units Batch(s)	: 103052	J/L	Analys Test (st Code	.: cas .: CHL	
PC	Lab ID	Reagent	QC Result	QC Result	True Value	Orig. Value	Calc. Result *	Limits	F	Date	Time
īcv		WCS31126	19.932		20.00		99.7	90.0-110.		06/15/2004	1200
'I CB			0							06/15/2004	1215
MB			0							06/15/2004	1230
LCS		WCS31126	19.729		20.00		98.6	90.0-110.		06/15/2004	1245
CCV		WCS31126	20.712		20.00		103.6	90.0-110.		06/15/2004	1501
ССВ			0.2720							06/15/2004	1516
DU	275458-1		5.6227			5.4458	3.2	20		06/15/2004	1712
MS	275458-1	WCS30882	15.894		10.00000	5.4458	104.5	80-120		06/15/2004	1727
ÞU	275590-1		3.4219			3.4423	0.6	20		06/15/2004	1757
CCV		WCS31126	19.725		20.00		98.6	90.0-110.		06/15/2004	1813
ССВ			0.2434							06/15/2004	1828
MS	275590-1	WCS30882	13.806		10.000000	3.4423	103.6	80-120		06/15/2004	1843
CCV		WCS31126	19.795		20.00		99.0	90.0-110.		06/15/2004	2114
ССВ			0.2501							06/15/2004	2129
bu	275517-3		5.1628			5.2670	2.0	20		06/15/2004	, 2144
MS	275517-3	WCS30882	15.791		10.000000	5.2670	105.2	80-120		06/15/2004	, 2159
çcv		WCS31126	20.097		20.00		100.5	90.0-110.		06/16/2004	, 0015
ССВ			0.2435							06/16/2004	0031
ИВ			0							06/16/2004	, 004 <i>6</i>
LCS		WCS31126	19.804		20.00		99.0	90.0-110.		06/16/2004	0101
DU	275334-2		7.5941			7.2345	4.9	20		06/16/2004	+ 0146
MS	275334-2	WCS30882	18.024		10.000000	7.2345	107.9	80-120		06/16/2004	+ 0201
ccv		WCS31126	19.584		20.00		97.9	90.0-110.		06/16/2004	0317
ССВ			0							06/16/2004	0332
DU	275407-2		4.2093			4.1746	0.8	20		06/16/2004	0533
MS	275407-2	WCS30882	14.703		10.000000	4.1746	105.3	80-120		06/16/2004	+ 0548
CCV		WCS31126	19.758		20.00		98.8	90.0-110.		06/16/2004	0618
ССВ			0.2345							06/16/2004	0633
ccv		WCS31126	19.904		20.00		99.5	90.0-110.		06/16/2004	0704
ССВ			0.2642							06/16/2004	0719

 Test Method......: EPA 160.1
 Analyst...: sur

 Method Description.: Solids, Total Dissolved (TDS)
 Units......: mg/L
 Test Code.: TDS

 Parameter......: Solids, Total Dissolved (TDS)
 Batch(s)...: 102935

DC	Lab ID	Reagent	QC Result	QC Result	True Value	Orig. Value	Calc. Result *	Limits	F	Date	Time
DU	275338-10		1359.00			1388.00	2.1	10.0		06/14/2004	1800
D U	275487-6		1311.00			1256.00	4.3	10.0		06/14/2004	1800
ИB			1.00							06/14/2004	1800
Lcs		WCS31351	3506.00		3600		97.4	90.0-110.		06/14/2004	1800
DU	275517-2		1052.00			1012.00	3.9	10.0		06/14/2004	1800
_LCS		WCS31351	3520.00		3600		97.8	90.0-110.		06/14/2004	1800
МВ			1.00							06/14/2004	1800

Page 3

* %=% REC, R=RPD, A=ABS Diff., D=% Diff.

QUALITY ASSURANCE METHODS

Report Date: 07/08/2004

REFERENCES AND NOTES

REPORT COMMENTS

- 1) All pages of this report are integral parts of the analytical data. Therefore, this report should be reproduced only in its entirety.
- 2) Reporting limits are adjusted for sample size used, dilutions and moisture content if applicable.
- 3) According to 40CFR Part 136.3, pH, Chlorine Residual, and Dissolved Oxygen analyses are to be performed immediately after aqueous sample collection. When these parameters are not indicated as field,(e.g. pH Field) they were not analyzed immediately, but as soon as possible on laboratory receipt.
- 4) For all USACE projects, the QC limits are based on "mean +/- 2 sigma", which are the warning limits.

