BW-028

ANNUAL REPORT

2019

Performance *is* Key

ANNUAL CLASS III WELL REPORT FOR 2019

Key Energy Services, Inc. (Key)
State S Brine Station
Permit BW-028
API No. 30-025-33547
May 18, 2020

Prepared for:

1301 McKinney Street
Suite 1800
Houston, Texas 77010

Submitted by:

Jill Best
Environmental Director

Prepared By: Wayne Price- Price LLC

505-715-2809
wayneprice@q.com

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APPENDICES

1.0 Introduction

Price LLC on behalf of Key Energy Services, LLC. (Key) prepared this Annual Class III Well Report for 2019 report to document activities associated with Discharge Permit BW-28 for Well #1 (API #30-025-33547) which is located at the State S Brine Station, 1,340 FNL and 330 FWL (SW/4, NW/4, Unit Letter E) in Section 15, Township 21 South, Range 37 East, NMPM, Lea County, New Mexico (the Site). The Site is located approximately two miles north of Eunice, New Mexico along the east side of NM 207/CR18. This Annual Class III Well Report has been prepared pursuant to 20.6.2.3107 of the New Mexico Administrative Code and addresses all required content detailed in Section 2.J of the renewed permit dated December 26, 2019.

2.0 2.J. Bullet 2 – Summary of Operations

(Permit Condition 2.J.2 Annual Report: "Summary of Class III well operations for the year including a description and reason for any remedial or major work on the well with a copy of C-103")

There was no major or remedial well work during the 2019 year.

Key Energy has a web-based monitoring and automation system at this site. This system monitors all equipment, fluid levels, and driver access. The integrated Control System (ICS) system also sends out alarms to personnel via text or Email, as well as, allows users to monitor and control remotely via the internet.

3.0 2.J. Bullet 3 – Injection/Production/Carry-Over Volumes

(Permit condition 2.J.3 "Monthly fluid injection and brine production volume, including the cumulative total carried over each year")

Key has an electronic card system that tracks sales of both fresh and brine water. In addition, in 2019 Key installed new Halliburton calibrated flow meters on the well to improve the monitor accuracy for both water injected and brine produced. The operator reads these flow meters daily. The meters are not currently connected to the ICS system.

Monthly, Yearly and Lifetime Injection and Production Volumes:
The monthly, yearly and lifetime fresh water injection and brine production volumes are attached herein for review as tables in ***Appendix A*****.** The total 2019 brine injection volume was 267,517 (bbl) And production volume was 241,383 barrels (bbl) and the lifetime production volume is 6,004,319 (bbl).

4.0 2.J. Bullet 4 – Injection Pressure Data

A submersible centrifugal injection pump was installed in the fresh water storage tank in 2014. The system has an automatic shut-down switch set at 224 pounds per square inch (psig). For this reason, permit condition 3.B.2. Pressure Limiting Device, *"The operator shall have a working pressure limiting device or controls to prevent overpressure."*, is conditionally met.

The average injection pressure is taken either from a pressure gauge mounted on the wellhead inlet, and/or can be from the ICS and is noted by Key's personnel. The noted injection pressures ranged from 180 psig to 195 psig during 2019.

5.0 2.J. Bullet 5 – Chemical analysis shall be included with data summary and all QA/WC information

Per Permit condition 2.A. "Quarterly Monitoring Requirements for Class III Wells", injection fluid and brine fluid samples were collected quarterly. The quarterly injection fluid samples were analyzed for pH, density (or specific gravity), total dissolved solids, and chlorides. The quarterly brine fluid samples were analyzed for pH, density, total dissolved solids, chloride, and sodium. Please find attached in ***Appendix B*** the quarterly laboratory analytical results and chain-of-custodies for the brine and fresh water injection water samples.

6.0 2.J. Bullet 6 – Mechanical Integrity

(Permit condition 2.J.6 "Copy of any mechanical integrity test chart, including the type of test, i.e., duration, gauge pressure, etc.")

A 4-hour Cavern Mechanical Integrity Test (MIT) was successfully ran and passed on February 02, 2017 and subsequently approved by OCD.

The next five-year test will be scheduled for November of 2021, unless otherwise required by OCD for good cause shown, or permit condition requirements.

7.0 2.J. Bullet 7 – Deviations from Normal Production Methods

(Permit condition 2.J.7 "Brief explanation describing deviations from normal operations")

Key operates the brine well using "conventional flow" i.e. fresh water down the tubing and producing brine up the casing annulus and only reverses for maintenance only. There were no deviations from normal operation in 2019.

8.0 2.J. Bullet 8 – Leak & Spill Reports

(Permit condition 2.J.8 "Results of any leaks and spill reports")

The brine station is designed with an impermeable liner under the brine tanks and loading pads. The entire facility is bermed to prevent run-on or run-off. The concrete loading pads are designed to catch *de minimus* drips from hose connections and are piped to two 250-bbl fiberglass tanks. This liquid material is routinely recycled or disposed of at a New Mexico Oil Conservation Division (OCD)-approved facility.

Rainwater that collects inside the lined and bermed area is routinely pumped out and recycled or disposed of at an OCD-approved facility. Small quantities of rainwater, which cannot be pumped are left to evaporate.

Any reportable or non-reportable spill is cleaned up pursuant to OCD rules and guidance.

9.0 2.J. Bullet 9 – Area of Review Update Summary

(Permit condition 2.J.9 "An Area of Review (AOR) update summary")

Key's approach on the AOR update has been to research OCD well files and perform site surveillance yearly. All existing and new wells within ¼ mile are logged and reviewed for casing program status, casing/cementing status, and if corrective actions required.

Key utilizes a critical zone method by using the current estimated radius of the brine well and applying a 10:1 safety factor. As the brine well grows, the critical AOR is expanded and new wells are added for yearly review.

Appendix C contains a comprehensive list of all wells within adjacent quarter sections of the BW-28 location. The list includes API#, Operator well name, UL, Section, Township and Range, and footages, wells within the critical radius and ¼-mile radius from the brine well, BW-28.

There are 44 wells located within these adjacent units, with no new wells added in 2019. Within a ¼ mile radius of the brine well there are 18 wells, and 4 wells are actually within the 830-foot critical radius. A plot plan is included in **Appendix C** for reference.

All four wells located in the critical zone were verified in May 2020 by reviewing the OCD on-line well records. They are identified as

- API# 30-025-09914 is proposed by Apache Corporation to become an injection well. This well is close or at the 810 feet critical range as determine by Key. Notified OCD E-mail dated May 19, 2020.
- API# 30-025-09913 well has been plugged and abandoned.
- API# 30-025-06586 well has been previously checked and no change was noted in the 2019 review.
- API# 30-025-39277 well has been previously checked and no change was noted in the 2019 review.

10.0 2.J. Bullet 10 – Subsidence/Cavern Volumes/Geometric Measurements

(Permit condition 2.J.10 "A summary with interpretations of MITs, surface subsidence surveys, cavern volume and geometric measurements with conclusion(s) and recommendation(s)")

10.1. Cavern Volumes

Cavern surveys did not provide adequate information pertaining to the size of the cavern. This has been an issue with many brine wells and until the validity of using sonar test is resolved, an alternate method will be employed. The alternate method involves calculating the maximum diameter of the cavern by using a worst-case scenario of an "inverted cone" with the cone base located at the top.

The Solution Mining Research Institute (SMRI), other state agencies, OCD work-group, along with various studies conducted during the permitting of the USDOE Waste Isolation Pilot Plant (WIPP) site, has concluded that failures, such as "catastrophic collapses", have a higher probability when the roof diameter of the cavern exceeds a certain value compared to the actual depth of the cavern. This number is typically called D/H where "D" is the diameter of the cavity and "H" is the depth from surface to the casing shoe. OCD concluded that when a ratio of D/H reaches or exceeds 0.66 then the probably of collapse increases to a point that the well may be considered un-safe, thus closing procedures, such as proper plugging and abandonment, and possible long-term subsidence monitoring should be considered.

This alternate method has been discussed with Jim Griswold, OCD, and it was mutually decided that an estimated worst-case diameter was to be determined in order to provide maximum protection and ensure the permit conditions are being met.

The cavern volume is calculated using the lifetime brine production volume and multiplying it by a *"rule of thumb"* conversion factor to determine the volumetric size of the cavern. The rule of thumb conversion factor was taken from the 1982 Wilson Report, which equates that every barrel of brine produced, will create approximately one cubic foot of cavity.

A wellbore sketch depicting the volume calculations for the brine well, and the lifetime brine production tally of approximately 6.00 million barrels of brine produced as of December 2019, has been included in ***Appendix D***. The maximum diameter was calculated to be approximately 166 feet with a corresponding D/H ratio of 0.12, updated for the 2019 year.

The current brine well status meets and exceeds the recommended safety value by five times when the current D/H ratio of 0.12 is compared to the 0.66 value mentioned above.

10.2. 2.B.1 Surface Subsidence Monitoring Plan

(Permit Condition 2.B.1 "The Permittee shall submit a Surface Subsidence Monitoring Plan to OCD within 180 days of the effective data of this permit. The Surface Subsidence Monitoring Plan shall specify that the Permittee will install at least three survey monuments and shall include a proposal to monitor the elevation of the monuments at least semiannually

The Permittee shall survey each benchmark at least semiannually to monitor for possible surface subsidence and shall tie each survey to the nearest USGS benchmark. The Permittee shall employ a licensed professional surveyor to conduct the subsidence-monitoring program. The Permittee shall submit the results of all subsidence surveys to OCD within 15 days of the survey. If the monitored surface subsidence at any measuring point reaches 0.10 feet compared to its baseline elevation, then the Permittee shall suspend operation of the Class III well. If the Permittee cannot demonstrate the integrity of the cavern and well to the satisfaction of OCD, then it shall cease all brine production and submit a corrective action plan to mitigate the subsidence.")

There were no significant changes to the survey monuments in 2019. Key will continue to monitor, and if any trend is noted, Key will notify OCD. Copies of the 2019 subsidence monitoring reports are included in ***Appendix E***.