General Information:

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- Cresylic Acid is the combination of o,m and p-Cresol. The combination is reported as the final result.
- m-Cresol and p-Cresol co-elute. The result of the two is reported as either m&p-cresol or as p-cresol.
- m-Xylene and p-Xylene co-elute. The result of the two is reported as m,p-Xylene.
- N-Nitrosodiphenylamine decomposes in the gas chromatograph inlet forming dipheylamine and, consequently, may be detected as diphenylamine.
- Methylene Chloride and Acetone are recognized potential laboratory contaminants. Its presence in the sample up to five times the amount reported in the blank may be attributed to laboratory contamination.
- Trimethysilyl(Diazomethane) is used to esterify acid herbicides in Method SW-846 8151A.
- For Inorganic analyses, duplicate QC limits are determined as follows: If the sample result is less than or equal to 5 times the reporting limit, the RPD limit is equal to the reporting limit. If the sample result is greater than 5 times the reporting limit, the RPD limit is the method defined RPD.

Explanation of Qualifiers:

- U This qualifier indicates that the analyte was analyzed but not detected.
- J (Organics only) This qualifier indicates that the analyte is an estimated value between the RL and the MDL.
- B (Inorganics only) This Qualifier indicates that the analyte is an estimated value between the RL and the MDL.
- N (Organics only) This flag indicates presumptive evidence of a compound. This flag is only used for tentatively identified compounds (TICs), where the identification is based on a mass spectral library search. It is applied to all TIC results. For generic charachterization of a TIC, such as "chlorinated hydrocarbon", the "N" flag is not used.

Explanation of General QC Outliers:

- A Matrix interference present in sample.
- a MS/MSD analyses yielded comparable poor recoveries, indicating a possible matrix interference. Method performance is demonstrated by acceptable LCS recoveries.
- b Target analyte was found in the method blank.
- M QC sample analysis yielded recoveries outside QC acceptance criteria. This sample was reanalyzed. L - LCS analysis yielded high recoveries, indicating a potential high bias. No target analytes were
- observed above the RL in the associated samples.
- G Marginal outlier within 1% of acceptance criteria.
- r RPD value is outside method acceptance criteria.
- C Poor RPD values observed due to the non-homogenous nature of the sample.
- 0 Sample required dilution due to matrix interference.
- D Sample reported from a dilution.
- d Spike and/or surrogate diluted.
- P The recovery of this analyte is outside default QC limits. The data is accepted and will be used to calculate in-house statistical limits.
- E The reported concentration exceeds the instrument calibration.
- F The analyte is outside QC limits. The sample data is accepted since this analyte is not reported in associated samples.
- H Continuing Calibration Verification (CCV) standard is not associated with the samples reported.
- q See the subcontract final report for qualifier explanation.

QUALITY ASSURANCE METHODS REFERENCES AND NOTES

Report Date: 07/08/2004

- W The MS/MSD recoveries are outside QC acceptance criteria because the amount spiked is much less than the amount found in the sample.
- K High recovery will not affect the quality of reported results.
- Z See case narrative.

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Explanation of Organic QC Outliers:

- e Method blank analysis yielded phthalate concentrations above the RL. Phthlates are recognized potential laboratory contaminants. Its presence in the sample up to five times the amount reported in the blank may be attributed to laboratory contamination.
- S Sample reanalyzed/reextracted due to poor surrogate recovery. Reanalysis confirmed original analysis indicating a possible matrix interference.
- T Sample analysis yielded poor surrogate recovery.
- R The RPD between the two GC columns is greater than 40% and no anomalies are present. The higher result is reported as per EPA Method 8000B.
- 1 The RPD between the two GC columns is greater than 40% and anomalies are present. The lower of the two results has been reported.
- X Gaseous compound. In-house QC limits are advisory.
- Y Ketone compounds have poor purge efficiency. In-house QC limits are advisory.
- f Surrogate not associated with reported analytes.

Explanation of Inorganic QC Outliers:

- Q Method blank analysis yielded target analytes above the RL. Associated sample results are greater than 10 times the concentrations observed in the method blank.
- V The RPD control limit for sample results less than 5 times the RL is +/- the RL value. Sample and duplicate results are within method acceptance criteria.
- e Serial dilution failed due to matrix interference.
- g Sample result quantitated by Method of Standard Additions (MSA) due to the analytical spike recovery being below 85 percent. The correlation coefficent for the MSA is greater than or equal to 0.995.
- s BOD/cBOD seed value is not within method acceptance criteria. Due to the nature of the test method, the sample cannot be reanalyzed.
- l BOD/cBOD LCS value is not within method acceptance criteria. Due to the nature of the test method, sample cannot be reanalyzed.
- n Sample result quantitated by Method of Standard Additions (MSA) due to the analytical spike recovery being below 85 percent. The correlation coefficient for the MSA is less than 0.995.

Abbreviations:

- Designation given to identify a specific extraction, digestion, preparation, or analysis set. Batch CCV - Continuing Calibration Verification CRA - Low level standard check - GFAA, Mercury - Low level standard check - ICP CRI Dil Fac - Dilution Factor - Secondary dilution analysis - Detection Limit Factor DLFac - Extraction Blank (TCLP, SPLP, etc.) FR ICAL - Initial Calibration - Initial Calibration Blank I CB - Initial Calibration Verification ICV - Interference Check Sample A - ICP I SA - Interference Check Sample B - ICP I SB LCD - Laboratory Control Duplicate LCS - Laboratory Control Sample MB - Method Blank - Method Duplicate MD - Method Detection Limit MDL MS - Matrix Spike



QUALITY ASSURANCE METHODS REFERENCES AND NOTES

Report Date: 07/08/2004

MSD	-	Matrix	Spike	Duplicate	
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- ND - Not Detected
- Preparation Blank PB
- PREPF - Preparation Factor
- Reporting Limit RL
- Relative Percent Difference RPD
- Relative Response Factor RRF
- RT - Retention Time
- DU - Duplicate

Method References:

- (1) EPA 600/4-79-020 Methods for the Analysis of Water and Wastes, March 1983.
- (2) EPA 600/R-94-111 Methods for the Determination of MEtals in Environmental Samples, Supplement I, May 1994.
- (3) EPA SW846 Test Methods for Evaluating Solid Waste, Third Edition, September 1986; Update I July 1992; Update II, September 1994, Update IIA August 1993; Update IIB, January 1995; Update III, December 1996, Update IVA January 1998, Update IVB November 2000.

(4) Standard Methods for the Examination of Water and Wastewater, 16th Edition (1985), 17th Edition (1989), 18th Edition (1992), 19th Edition (1995), 20th Edition (1998).

- (5) HACH Water Analysis Handbook 3rd Edition (1997).
- (6) Federal Register, July 1, 1990 (40 CFR Part 136 Appendix A).
 (7) Compendium of Methods for the Determination of Toxic Organic Compounds in Ambient Air, 2nd Edition, January 1997.
- (8) ASTM Annual Book of Methods (Various Years)
- (9) Diagnosis and Improvement of Saline and Alkali Soils, Agriculture Handbook No. 60, United States Department of Agriculture, 1954.



Job Number: 275517

LABORATORY CHRONICLE

Date: 07/08/2004

CUSTOMER: Brown a	nd Caldwell	PROJECT: KEY EN	ERGY		ATTN: Madeline Mauk	
Lab ID: 275517-3	Client ID: MW-2	Date Re	cvd: 06/12,	/2004 Sample	Date: 06/11/2004	
METHOD	DESCRIPTION	RUN#	BATCH# PI	REP BT #(S)	DATE/TIME ANALYZED	DILUTION
EPA 300.0	Ion Chromatography Analysis	1	103052		06/15/2004 2059	100
EPA 160.1	Solids, Total Dissolved (TDS)	1	102935		06/14/2004 1800	