10.3. Solution Cavern Characterization Plan

(Permit Condition 2.B.2 "The Permittee shall submit a Solution Cavern Characterization Plan to characterize the size and shape of the solution cavern using geophysical methods within 180 days of the effective date of this permit. The Permittee shall characterize the size and shape of the solution cavern using a geophysical methods approved by OCD at least once before November 8, 2018. The Permittee shall demonstrate that at least 90% of the calculated volume of salt removed based upon injection and production volumes has been accounted for by the approved geophysical method(s) for such testing to be considered truly representative.")

Since the BW-28 well never had any logs run, a well log was obtained from a nearby well and annotated to reflect the geophysical characterization of the area lithology. In addition, a mass balance has been calculated and the results are included in ***Appendix D***. The mass balance compares the measured salt removed to the calculated salt removed. The comparison was within 7%, which satisfies permit condition 2.

11.0 2.J. Bullet 11 – Ratio of Injection & Produced Fluids

(Permit condition 2.J.11. "A summary of the ratio of the volume of injected fluids to the volume of produced brine")

Enclosed in ***Appendix A*** are the report tables documenting the injection and production data and the comparison chart of injected water to produced water with comments. The 2019 results indicate a 110.83 % variance, while the total variance during the lifetime of the well has been 105.93%.

12.0 2.J. Bullet 12 – Summary of Activities

(Permit condition 2.J.12 "A summary of all major Facility activities or events, which occurred during the year with any conclusions and recommendations)

There was no major or remedial well work during the 2019 year.

Key's maintenance crew performed the following up-grades:

1. Replaced the brine tank common manifold lines and valves.
2. Re-built the brine pumps suction manifold.
3. Installed new check valves on the fresh water tank inlet and outlet.
4. Installed new calibrated flow meters on the Wellhead.
5. Removed the flex rubber hose off of the brine well and installed pipe caps.
6. Installed new pressure gauges on brine well.
7. Drained and clean out the fresh water tank.
8. Installed new check valves on the wellhead.
9. Installed new pipe support on East load line.
10. Replace brine tank inlet valve and piping.

13.0 2.J. Bullet 13 – Annual Certification

(Permit condition 2.J.13 "Annual Certification in accordance with Permit Condition 2.B.3. "2.B.3. Annual Certification: The Permittee shall certify annually that continued salt solution mining will not cause cavern collapse, surface subsidence, property damage, or otherwise threaten public health and the environment, based on geologic and engineering data.")

Based on all current information and on-site observance, the operator of record herby certifies that the current operations pose no threat to public health and the environment at the time of report submission. If any substantial event that has, or may cause, this current certification to change, then the operator will notify OCD and take the necessary actions to protect the public and environment.

By signing the cover sheet the operator hereby certifies this condition of the permit as well as permit condition 2.J. Bullet 1.

14.0 2.J. Bullet 14 – Groundwater Monitoring

(Permit condition 2.J.14 "A summary of any new discoveries of ground water contamination with all leaks, spills and releases and corrective actions taken")

The site does not have any groundwater monitoring wells associated with BW-28. There are no planned or intentional discharges of water contaminants that may move directly or indirectly into groundwater. Any unintentional discharge, leak, spill, or drip is handled pursuant to the permit conditions.

15.0 2.J. Bullet 15 – Annual Reporting

(Permit condition 2.J.15 "The Permittee shall file its Annual Report in an electronic format with a hard copy submitted to OCD's Environmental Bureau.")

The operator hereby submits a PDF file on flash drive and will submit a hard copy to the OCD's Environmental Bureau upon request.

Appendix A – Injection & Production Fluids Tables and Comparison Chart

TABLE 1

TABLE 1 BW-28 Annual Report Brine Well Production Volumes and Lifetime History Volumes

Year	Month	Reported Monthly Brine Production	Quarterly Brine Production (bbls)	Annual Brine Production (bbls)	Reported Monthly Freshwater Injection (bbls)	Quarterly Freshwater Injection (bbls)	Annual Freshwater Injection (bbls)	Comments	Operator
1996	October	10,588			10,588				Goldstar SWD
	November	17,770			17,743				
	December	32,223	60,581	60,581	33,004	61,335	61,335		
1997	January	20,194			20,445			estimate (1)	
	February	20,194			20,445			estimate (1)	
	March	20,194	60,582		20,445	61,335		estimate (1)	
	April	48,226			47,714				
	May	38,000			36,571				
	June	47,970	134,196		42,264	126,549			
	July	24,711			24,271				
	August	31,817			31,559				
	September	38,120	94,648		38,697	94,527			
	October	27,462			25,512				
	November	26,618			26,261				
	December	16,137	70,217	359,643	15,850	67,623	350,034		
1998	January	13,301			13,614				
	February	47,212			49,552				
	March	42,337	102,850		44,964	108,130			
	April	27,072			27,519				
	May	18,084			18,161				
	June	26,699	71,855		26,976	72,656			
	July	16,535			15,929				
	August	8,287			7,488				
	September	9,994	34,816		9,021	32,438			
	October	13,312			17,302				
	November	9,822			9,873				
	December	8,287	31,421	240,942	9,497	36,672	249,896		
1999	January	4,026			4,607				
	February	6,867			8,138				
	March	5,641	16,534		6,030	18,775			
	April	7,873			7,338				
	May	34,100			32,461				
	June	20,708	62,681		20,171	59,970			
	July	35,278			34,566				
	August	35,876			35,995				
	September	43,196	114,350		42,724	113,285			
	October	9,700			10,097				
	November	8,383			9,080				
	December	28,662	46,745	240,310	29,721	48,898	240,928		
2000	January	65,492			65,028				
	February	37,709			36,909				
	March	40,409	143,610		40,414	142,351			
	April	20,181			20,404				
	May	52,092			50,373				
	June	41,371	113,644		37,776	108,553			
	July	33,860			31,757				
	August	37,535			35,492				
	September	58,042	129,437		53,288	120,537			
	October	28,777			27,216				
	November	22,677			24,130				
	December	17,670	69,124	455,815	17,369	68,715	440,156		
2001	January	32,427			37,083				
	February	17,493			23,076				
	March	34,050	83,970		33,216	93,375			
	April	32,900			36,064				Change to Yale E. Key
	May	66,724			52,555				
	June	37,607	137,231		42,347	130,966			
	July	16,399			15,588				
	August	10,173			33,664				
	September	16,185	42,757		16,200	65,452			
	October	25,184			24,147				
	November	10,447			8,666				
	December	21,061	56,692	320,650	18,733	51,546	341,339		
2002	January	11,809			10,135				
	February	22,700			23,733				
	March	4,693	39,202		4,369	38,237			
	April	15,160			16,776				
	May	16,321			17,283				
	June	13,938	45,419		15,276	49,335			
	July	8,301			10,688				
	August	7,079			6,842				
	September	18,560	33,940		17,240	34,770			
	October	7,040			7,823				
	November	9,788			10,950				
	December	11,666	28,494	147,055	19,667	38,440	160,782		
2003	January	20,278			23,526				
	February	8,603			5,310				
	March	37,680	66,561		35,548	64,384			
	April	31,782			31,619				
	May	17,767			13,305				
	June	10,733	60,282		9,260	54,184			
	July	27,104			13,927				
	August	9,555			7,197				
	September	7,945	44,604		5,056	26,180			
	October	12,014			10,394				
	November	26,100			12,438				
	December	38,748	76,862	248,309	18,218	41,050	185,798		
2004	January	7,980			8,539				
	February	8,130			8,797				
	March	8,220	24,330		8,894	26,230			
	April	29,898			31,931				
	May	14,233			15,428				
	June	28,716	72,847		30,410	77,769			
	July	1,840			2,060				
	August	29,898			30,201				
	September	20,277	52,015		20,266	52,527			
	October	24,436			23,784				
	November	21,925			22,430				
	December	32,225	78,586	227,778	33,630	79,844	236,370		
2005	January	17,873			19,160				
	February	23,929			24,958				
	March	37,896	79,698		40,435	84,553			
	April	29,882			31,794				
	May	39,575			42,385				
	June	22,766	92,223		23,995	98,174			
	July	7,593			7,640				
	August	31,573			29,316				
	September	47,305	86,471		48,230	85,186			
	October	38,571			51,232				
	November	31,533			27,670				
	December	36,430	106,534	364,926	36,412	115,314	383,227		
2006	January	18,480			19,977				
	February	33,250			35,511				
	March	39,492	91,222		38,630	94,118			
	April	40,194			43,605				
	May	51,009			54,630				

TABLE 1

TABLE 1 BW-28 Annual Report Brine Well Production Volumes and Lifetime History Volumes