TIME	PRINTED NAME/COMPANY:	TIME	PRINTED NAME/COMPANY:	NAME/COMPANY:
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rpjsckl	Job Sample Receipt Checklist Report	V2
Job Number.: 275517 Location.: 57216 Customer Job ID: Project Number.: 99004969 Project Descr Customer: Brown and Caldwell	Check List Number.: 1 Description.: Job Check List Date.: 06/12/2004 iption.: Brown and Caldwell-Hobbs Eunice Contact.: Madeline Mauk	Date of the Report: 06/12/2004 Project Manager: ebf
Questions ?	(Y/N) Comments	
Chain of Custody Received?	Y	
If "yes", completed properly?	Y	٤
Custody seal on shipping container?	N	
If "yes", custody seal intact?		
Custody seals on sample containers?	N	
If "yes", custody seal intact?		
Samples chilled?	······ Y	
Temperature of cooler acceptable? (4 deg 0	: +/- 2). Y 2.2	
If "no", is sample an air matrix?(no te	mp req.)	
Thermometer ID		
Samples received intact (good condition)?.	······································	
Volatile samples acceptable? (no headspace	·)	
Correct containers used?	Y	
Adequate sample volume provided?	Y	
Samples preserved correctly?	Y	
Samples received within holding-time?	Y	
Agreement between COC and sample labels?	Y	
Radioactivity at or below background level	s?Y	
Additional		
Comments	*****	
Sample Custodian Signature/Date	Y TES	
	······································	

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COOLER ID	COC	CUSTO	DY TAPE	COOLER	THERM	TEMP ELK	List Sample Bottles in Each Cooler i out of Temperature
	(1/4)	PRESENT (Y/N)	INTACT (Y/N)	(°C)			
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ECIFIC PROJECT LATILE HEADSPA NY headspace is pre	INFORMATI CE ACCEPT	ABLE? Yes _	No	NA	JO Mai Nur	E NUMBER: rked As Prese nber of VOA	273511 erved? Yes No Vials:
ECIFIC PROJECT LATILE HEADSPA NY headspace is pre OF WATER SAMP	CE ACCEPT	DN ABLE? Yes_ is in INCONSIS	No STENCIES se	NA	JO Mai Nur	E NUMBER: rked As Prese nber of VOA	273511 erved? YesNo Vials:
ECIFIC PROJECT LATILE HEADSPA WY headspace is pre OF WATER SAMP PRESERVA	INFORMATI CE ACCEPT Isent, list detail ILES ITION	<u>ON</u> ABLE? Yes_ Is in INCONSIS	No STENCIE3 se		JO Mai Nur	E NUMBER:_ rked As Prese nber of VOA f N, List sam	erved? Yes No Vials: ple ID and Corresponding pH
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ECIFIC PROJECT LATILE HEADSPA WY headspace is pre OF WATER SAMP PRESERVA 304 (<2) D3 (<2) - (<2) (Not VOA Vi 0H - Cyanide (>12	INFORMATI CE ACCEPT Isent, list detail ILES TION als)	<u>ON</u> ABLE? Yes_ is in INCONSIS # BOT	No STENCIE5 se	NA cōon) CORRECT ph (Y/N)		E NUMBER:_ rked As Prese nber of VOA f N, List sam	Prved? YesNo Vials: Ple ID and Corresponding pH
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ECIFIC PROJECT LATILE HEADSPA VIY headspace is pre OF WATER SAMP PRESERVA SO4 (<2) D3 (<2) L (<2) (Not VOA Vi DH – Cyanide (>12 DH/Zri +cetate – So er	INFORMATI CE ACCEPT esent, list detail pLES TTION als)) Julfide (>9)	<u>ON</u> ABLE? Yes_ is in INCONSIS # BOT	No	NA ction) CORRECT pl (Y/N)		E NUMBER: rked As Press nber of VOA i N, List sam	ple ID and Corresponding pH
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ECIFIC PROJECT LATILE HEADSPA NY headspace is pre OF WATER SAMP PRESERVA 304 (<2) 03 (<2) (<2) (Not VOA Vi 04 - Cyanide (>12 H/Zri Hoetate - Si er NEAT BOTTLES:	INFORMATI CE ACCEPT esent, list detail VLES TTION alls)) utifide (>9)	ABLE? Yas_ s in INCONSIS # BOT	No	NA ction) CORRECT pr (Y/N)	JO Mai Nur	E NUMBER: rked As Prese nber of VOA i N, List sam SOIL JARS	ple ID and Corresponding pH
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