Year	Month	Reported Monthly Brine Production	Quarterly Brine Production (bbls)	Annual Brine Production (bbls)	Reported Monthly Freshwater Injection (bbls)	Quarterly Freshwater Injection (bbls)	Annual Freshwater Injection (bbls)	Comments	Operator
	June	22,374	113,577		24,832	123,067			
	July	38,208			37,613				
	August	35,627			36,201				
	September	48,784	122,619		47,312	121,126			
	October	50,375			51,232				
	November	26,084			27,670				
	December	8,224	84,683	412,101	10,202	89,104	427,415		
2007	January	31,540			33,320				
	February	24,313			25,260				Change to Key Energy Services
	March	40,514	96,367		38,412	96,992			
	April	34,095			35,120				
	May	19,308			23,130				
	June	9,170	62,573		11,009	69,259			
	July	30,857			28,468				
	August	12,394			18,884				
	September	25,970	69,221		23,360	70,712			
	October	7,882			7,643				
	November	2,476			2,630				
	December	3,933	14,291	242,452	4,528	14,801	251,764		
2008	January	1,706			1,982				
	February	5,845			6,203				
	March	21,386	28,937		21,673	29,858			
	April	25,787			22,704				
	May	17,100			19,842				
	June	16,598	59,485		17,479	60,025			
	July	32,458			36,448				
	August	37,458			38,377				
	September	39,945	109,861		37,203	112,028			
	October	25,572			26,551				
	November	27,325			25,792				
	December	26,825	79,722	278,005	28,694	81,037	282,948		
2009	January	20,990			21,310				
	February	650			1,306				
	March	3,249	24,889		3,420	26,036			
	April	5,428			5,360				
	May	1,343			1,762				
	June	630	7,401		1,232	8,354			
	July	1,546			1,673				
	August	881			1,031				
	September	2,672	5,099		2,930	5,634			
	October	9,898			8,861				
	November	3,716			3,618				
	December	1,474	15,088	52,477	2,035	14,514	54,538		
2010	January	0			0				
	February	1,650			1,810				
	March	4,092	5,742		4,789	6,599			
	April	5,092			6,150				
	May	12,256			14,953				
	June	2,099	19,447		2,033	23,136			
	July	5,068			6,322				
	August	10,270			15,126				
	September	11,281	26,619		10,334	31,782			
	October	7,575			8,802				
	November	20,304			24,494				
	December	36,765	64,644	116,452	44,153	77,449	138,966		
2011	January	44,126			52,975				
	February	24,388			29,666				
	March	19,421	87,935		23,284	105,925			
	April	18,356			22,365				
	May	9,828			11,754				
	June	15,661	43,845		18,902	53,021			
	July	17,503			20,961				
	August	14,401			17,273				
	September	5,430	37,334		16,000	54,234			
	October	11,359			8,284				
	November	18,585			19,662				
	December	23,228	53,172	222,286	27,806	55,752	268,932		
2012	January	21,570			25,897				
	February	12,230			14,854				
	March	10,124	43,924		12,190	52,941			
	April	18,185			22,110				
	May	23,761			28,667				
	June	31,207	73,153		37,707	88,484			
	July	20,931			25,225				
	August	31,025			35,837				
	September	29,414	81,370		34,226	95,288			
	October	17,507			21,138				
	November	28,038			33,360				
	December	23,015	68,560	267,007	25,205	79,703	316,416		
2013	January	16,097			21,395				
	February	17,379			20,812				
	March	14,816	48,292		21,978	64,185			
	April	19,374			23,799				
	May	23,932			25,979				
	June	34,926	78,232		38,500	88,278			
	July	18,446			22,414				
	August	29,958			35,877				
	September	16,923	65,327		20,230	78,521			
	October	22,409			25,868				
	November	14,139			16,972				
	December	24,920	61,468	253,319	29,762	72,602	303,586		
2014	January	31,460			35,865				
	February	38,614			45,444				
	March	43,210	113,284		50,710	132,019			
	April	36,217			44,597				
	May	45,170			54,007				
	June	24,524	105,911		23,748	122,352			
	July	19,428			20,442				
	August	15,545			24,683				
	September	23,652	58,625		26,341	71,466			
	October	5,692			7,057				
	November	10,914			13,136				
	December	15,966	32,572	310,392	17,466	37,659	363,496		
2015	January	28,665			30,266				
	February	26,229			29,541				
	March	24,106	79,000		29,666	89,473			
	April	19,087			24,034				
	May	19,573			22,921				
	June	27,070	65,730		32,555	79,510			
	July	34,975			39,132				
	August	19,234			23,879				
	September	16,952	71,161		20,455	83,466			
	October	23,972			25,739				
	November	18,722			21,557				
	December	13,942	56,636	272,527	17,412	64,708	317,157		

TABLE 1

TABLE 1 BW-28 Annual Report Brine Well Production Volumes and Lifetime History Volumes

Year	Month	Reported Monthly Brine Production	Quarterly Brine Production (bbls)	Annual Brine Production (bbls)	Reported Monthly Freshwater Injection (bbls)	Quarterly Freshwater Injection (bbls)	Annual Freshwater Injection (bbls)	Comments	Operator
2016	January	15,897			18,182				
	February	15,649			17,434				
	March	10,759	42,305		12,095	47,711			
	April	8,608			9,575				
	May	12,202			14,032				
	June	19,354	40,164		20,745	44,352			
	July	20,725			23,809				
	August	20,410			22,859				
	September	18,278	59,413		21,020	67,688			
	October	24,944			28,521				
	November	22,899			25,928				
	December	11,516	59,359	201,241	13,940	68,389	228,140	Ratio FW/BW	
2017	January	21,709			23,795			109.61%	
	February	11,551			14,531			125.80%	
	March	20,673	53,933		21,931	60,257		106.09%	
	April	29,467			30,958			105.06%	
	May	26,817			27,209			101.46%	
	June	15,463	71,747		18,156	76,323		117.42%	
	July	800			1,428			178.50%	* System Shut Down to Check Water Quality
	August	7,743			6,228			80.43%	*
	September	6,279	14,822		4,357	12,013		69.39%	*
	October	23,253			24,108			103.68%	
	November	24,204			27,380			113.12%	
	December	32,237	79,694	220,196	32,445	83,933	232,526	105.60%	Monthly/Year End Average Average
2018	January	27,325			30,717			112.41%	
	February	30,315			26,203			86.44%	
	March	14,616	72,256		18,419	75,339		126.02%	
	April	15,198			15,669			103.10%	
	May	18,492			22,230			120.21%	
	June	14,296	47,986		17,296	55,195		120.98%	
	July	22,568			25,597			113.42%	
	August	32,500			27,635			85.03%	
	September	17,381	72,449		15,153	68,385		87.18%	
	October	19,346			18,009			93.09%	
	November	14,575			16,993			116.59%	
	December	21,860	55,781	248,472	23,352	58,354	257,273	103.54%	Monthly/Year End Average Average
2019	January	21,647			24,415			112.79%	
	February	23,735			24,599			103.64%	
	March	31,990	77,372		36,841	85,855		115.16%	
	April	15,075			18,568			123.17%	
	May	9,145			11,073			121.08%	
	June	13,605	37,825		16,562	46,203		121.73%	
	July	20,135			19,593			97.31%	
	August	24,319			25,557			105.09%	
	September	15,245	59,699		19,810	64,960		129.94%	
	October	21,712			23,917			110.16%	
	November	22,390			23,206			103.64%	
	December	22,385	66,487	241,383	23,376	70,499	267,517	110.83%	Monthly/Year End Average Average
	Total			6,004,319			6,360,539	105.93%	Total Average

Appendix B – Quarterly Laboratory Analytical Reports

CARDINAL Laboratories

PHONE (575) 393-2326 ° 101 E. MARLAND ° HOBBS, NM 88240

February 07, 2019

WAYNE PRICE

PRICE LLC

312 ENCANTADO RIDGE COURT, NE

RIO RANCHO, NM 87124

RE: QUARTERLY SAMPLES

Enclosed are the results of analyses for samples received by the laboratory on 01/30/19 8:15.

Cardinal Laboratories is accredited through Texas NELAP under certificate number T104704398-18-11. Accreditation applies to drinking water, non-potable water and solid and chemical materials. All accredited analytes are denoted by an asterisk (*). For a complete list of accredited analytes and matrices visit the TCEQ website at www.tceq.texas.gov/field/qa/lab_accred_certif.html.

Cardinal Laboratories is accreditated through the State of Colorado Department of Public Health and Environment for:

Method EPA 552.2	Total Haloacetic Acids (HAA-5)
Method EPA 524.2	Total Trihalomethanes (TTHM)
Method EPA 524.4	Regulated VOCs (V1, V2, V3)

Cardinal Laboratories is accredited through the State of New Mexico Environment Department for:

Method SM 9223-B	Total Coliform and E. coli (Colilert MMO-MUG)
Method EPA 524.2	Regulated VOCs and Total Trihalomethanes (TTHM)
Method EPA 552.2	Total Haloacetic Acids (HAA-5)

Accreditation applies to public drinking water matrices for State of Colorado and New Mexico.

This report meets NELAP requirements and is made up of a cover page, analytical results, and a copy of the original chain-of-custody. If you have any questions concerning this report, please feel free to contact me.

Sincerely,

Celey D. Keene

Celey D. Keene

Lab Director/Quality Manager

CARDINAL Laboratories

PHONE (575) 393-2326 ° 101 E. MARLAND ° HOBBS, NM 88240

Analytical Results For:

PRICE LLC 312 ENCANTADO RIDGE COURT, NE RIO RANCHO NM, 87124	Project: QUARTERLY SAMPLES Project Number: 2018-19 4TH QT - KEY EUNICE BR Project Manager: WAYNE PRICE Fax To: UNK-NOWN	Reported: 07-Feb-19 09:35

Sample ID	Laboratory ID	Matrix	Date Sampled	Date Received
FRESH WATER - W LOAD LINE	H900314-01	Water	28-Jan-19 15:05	30-Jan-19 08:15
BRINEWATER - W LOAD LINE	H900314-02	Water	28-Jan-19 15:10	30-Jan-19 08:15
FRESH WATER TANK	H900314-03	Water	28-Jan-19 15:40	30-Jan-19 08:15
CITY WATER INLET TO TK	H900314-04	Water	28-Jan-19 15:55	30-Jan-19 08:15

Cardinal Laboratories

*=Accredited Analyte

Celey D. Keene, Lab Director/Quality Manager

CARDINAL Laboratories

PHONE (575) 393-2326 ° 101 E. MARLAND ° HOBBS, NM 88240

Analytical Results For:

PRICE LLC 312 ENCANTADO RIDGE COURT, NE RIO RANCHO NM, 87124	Project: QUARTERLY SAMPLES Project Number: 2018-19 4TH QT - KEY EUNICE BR Project Manager: WAYNE PRICE Fax To: UNK-NOWN	Reported: 07-Feb-19 09:35

FRESH WATER - W LOAD LINE

H900314-01 (Water)

Analyte	Result	MDL	Reporting Limit	Units	Dilution	Batch	Analyst	Analyzed	Method	Notes
Cardinal Laboratories										
Inorganic Compounds										
Chloride*	**130000**		4.00	mg/L	1	9012811	AC	31-Jan-19	4500-Cl-B	

Cardinal Laboratories

*=Accredited Analyte

Celey D. Keene, Lab Director/Quality Manager

CARDINAL Laboratories

PHONE (575) 393-2326 ° 101 E. MARLAND ° HOBBS, NM 88240

Analytical Results For:

PRICE LLC 312 ENCANTADO RIDGE COURT, NE RIO RANCHO NM, 87124	Project: QUARTERLY SAMPLES Project Number: 2018-19 4TH QT - KEY EUNICE BR Project Manager: WAYNE PRICE Fax To: UNK-NOWN	Reported: 07-Feb-19 09:35

BRINEWATER - W LOAD LINE

H900314-02 (Water)

Analyte	Result	MDL	Reporting Limit	Units	Dilution	Batch	Analyst	Analyzed	Method	Notes
Cardinal Laboratories										
Inorganic Compounds										
Chloride*	**182000**		4.00	mg/L	1	9012811	AC	31-Jan-19	4500-Cl-B	
pH*	**6.90**		0.100	pH Units	1	9013002	AC	30-Jan-19	150.1	
Specific Gravity @ 60° F	**1.184**		0.000	[blank]	1	9013007	AC	30-Jan-19	SM 2710F	
TDS*	**275000**		5.00	mg/L	1	9013005	AC	01-Feb-19	160.1	
Green Analytical Laboratories										
Total Recoverable Metals by ICP (E200.7)										
Sodium*	**101000**		300	mg/L	300	B902012	AES	04-Feb-19	EPA200.7	

Cardinal Laboratories

*=Accredited Analyte

Celey D. Keene, Lab Director/Quality Manager

CARDINAL Laboratories

PHONE (575) 393-2326 ° 101 E. MARLAND ° HOBBS, NM 88240

Analytical Results For:

PRICE LLC 312 ENCANTADO RIDGE COURT, NE RIO RANCHO NM, 87124	Project: QUARTERLY SAMPLES Project Number: 2018-19 4TH QT - KEY EUNICE BR Project Manager: WAYNE PRICE Fax To: UNK-NOWN	Reported: 07-Feb-19 09:35

FRESH WATER TANK

H900314-03 (Water)

Analyte	Result	MDL	Reporting Limit	Units	Dilution	Batch	Analyst	Analyzed	Method	Notes
Cardinal Laboratories										
Inorganic Compounds										
Chloride*	**440**		4.00	mg/L	1	9012811	AC	31-Jan-19	4500-Cl-B	
pH*	**7.95**		0.100	pH Units	1	9013002	AC	30-Jan-19	150.1	
Specific Gravity @ 60° F	**0.9990**		0.000	[blank]	1	9013007	AC	30-Jan-19	SM 2710F	
TDS*	**762**		5.00	mg/L	1	9013005	AC	01-Feb-19	160.1	

Cardinal Laboratories

*=Accredited Analyte

Celey D. Keene, Lab Director/Quality Manager

CARDINAL Laboratories

PHONE (575) 393-2326 ° 101 E. MARLAND ° HOBBS, NM 88240

Analytical Results For:

PRICE LLC 312 ENCANTADO RIDGE COURT, NE RIO RANCHO NM, 87124	Project: QUARTERLY SAMPLES Project Number: 2018-19 4TH QT - KEY EUNICE BR Project Manager: WAYNE PRICE Fax To: UNK-NOWN	Reported: 07-Feb-19 09:35

CITY WATER INLET TO TK

H900314-04 (Water)

Analyte	Result	MDL	Reporting Limit	Units	Dilution	Batch	Analyst	Analyzed	Method	Notes
Cardinal Laboratories										
Inorganic Compounds										
Chloride*	**60.0**		4.00	mg/L	1	9012811	AC	31-Jan-19	4500-Cl-B	

Cardinal Laboratories

*=Accredited Analyte

Celey D. Keene, Lab Director/Quality Manager

CARDINAL Laboratories

PHONE (575) 393-2326 ° 101 E. MARLAND ° HOBBS, NM 88240

Analytical Results For:

PRICE LLC 312 ENCANTADO RIDGE COURT, NE RIO RANCHO NM, 87124	Project: QUARTERLY SAMPLES Project Number: 2018-19 4TH QT - KEY EUNICE BR Project Manager: WAYNE PRICE Fax To: UNK-NOWN	Reported: 07-Feb-19 09:35

Inorganic Compounds - Quality Control

Cardinal Laboratories

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch 9012811 - General Prep - Wet Chem										
Blank (9012811-BLK1)				Prepared & Analyzed: 28-Jan-19						
Chloride	ND	4.00	mg/L							
LCS (9012811-BS1)				Prepared & Analyzed: 28-Jan-19						
Chloride	104	4.00	mg/L	100		104	80-120			
LCS Dup (9012811-BSD1)				Prepared & Analyzed: 28-Jan-19						
Chloride	104	4.00	mg/L	100		104	80-120	0.00	20	
Batch 9013002 - General Prep - Wet Chem										
LCS (9013002-BS1)				Prepared & Analyzed: 30-Jan-19						
pH	7.10		pH Units	7.00		101	90-110			
Duplicate (9013002-DUP1)		**Source: H900304-01**		Prepared & Analyzed: 30-Jan-19						
pH	6.62	0.100	pH Units		6.61			0.151	20	
Batch 9013005 - Filtration										
Blank (9013005-BLK1)				Prepared: 30-Jan-19 Analyzed: 01-Feb-19						
TDS	ND	5.00	mg/L							
LCS (9013005-BS1)				Prepared: 30-Jan-19 Analyzed: 05-Feb-19						
TDS	191		mg/L	204		93.6	80-120			
Duplicate (9013005-DUP1)		**Source: H900304-07**		Prepared: 30-Jan-19 Analyzed: 01-Feb-19						
TDS	474	5.00	mg/L		394			18.4	20	

Cardinal Laboratories

*=Accredited Analyte

Celey D. Keene, Lab Director/Quality Manager

CARDINAL Laboratories

PHONE (575) 393-2326 ° 101 E. MARLAND ° HOBBS, NM 88240

Analytical Results For:

PRICE LLC 312 ENCANTADO RIDGE COURT, NE RIO RANCHO NM, 87124	Project: QUARTERLY SAMPLES Project Number: 2018-19 4TH QT - KEY EUNICE BR Project Manager: WAYNE PRICE Fax To: UNK-NOWN	Reported: 07-Feb-19 09:35

Inorganic Compounds - Quality Control

Cardinal Laboratories

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch 9013007 - General Prep - Wet Chem										
Duplicate (9013007-DUP1)		**Source: H900304-01**		Prepared & Analyzed: 30-Jan-19						
Specific Gravity @ 60° F	1.013	0.000	[blank]		1.014			0.168	20	

Celey D. Keene, Lab Director/Quality Manager

CARDINAL Laboratories

PHONE (575) 393-2326 ° 101 E. MARLAND ° HOBBS, NM 88240

Analytical Results For:

PRICE LLC 312 ENCANTADO RIDGE COURT, NE RIO RANCHO NM, 87124	Project: QUARTERLY SAMPLES Project Number: 2018-19 4TH QT - KEY EUNICE BR Project Manager: WAYNE PRICE Fax To: UNK-NOWN	Reported: 07-Feb-19 09:35

Total Recoverable Metals by ICP (E200.7) - Quality Control

Green Analytical Laboratories

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch B902012 - Total Rec. 200.7/200.8/200.2										
Blank (B902012-BLK1)				Prepared & Analyzed: 04-Feb-19						
Sodium	ND	1.00	mg/L							
LCS (B902012-BS1)				Prepared & Analyzed: 04-Feb-19						
Sodium	3.17	1.00	mg/L	3.24		97.9	85-115			
LCS Dup (B902012-BSD1)				Prepared & Analyzed: 04-Feb-19						
Sodium	3.21	1.00	mg/L	3.24		99.2	85-115	1.27	20	

Cardinal Laboratories

*=Accredited Analyte

Celey D. Keene, Lab Director/Quality Manager

CARDINAL Laboratories

PHONE (575) 393-2326 ° 101 E. MARLAND ° HOBBS, NM 88240

Notes and Definitions

ND	Analyte NOT DETECTED at or above the reporting limit
RPD	Relative Percent Difference
**	Samples not received at proper temperature of 6°C or below.
***	Insufficient time to reach temperature.
-	Chloride by SM4500Cl-B does not require samples be received at or below 6°C
	Samples reported on an as received basis (wet) unless otherwise noted on report

Cardinal Laboratories

*=Accredited Analyte

Celey D. Keene, Lab Director/Quality Manager

CARDINAL Laboratories

CHAIN-OF-CUSTODY AND ANALYSIS REQUEST

101 East Marland, Hobbs, NM 88240
(575) 393-2326 FAX (575) 393-2476

Send Results to wayneprice@q.com

Company Name:	Key Energy	**BILL TO**	
Project Manager:	Wayne Price-Price LLC	P.O. #:	
Address:	312 Encantado Rd CT NE	Company:	Price LLC
City:	Rio Rancho State: NM Zip: 87124	Attn:	Wayne Price
Phone #:	505-715-2809 Fax #:	Address:	Same
Project #:	2018-19 4th qtr Project Owner: Key Energy	City:	Same
Project Name:	Key Eunice Brine Station BW-28	State: NM Zip:	Same
Project Location:	UL E of Section I5-Township 21 South-Range 37 East.	Phone #:	505-715-2809
Sampler Name:	W.Price-PriceLLC 505-715-2809 wayneprice@q.com	Fax #:	

FOR LAB USE ONLY				MATRIX						PRESERV.			SAMPLING		ANALYSIS REQUEST											
Lab I.D.	Sample I.D.	(G)RAB OR (C)OMP.	# CONTAINERS	GROUNDWATER	WASTEWATER	SOIL	OIL	SLUDGE	OTHER : Water	ACID/BASE:	ICE / COOL	OTHER :	DATE	TIME	Chlorides	Chlorides TDS, SG, Ph + Na	Chlorides TDS, SG, Ph									
H900314																										
1	Fresh Water- W load line	G	1						✓		✓		1-28-19	3:05 pm	XX											
2	Brine Water-W load line	G	1						✓		✓		↓	3:10 pm		XX										
3	Fresh Water Tank **	G	1						✓		✓			3:40 pm			XX									
4	City Fresh Inlet to TK	G	1						✓		✓			3:55 pm	XX											

Relinquished By: wayne Price-Price LLC	Date: 1-30-19	Received By: Tamara Oldaker	Phone Result: ☐ Yes ☐ No Add'l Phone #:
	Time: 0815		Fax Result: ☐ Yes ☐ No Add'l Fax #:
Relinquished By:	Date:	Received By:	REMARKS: Send results to wayneprice@q.com
	Time:		** Fresh Water tank supply water to brine well injection tubing

Delivered By: (Circle One)	Sample Condition	CHECKED BY: (Initials)
Sampler - UPS - Bus - Other: -0.8c #67	Cool: ☑ Yes ☐ No Intact: ☑ Yes ☐ No	TO

CARDINAL Laboratories

PHONE (575) 393-2326 ° 101 E. MARLAND ° HOBBS, NM 88240

May 08, 2019

WAYNE PRICE

PRICE LLC

312 ENCANTADO RIDGE COURT, NE

RIO RANCHO, NM 87124

RE: EUNICE STATE S BRINE WELL

Enclosed are the results of analyses for samples received by the laboratory on 04/29/19 15:00.

Cardinal Laboratories is accredited through Texas NELAP under certificate number T104704398-18-11. Accreditation applies to drinking water, non-potable water and solid and chemical materials. All accredited analytes are denoted by an asterisk (*). For a complete list of accredited analytes and matrices visit the TCEQ website at www.tceq.texas.gov/field/qa/lab_accred_certif.html.

Cardinal Laboratories is accreditated through the State of Colorado Department of Public Health and Environment for:

Method EPA 552.2	Total Haloacetic Acids (HAA-5)
Method EPA 524.2	Total Trihalomethanes (TTHM)
Method EPA 524.4	Regulated VOCs (V1, V2, V3)

Cardinal Laboratories is accredited through the State of New Mexico Environment Department for:

Method SM 9223-B	Total Coliform and E. coli (Colilert MMO-MUG)
Method EPA 524.2	Regulated VOCs and Total Trihalomethanes (TTHM)
Method EPA 552.2	Total Haloacetic Acids (HAA-5)

Accreditation applies to public drinking water matrices for State of Colorado and New Mexico.

This report meets NELAP requirements and is made up of a cover page, analytical results, and a copy of the original chain-of-custody. If you have any questions concerning this report, please feel free to contact me.

Sincerely,

Celey D. Keene

Celey D. Keene

Lab Director/Quality Manager

CARDINAL Laboratories

PHONE (575) 393-2326 ° 101 E. MARLAND ° HOBBS, NM 88240

Analytical Results For:

PRICE LLC 312 ENCANTADO RIDGE COURT, NE RIO RANCHO NM, 87124	Project: EUNICE STATE S BRINE WELL Project Number: BW - 28 1ST QTR 2019 Project Manager: WAYNE PRICE Fax To: UNK-NOWN	Reported: 08-May-19 15:31

Sample ID	Laboratory ID	Matrix	Date Sampled	Date Received
FRESH WATER	H901527-01	Water	29-Apr-19 12:15	29-Apr-19 15:00
BRINE WATER	H901527-02	Water	29-Apr-19 12:30	29-Apr-19 15:00

Cardinal Laboratories

*=Accredited Analyte

Celey D. Keene, Lab Director/Quality Manager

CARDINAL Laboratories

PHONE (575) 393-2326 ° 101 E. MARLAND ° HOBBS, NM 88240

Analytical Results For:

PRICE LLC 312 ENCANTADO RIDGE COURT, NE RIO RANCHO NM, 87124	Project: EUNICE STATE S BRINE WELL Project Number: BW - 28 1ST QTR 2019 Project Manager: WAYNE PRICE Fax To: UNK-NOWN	Reported: 08-May-19 15:31

FRESH WATER

H901527-01 (Water)

Analyte	Result	MDL	Reporting Limit	Units	Dilution	Batch	Analyst	Analyzed	Method	Notes
Cardinal Laboratories										
Inorganic Compounds										
Chloride*	**476**		4.00	mg/L	1	9043006	AC	02-May-19	4500-Cl-B	
pH*	**7.73**		0.100	pH Units	1	9050107	AC	01-May-19	150.1	
Specific Gravity @ 60° F	**0.9976**		0.000	[blank]	1	9050122	AC	01-May-19	SM 2710F	
TDS*	**1120**		5.00	mg/L	1	9043002	AC	02-May-19	160.1	

Cardinal Laboratories

*=Accredited Analyte

Celey D. Keene, Lab Director/Quality Manager

CARDINAL Laboratories

PHONE (575) 393-2326 ° 101 E. MARLAND ° HOBBS, NM 88240

Analytical Results For:

PRICE LLC 312 ENCANTADO RIDGE COURT, NE RIO RANCHO NM, 87124	Project: EUNICE STATE S BRINE WELL Project Number: BW - 28 1ST QTR 2019 Project Manager: WAYNE PRICE Fax To: UNK-NOWN	Reported: 08-May-19 15:31

BRINE WATER

H901527-02 (Water)

Analyte	Result	MDL	Reporting Limit	Units	Dilution	Batch	Analyst	Analyzed	Method	Notes
Cardinal Laboratories										
Inorganic Compounds										
Chloride*	**188000**		4.00	mg/L	1	9043006	AC	02-May-19	4500-Cl-B	
pH*	**6.94**		0.100	pH Units	1	9050107	AC	01-May-19	150.1	
Specific Gravity @ 60° F	**1.169**		0.000	[blank]	1	9050122	AC	01-May-19	SM 2710F	
TDS*	**282000**		5.00	mg/L	1	9043002	AC	02-May-19	160.1	
Green Analytical Laboratories										
Total Recoverable Metals by ICP (E200.7)										
Sodium*	**94200**		500	mg/L	500	B905025	AES	06-May-19	EPA200.7	

Cardinal Laboratories

*=Accredited Analyte

Celey D. Keene, Lab Director/Quality Manager

CARDINAL Laboratories

PHONE (575) 393-2326 ° 101 E. MARLAND ° HOBBS, NM 88240

Analytical Results For:

PRICE LLC 312 ENCANTADO RIDGE COURT, NE RIO RANCHO NM, 87124	Project: EUNICE STATE S BRINE WELL Project Number: BW - 28 1ST QTR 2019 Project Manager: WAYNE PRICE Fax To: UNK-NOWN	Reported: 08-May-19 15:31

Inorganic Compounds - Quality Control

Cardinal Laboratories

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch 9043002 - Filtration										
Blank (9043002-BLK1)				Prepared: 30-Apr-19 Analyzed: 02-May-19						
TDS	ND	5.00	mg/L							
LCS (9043002-BS1)				Prepared: 30-Apr-19 Analyzed: 02-May-19						
TDS	562		mg/L	527		107	80-120			
Duplicate (9043002-DUP1)	**Source: H901493-01**			Prepared: 30-Apr-19 Analyzed: 02-May-19						
TDS	658	5.00	mg/L		562			15.7	20	
Batch 9043006 - General Prep - Wet Chem										
Blank (9043006-BLK1)				Prepared: 30-Apr-19 Analyzed: 02-May-19						
Chloride	ND	4.00	mg/L							
LCS (9043006-BS1)				Prepared: 30-Apr-19 Analyzed: 02-May-19						
Chloride	100	4.00	mg/L	100		100	80-120			
LCS Dup (9043006-BSD1)				Prepared: 30-Apr-19 Analyzed: 02-May-19						
Chloride	100	4.00	mg/L	100		100	80-120	0.00	20	
Batch 9050107 - General Prep - Wet Chem										
LCS (9050107-BS1)				Prepared & Analyzed: 01-May-19						
pH	7.08		pH Units	7.00		101	90-110			
Duplicate (9050107-DUP1)	**Source: H901523-01**			Prepared & Analyzed: 01-May-19						
pH	6.07	0.100	pH Units		6.05			0.330	20	

Cardinal Laboratories

*=Accredited Analyte

Celey D. Keene, Lab Director/Quality Manager

CARDINAL Laboratories

PHONE (575) 393-2326 ° 101 E. MARLAND ° HOBBS, NM 88240

Analytical Results For:

PRICE LLC 312 ENCANTADO RIDGE COURT, NE RIO RANCHO NM, 87124	Project: EUNICE STATE S BRINE WELL Project Number: BW - 28 1ST QTR 2019 Project Manager: WAYNE PRICE Fax To: UNK-NOWN	Reported: 08-May-19 15:31

Inorganic Compounds - Quality Control

Cardinal Laboratories

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch 9050122 - General Prep - Wet Chem										
Duplicate (9050122-DUP1)		**Source: H901511-01**		Prepared & Analyzed: 01-May-19						
Specific Gravity @ 60° F	0.9989	0.000	[blank]		0.9970			0.185	20	

Celey D. Keene, Lab Director/Quality Manager

CARDINAL Laboratories

PHONE (575) 393-2326 ° 101 E. MARLAND ° HOBBS, NM 88240

Analytical Results For:

PRICE LLC 312 ENCANTADO RIDGE COURT, NE RIO RANCHO NM, 87124	Project: EUNICE STATE S BRINE WELL Project Number: BW - 28 1ST QTR 2019 Project Manager: WAYNE PRICE Fax To: UNK-NOWN	Reported: 08-May-19 15:31

Total Recoverable Metals by ICP (E200.7) - Quality Control

Green Analytical Laboratories

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch B905025 - Total Rec. 200.7/200.8/200.2										
Blank (B905025-BLK1)				Prepared: 02-May-19 Analyzed: 06-May-19						
Sodium	ND	1.00	mg/L							
LCS (B905025-BS1)				Prepared: 02-May-19 Analyzed: 06-May-19						
Sodium	3.26	1.00	mg/L	3.24		101	85-115			
LCS Dup (B905025-BSD1)				Prepared: 02-May-19 Analyzed: 06-May-19						
Sodium	3.31	1.00	mg/L	3.24		102	85-115	1.49	20	

Cardinal Laboratories

*=Accredited Analyte

Celey D. Keene, Lab Director/Quality Manager

CARDINAL Laboratories

PHONE (575) 393-2326 ° 101 E. MARLAND ° HOBBS, NM 88240

Notes and Definitions

ND	Analyte NOT DETECTED at or above the reporting limit
RPD	Relative Percent Difference
**	Samples not received at proper temperature of 6°C or below.
***	Insufficient time to reach temperature.
-	Chloride by SM4500Cl-B does not require samples be received at or below 6°C
	Samples reported on an as received basis (wet) unless otherwise noted on report

Cardinal Laboratories

*=Accredited Analyte

Celey D. Keene, Lab Director/Quality Manager

CARDINAL Laboratories

CHAIN-OF-CUSTODY AND ANALYSIS REQUEST

101 East Marland, Hobbs, NM 88240
(575) 393-2326 FAX (575) 393-2476

Company Name:	Key Energy Services LLC	**BILL TO**	
Project Manager:	Wayne Price- Price LLC	P.O. #:	
Address:	312 Encantado Ridge CT NE	Company:	Price LLC
City:	Rio Rancho State: NM Zip: 87124	Attn:	Wayne Price
Phone #:	505-715-2809 Fax #:	Address:	same
Project #:	BW-28 1st QTR 2019 Project Owner: Key Energy Services	City:	Same
Project Name:	Eunice State S Brine Well	State:	Zip: same
Project Location:		Phone #:	505-715-2809
Sampler Name:	Wayne Price- Price LLC	Fax #:	

FOR LAB USE ONLY				MATRIX						PRESERV.			SAMPLING		ANALYSIS REQUEST												
Lab I.D.	Sample I.D.	(G)RAB OR (C)OMP.	# CONTAINERS	GROUNDWATER	WASTEWATER	SOIL	OIL	SLUDGE	OTHER : water	ACID/BASE:	ICE / COOL	OTHER :	DATE	TIME	TDS,SG,ph, Cl's	TDS,SG,ph, Cl's + Na											
H901527																											
1	Fresh Water	G	1						✓		✓		4-29-2019	12:15pm	✓												
2	Brine Water	G	1						✓		✓		"	12:39pm		✓											

Relinquished By: Wayne Price	Date: 4-29-2019 Time: 3 PM	Received By: Jodi Henson	Phone Result: ☐ Yes ☐ No Add'l Phone #:
Relinquished By:	Date: Time:	Received By:	Fax Result: ☐ Yes ☐ No Add'l Fax #:
Delivered By: (Circle One) Sampler - UPS - Bus - Other: 1.8°C / #97	Sample Condition Cool: ☑ Yes ☐ No Intact: ☑ Yes ☐ No	CHECKED BY: (Initials)	REMARKS: FW FROM FW TANK BW IN WEST LOAN LINE

The results set forth herein are provided by SGS North America Inc.

e-Hardcopy 2.0
Automated Report

Technical Report for

Key Energy

Key Eunice Brine Well

SGS Job Number: TD48103

Sampling Date: 11/22/19

Report to:

Key Energy
1301 McKinney Street
Houston, TX 77010
msticker@keyenergy.com; jbest@keyenergy.com

ATTN: Jill Best

Total number of pages in report: 25

Test results contained within this data package meet the requirements of the National Environmental Laboratory Accreditation Program and/or state specific certification programs as applicable.

John Watson
Technical Director

Client Service contact: Electa Brown 713-271-4700

Certifications: TX (T104704220-19-34) AR (14-016-0) AZ (AZ0769) FL (E87628) KS (E-10366) LA (85695/04004) NJ (TX010) OK (2018-129) VA (10171)

Sections: 1 2 3 4 5 6 7

Table of Contents

Sample Summary

Key Energy

Key Eunice Brine Well

Job No: TD48103

Sample Number	Collected Date	Time	By	Received	Matrix Code	Type	Client Sample ID
TD48103-1	11/22/19	09:50		11/25/19	LIQ	Liquid, Non-aqueous	BRINE WATER PUMP SUCTION MANIFOLD
TD48103-2	11/22/19	09:30		11/25/19	LIQ	Liquid, Non-aqueous	FRESH WATER E. LOAD LINE

Summary of Hits

Job Number: TD48103
Account: Key Energy
Project: Key Eunice Brine Well
Collected: 11/22/19

Lab Sample ID / Analyte	Client Sample ID	Result/ Qual	RL	MDL	Units	Method
TD48103-1	**BRINE WATER PUMP SUCTION MANIFOLD**					
Sodium [a]		36300000	500000		ug/l	SW846 6010C
Chloride		224000	14000		mg/l	EPA 300.0
Solids, Total Dissolved		293000	1000		mg/l	SM 2540C-2011
Specific Gravity		1.2				ASTM 2710F
pH [b]		7.02			su	SM 4500H+ B-2011
TD48103-2	**FRESH WATER E. LOAD LINE**					
Chloride		1480	1400		mg/l	EPA 300.0
Solids, Total Dissolved		393	10		mg/l	SM 2540C-2011
Specific Gravity		1.0				ASTM 2710F
pH [c]		8.01			su	SM 4500H+ B-2011

(a) Elevated reporting limit due to sample result over Linear Dynamic Range. Analysis performed at SGS Scott, LA.
(b) Sample received outside the holding time. temp. 18.1 c
(c) Sample received outside the holding time. temp. 18.2 c

Sample Results

Report of Analysis

Report of Analysis

Client Sample ID:	BRINE WATER PUMP SUCTION MANIFOLD		
Lab Sample ID:	TD48103-1	**Date Sampled:**	11/22/19
Matrix:	LIQ - Liquid, Non-aqueous	**Date Received:**	11/25/19
		Percent Solids:	n/a
Project:	Key Eunice Brine Well		

Metals Analysis

Analyte	Result	RL	Units	DF	Prep	Analyzed	By	Method	Prep Method
Sodium [a]	36300000	500000	ug/l	1000	12/02/19	12/03/19	ALA	SW846 6010C [1]	SW846 3010A [2]

(1) Instrument QC Batch: L:MA17701
(2) Prep QC Batch: L:MP17067

(a) Elevated reporting limit due to sample result over Linear Dynamic Range. Analysis performed at SGS Scott, LA.

RL = Reporting Limit

Report of Analysis

Client Sample ID:	BRINE WATER PUMP SUCTION MANIFOLD		
Lab Sample ID:	TD48103-1	**Date Sampled:**	11/22/19
Matrix:	LIQ - Liquid, Non-aqueous	**Date Received:**	11/25/19
		Percent Solids:	n/a
Project:	Key Eunice Brine Well		

General Chemistry

Analyte	Result	RL	Units	DF	Analyzed	By	Method
Chloride	224000	14000	mg/l	20000	12/06/19 17:01	PK	EPA 300.0
Solids, Total Dissolved	293000	1000	mg/l	1	11/27/19	BG	SM 2540C-2011
Specific Gravity	1.2			1	11/27/19 12:55	PK	ASTM 2710F
pH [a]	7.02		su	1	11/25/19 11:00	PA	SM 4500H+ B-2011

(a) Sample received outside the holding time. temp. 18.1 c

RL = Reporting Limit

Report of Analysis

Client Sample ID:	FRESH WATER E. LOAD LINE		
Lab Sample ID:	TD48103-2	**Date Sampled:**	11/22/19
Matrix:	LIQ - Liquid, Non-aqueous	**Date Received:**	11/25/19
		Percent Solids:	n/a
Project:	Key Eunice Brine Well		

General Chemistry

Analyte	Result	RL	Units	DF	Analyzed	By	Method
Chloride	1480	1400	mg/l	2000	12/06/19 15:25	PK	EPA 300.0
Solids, Total Dissolved	393	10	mg/l	1	11/27/19	BG	SM 2540C-2011
Specific Gravity	1.0			1	11/27/19 12:55	PK	ASTM 2710F
pH [a]	8.01		su	1	11/25/19 11:00	PA	SM 4500H+ B-2011

(a) Sample received outside the holding time. temp. 18.2 c

RL = Reporting Limit

Misc. Forms

Custody Documents and Other Forms

Includes the following where applicable:

- Chain of Custody

Chain of Custody TD48103

XENCO LABORATORIES

Work Order No: _____

Houston,TX (281) 240-4200 Dallas,TX (214) 902-0300 San Antonio,TX (210) 509-3334
Midland,TX (432-704-5440) EL Paso,TX (915)585-3443 Lubbock,TX (806)794-1296
Hobbs,NM (575-392-7550) Phoenix,AZ (480-355-0900) Atlanta,GA (770-449-8800) Tampa,FL (813-620-2000)

www.xenco.com Page _____ of _____

Project Manager:	Wayne Price	Bill to: (if different)	Jill Best
Company Name:	Price LLC	Company Name:	Key Energy
Address:	312 Encantado Ridge CT NE	Address:	1301 McKinney St Suite 1800
City, State ZIP:	Rio Rancho, NM 87124	City, State ZIP:	Houston TX 77010
Phone:	505-715-2809	Email:	wayneprice@q.com

Work Order Comments

Program: UST/PST ☐ RP ☐ Brownfields RP ☐ Superfund ☐
State of Project:
Reporting:Level II ☐ Level III ☐ PST/UST TRRP ☐ Level IV ☐
Deliverables: EDD ☐ ADaPT ☐ Other:

Project Name:	Key Eunice Brine Well	Turn Around	
Project Number:	BW-28 2019 : 3 rd qtr	Routine	XXX
P.O. Number:		Rush:	
Sampler's Name:	Wayne Price	Due Date:	

SAMPLE RECEIPT				
Temp Blank:	Yes No	Wet Ice:	Yes No	
Temperature (°C):		Thermometer ID		
Received Intact:	Yes No			
Cooler Custody Seals:	Yes No N/A	Correction Factor:		
Sample Custody Seals:	Yes No N/A	Total Containers:		

Sample Identification	Matrix	Date Sampled	Time Sampled	Depth	Number of Containers	TDS, CL, Ph, SG	TDS, Cl, Ph, SG, Na
1-Brine Water [redacted]	L	11-22-19	9:50 AM		1		✓
2- Fresh Water [redacted]	L	"	9:30 AM		1	✓	
E. LOAD LINE							
PUMP SUCTION MANIFOLD							

ANALYSIS REQUEST

Work Order Notes

TAT starts the day recevied by the lab, if received by 4:30pm

Sample Comments

Total 200.7 / 6010 200.8 / 6020: 8RCRA 13PPM Texas 11 Al Sb As Ba Be B Cd Ca Cr Co Cu Fe Pb Mg Mn Mo Ni K Se Ag SiO2 Na Sr Tl Sn U V Zn
Circle Method(s) and Metal(s) to be analyzed **TCLP / SPLP 6010:** 8RCRA Sb As Ba Be Cd Cr Co Cu Pb Mn Mo Ni Se Ag Tl U **1631 / 245.1 / 7470 / 7471** : Hg

Relinquished by: (Signature)	Received by: (Signature)	Date/Time	Relinquished by: (Signature)	Received by: (Signature)	Date/Time
Wayne Price Price LLC		11/22/19 2:20 pm	2 Fedex		11/25/19 1004
3			4		
5			6		

Revised Date 051418 Rev. 2018.1

SGS Sample Receipt Summary

Job Number: TD48103 **Client:** KEY ENERGY **Project:** KEY EUNICE BRINE WELL

Date / Time Received: 11/25/2019 10:04:00 AM **Delv Method:** FEDEX **Airbill #'s:** 493390065377

# of Coolers: 1 **Therm ID:** IR-3; **Temp Adjustment Factor:** 0;

Cooler Temps (Initial/Adjusted): #1: (1.3/1.3);

Test Strip Lot #s: **pH 1-12:** 10D0391 **pH 12+:** _____ **Other: (Specify)** _____ _____

Cooler Information	Y	or	N	N/A
1. Custody Seals Present:	☑		☐	☐
2. Custody Seals Intact:	☑		☐	
3. Temp criteria achieved:	☑		☐	
4. Cooler temp verification:				
3. Cooler media:	Ice (Bag)			

Trip Blank Information	Y	or	N	N/A
1. Trip Blank present / cooler:	☐		☐	☑
2. Trip Blank listed on COC:	☐		☐	☑
3. Type Of TB Received	W	or	S	N/A
	☐		☐	☐

Misc. Information

Number of terracores: _____ Number of Lab Filtered Metals: _____

Number of 5035 Field Kits: _____

Residual Chlorine Test Strip Lot #: _____

Sample Information	Y	or	N	N/A
1. Sample labels present on bottles:	☑		☐	
2. Samples preserved properly:	☑		☐	
3. Sufficient volume recvd for analysis:	☑		☐	
4. Condition of sample:	Intact			
5. Sample recvd within HT:	☑		☐	
6. Dates/Times/IDs on COC match Sample Label	☑		☐	
7. Container labeling complete:	☑		☐	
8. Analysis requested is clear:	☑		☐	
9. VOCs headspace free:	☐		☐	☑
10. Bottles received for unspecified tests	☐		☑	
11. COC Present:	☑		☐	
12. Special Instructions (compositing/filtering) clear:	☐		☐	☑
13. Voa Soil Kits/Jars received past 48hrs?	☐		☐	☐
14. % Solids Jar received?	☐		☐	☐
15. Residual Chlorine Present?	☐		☐	☐

Comments

Sample Receipt Log

Job #: TD48103 **Date / Time Received:** 11/25/2019 10:04:00 AM **Initials:** MAURICIO

Client: KEY ENERGY

Cooler #	Sample ID:	Vol	Bot #	Location	Pres	pH	Therm ID	Initial Temp	Therm CF	Corrected Temp
1	TD48103-1	1000ml	1	3J	N/P	Note #2 - Preservative check not applicable.	IR-3	1.3	0	1.3
1	TD48103-2	1000ml	1	3J	N/P	Note #2 - Preservative check not applicable.	IR-3	1.3	0	1.3

General Chemistry

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QC Data Summaries

Includes the following where applicable:

- Method Blank and Blank Spike Summaries
- Duplicate Summaries
- Matrix Spike Summaries

METHOD BLANK AND SPIKE RESULTS SUMMARY
GENERAL CHEMISTRY

Login Number: TD48103
Account: KEYENTXH - Key Energy
Project: Key Eunice Brine Well

Analyte	Batch ID	RL	MB Result	Units	Spike Amount	BSP Result	BSP %Recov	QC Limits
Chloride	GP55893/GN2944	0.70	0.0	mg/l	10	9.66	96.6	90-110%
Fluoride	GP55893/GN2944	0.70	0.0	mg/l	10	9.94	99.4	90-110%
Solids, Total Dissolved	GN2817	10	0.0	mg/l	500	493	98.6	88-110%
Specific Gravity	GN2822		1					
Sulfate	GP55893/GN2944	0.50	0.0	mg/l	10	9.85	98.5	90-110%

Associated Samples:
Batch GN2817: TD48103-1, TD48103-2
Batch GN2822: TD48103-1, TD48103-2
Batch GP55893: TD48103-1, TD48103-2
(*) Outside of QC limits

DUPLICATE RESULTS SUMMARY
GENERAL CHEMISTRY

Login Number: TD48103
Account: KEYENTXH - Key Energy
Project: Key Eunice Brine Well

Analyte	Batch ID	QC Sample	Units	Original Result	DUP Result	RPD	QC Limits
Chloride	GP55893/GN2944	TD48096-1	mg/l	2.3	2.3	0.0	0-20%
Fluoride	GP55893/GN2944	TD48096-1	mg/l	1.1	1.1	0.0	0-20%
Solids, Total Dissolved	GN2817	TD48121-4	mg/l	1360	1380	1.5	0-5%
Specific Gravity	GN2822	TD47991-1		1.0568	1.0568	0.0	0-%
Sulfate	GP55893/GN2944	TD48096-1	mg/l	1.3	1.3	0.0	0-20%
pH	GN2771	TD48053-1	su	7.23	7.23	0.0	0-10%

Associated Samples:
Batch GN2771: TD48103-1, TD48103-2
Batch GN2817: TD48103-1, TD48103-2
Batch GN2822: TD48103-1, TD48103-2
Batch GP55893: TD48103-1, TD48103-2
(*) Outside of QC limits

MATRIX SPIKE RESULTS SUMMARY
GENERAL CHEMISTRY

Login Number: TD48103
Account: KEYENTXH - Key Energy
Project: Key Eunice Brine Well

Analyte	Batch ID	QC Sample	Units	Original Result	Spike Amount	MS Result	%Rec	QC Limits
Chloride	GP55893/GN2944	TD48096-1	mg/l	2.3	10	11.8	95.0	80-120%
Fluoride	GP55893/GN2944	TD48096-1	mg/l	1.1	10	12.2	111.0	80-120%
Sulfate	GP55893/GN2944	TD48096-1	mg/l	1.3	10	10.8	95.0	80-120%

Associated Samples:
Batch GP55893: TD48103-1, TD48103-2
(*) Outside of QC limits
(N) Matrix Spike Rec. outside of QC limits

Misc. Forms

Custody Documents and Other Forms

(SGS Scott, LA)

Includes the following where applicable:

- Chain of Custody

CHAIN OF CUSTODY

SGS

10165 Harwin Drive, Houston, TX 77036
TEL. 713-271-4700 FAX: 713-271-4770
www.sgs.com

FED-EX Tracking #	Bottle Order Control #
SGS Quote #	SGS Job # TD48103

Client / Reporting Information	Project Information
Company Name: SGS North America Inc.	Project Name: Key Eunice Brine Well
Street Address: 10165 Harwin Drive	Street
City: Houston State: TX Zip: 77036	City / State — Billing Information (if different from Report to) Company Name
Project Contact / E-mail: electa.brown@sgs.com	Project # — Street Address
Phone #: 713-271-4700 Fax #	Client Purchase Order # — City / State / Zip
Sampler(s) Name(s) Phone	Project Manager — Attention:

Requested Analysis (see TEST CODE sheet)

Matrix Codes: DW - Drinking Water, GW - Ground Water, WW - Water, SW - Surface Water, SO - Soil, SL- Sludge, SED-Sediment, OI - Oil, LIQ - Other Liquid, AIR - Air, SOL - Other Solid, WP - Wipe, FB-Field Blank, EB-Equipment Blank, RB- Rinse Blank, TB-Trip Blank

SGS Sample #	Field ID / Point of Collection	MEOH/DI Vial #	Collection Date	Collection Time	Sampled by	Matrix	# of bottles	HCl	NaOH	HNO3	H2SO4	NONE	DI Water	MEOH	ENCORE	NA	LAB USE ONLY
1	BRINE WATER PUMP SUCTION MANI		11/22/19	9:50:00 AM		LIQ	1					1				X	/

Turnaround Time (Business days)

- [ ] Std. 10 Business Days
- [ ] 5 Day RUSH
- [ ] 3 Day EMERGENCY
- [ ] 2 Day EMERGENCY
- [ ] 1 Day EMERGENCY
- [X] other Due 12/4/2019

Approved By (SGS PM): / Date:

Emergency & Rush T/A data available VIA Lablink

Data Deliverable Information

- [ ] Commercial "A" (Level 1)
- [ ] Commercial "B" (Level 2)
- [ ] FULLT1 (Level 3+4)
- [ ] NJ Reduced
- [ ] Commercial "C"
- [ ] NYASP Category A
- [ ] NYASP Category B
- [ ] State Forms
- [ ] EDD Format
- [X] Other COMMB

Commercial "A" = Results Only
Commercial "B" = Results + QC Summary
NJ Reduced = Results + QC Summary + Partial Raw data

Comments / Special Instructions

LA (BWJ) RUSH!
11-27-19 0905

Sample Custody must be documented below each time samples change possession, including courier delivery.

Relinquished by	Date Time	Received By	Relinquished By	Date Time	Received By
1	11/26/19 1743	1 Genu Pitarbee 1810	2 Genu	11-26-19	2
3		3	4		4
5		5	Custody Seal #	Intact / Not intact; Preserved where applicable	On Ice; Cooler Temp. 0.9

TD48103: Chain of Custody
Page 1 of 2
SGS Scott, LA

SGS Sample Receipt Summary

Job Number: TD48103 **Client:** SGS NORTH AMERICA **Project:** KEY EUNICE BRINE WELL

Date / Time Received: 11/27/2019 9:15:00 AM **Delivery Method:** Accutest Courier **Airbill #'s:**

Cooler Temps (Initial/Adjusted): #1: (0.9/0.9);

Cooler Security	Y	or	N		Y	or	N
1. Custody Seals Present:	☑		☐	3. COC Present:	☑		☐
2. Custody Seals Intact:	☑		☐	4. Smpl Dates/Time OK	☑		☐

Cooler Temperature	Y	or	N
1. Temp criteria achieved:	☑		☐
2. Thermometer ID:	DV440;		
3. Cooler media:	Ice (direct contact)		
4. No. Coolers:	1		

Quality Control Preservation	Y	or	N	N/A
1. Trip Blank present / cooler:	☐		☐	☑
2. Trip Blank listed on COC:	☐		☐	☑
3. Samples preserved properly:	☑		☐	
4. VOCs headspace free:	☐		☐	☑

Sample Integrity - Documentation	Y	or	N
1. Sample labels present on bottles:	☑		☐
2. Container labeling complete:	☑		☐
3. Sample container label / COC agree:	☑		☐

Sample Integrity - Condition	Y	or	N
1. Sample recvd within HT:	☑		☐
2. All containers accounted for:	☑		☐
3. Condition of sample:	Intact		

Sample Integrity - Instructions	Y	or	N	N/A
1. Analysis requested is clear:	☑		☐	
2. Bottles received for unspecified tests	☐		☑	
3. Sufficient volume recvd for analysis:	☑		☐	
4. Compositing instructions clear:	☐		☐	☑
5. Filtering instructions clear:	☐		☐	☑

Comments

6.1

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TD48103: Chain of Custody
Page 2 of 2

Metals Analysis

QC Data Summaries

(SGS Scott, LA)

Includes the following where applicable:

- Method Blank Summaries
- Matrix Spike and Duplicate Summaries
- Blank Spike and Lab Control Sample Summaries
- Serial Dilution Summaries

BLANK RESULTS SUMMARY
Part 2 - Method Blanks

Login Number: TD48103
Account: ALGC - SGS Houston, TX
Project: KEYENTXH: Key Eunice Brine Well

QC Batch ID: MP17067
Matrix Type: AQUEOUS

Methods: SW846 6010C
Units: ug/l

Prep Date: 12/02/19

Metal	RL	IDL	MDL	MB raw	final
Aluminum	100	6	56		
Antimony	6.0	1.4	3		
Arsenic	10	2.8	3.6		
Barium	10	.1	4		
Beryllium	4.0	.06	.3		
Boron	100	.51	30		
Cadmium	5.0	.15	.4		
Calcium	100	19	92		
Chromium	10	.34	2		
Cobalt	10	.31	1.7		
Copper	10	.44	3.8		
Iron	100	2.1	17		
Lead	10	1.1	3.1		
Lithium	10	1.1	8		
Magnesium	100	16	90		
Manganese	10	.16	1.2		
Molybdenum	10	.15	1		
Nickel	10	.65	5		
Potassium	500	14	220		
Selenium	10	2.3	4.5		
Silver	10	.41	2.8		
Sodium	500	5.2	170	-88	<500
Strontium	10	.05	3.2		
Thallium	10	1.3	5.1		
Tin	10	.71	2.4		
Titanium	10	.28	2.4		
Vanadium	10	.2	2.4		
Zinc	20	1.3	3.7		

Associated samples MP17067: TD48103-1

Results < IDL are shown as zero for calculation purposes
(*) Outside of QC limits
(anr) Analyte not requested

MATRIX SPIKE AND DUPLICATE RESULTS SUMMARY

Login Number: TD48103
Account: ALGC - SGS Houston, TX
Project: KEYENTXH: Key Eunice Brine Well

QC Batch ID: MP17067
Matrix Type: AQUEOUS

Methods: SW846 6010C
Units: ug/l

Prep Date: 12/02/19

Metal	LA59734-1 Original MS		Spikelot ICPSPIKE1% Rec		QC Limits
Aluminum					
Antimony					
Arsenic					
Barium					
Beryllium					
Boron					
Cadmium					
Calcium					
Chromium					
Cobalt					
Copper					
Iron	anr				
Lead	anr				
Lithium					
Magnesium					
Manganese					
Molybdenum					
Nickel					
Potassium					
Selenium					
Silver					
Sodium	365000	372000	10000	70.0 (a)	75-125
Strontium					
Thallium					
Tin					
Titanium					
Vanadium					
Zinc					

Associated samples MP17067: TD48103-1

Results < IDL are shown as zero for calculation purposes
(*) Outside of QC limits
(N) Matrix Spike Rec. outside of QC limits
(anr) Analyte not requested
(a) Spike amount low relative to the sample amount. Refer to lab control or spike blank for recovery information.

MATRIX SPIKE AND DUPLICATE RESULTS SUMMARY

Login Number: TD48103
Account: ALGC - SGS Houston, TX
Project: KEYENTXH: Key Eunice Brine Well

QC Batch ID: MP17067
Matrix Type: AQUEOUS

Methods: SW846 6010C
Units: ug/l

Prep Date: 12/02/19

Metal	LA59734-1 Original	MSD	Spikelot ICPSPIKE1	% Rec		MSD RPD	QC Limit
Aluminum							
Antimony							
Arsenic							
Barium							
Beryllium							
Boron							
Cadmium							
Calcium							
Chromium							
Cobalt							
Copper							
Iron	anr						
Lead	anr						
Lithium							
Magnesium							
Manganese							
Molybdenum							
Nickel							
Potassium							
Selenium							
Silver							
Sodium	365000	365000	10000	0.0	(a)	1.9	20
Strontium							
Thallium							
Tin							
Titanium							
Vanadium							
Zinc							

Associated samples MP17067: TD48103-1

Results < IDL are shown as zero for calculation purposes
(*) Outside of QC limits
(N) Matrix Spike Rec. outside of QC limits
(anr) Analyte not requested
(a) Spike amount low relative to the sample amount. Refer to lab control or spike blank for recovery information.

SPIKE BLANK AND LAB CONTROL SAMPLE SUMMARY

Login Number: TD48103
Account: ALGC - SGS Houston, TX
Project: KEYENTXH: Key Eunice Brine Well

QC Batch ID: MP17067
Matrix Type: AQUEOUS

Methods: SW846 6010C
Units: ug/l

Prep Date: 12/02/19

Metal	BSP Result	Spikelot ICPSPIKE1%	Rec	QC Limits
Aluminum				
Antimony				
Arsenic				
Barium				
Beryllium				
Boron				
Cadmium				
Calcium				
Chromium				
Cobalt				
Copper				
Iron	anr			
Lead	anr			
Lithium				
Magnesium				
Manganese				
Molybdenum				
Nickel				
Potassium				
Selenium				
Silver				
Sodium	10200	10000	102.0	80-120
Strontium				
Thallium				
Tin				
Titanium				
Vanadium				
Zinc				

Associated samples MP17067: TD48103-1

Results < IDL are shown as zero for calculation purposes
(*) Outside of QC limits
(anr) Analyte not requested

SERIAL DILUTION RESULTS SUMMARY

Login Number: TD48103
Account: ALGC - SGS Houston, TX
Project: KEYENTXH: Key Eunice Brine Well

QC Batch ID: MP17067
Matrix Type: AQUEOUS

Methods: SW846 6010C
Units: ug/l

Prep Date: 12/02/19

Metal	LA59734-1 Original	SDL 1:5	%DIF	QC Limits
Aluminum				
Antimony				
Arsenic				
Barium				
Beryllium				
Boron				
Cadmium				
Calcium				
Chromium				
Cobalt				
Copper				
Iron	anr			
Lead	anr			
Lithium				
Magnesium				
Manganese				
Molybdenum				
Nickel				
Potassium				
Selenium				
Silver				
Sodium	365000	367000	0.6	0-10
Strontium				
Thallium				
Tin				
Titanium				
Vanadium				
Zinc				

Associated samples MP17067: TD48103-1

Results < IDL are shown as zero for calculation purposes
(*) Outside of QC limits
(anr) Analyte not requested

Appendix C – Area of Review Data

2019 BW-28 AOR Review-- Well Status List

up-dated May 21, 2019

	API#	Well Name	UL	Section	Ts	Rg	Footage	Within 1/4 mi AOR * within 800 ft			Casing Program Checked	Cased/Cemented across salt section	Corrective Action Required
1	***30-025-33547***	***Key-State no.001***	***E***	***15***	***21s***	***37e***	***1340 FNL & 330 FWL***	NA			NA		
1	30-025-06591	Apache NEDU 604	E	15	21s	37e	2310 FNL & 990 FWL	yes		1	no	Will check if critical radius approaches	Will check if critical radius approaches
1	30-025-09913 (P&A)	Shell NEDU 603	E	15	21s	37e	3390 FSL & 4520 FEL	**Yes***	1	1	yes	yes	no
1	30-025-09914	Apache NEDU 602	E	15	21s	37e	1980 FNL & 660 FWL	**Yes***	1	1	yes	yes	no
1	30-025-35271	Apache NEDU 602625	E	15	21s	37e	2580 FNL & 1300 FWL	no			na	na	na
0	30-025-37223 Never Drilled **	Apache NEDU 628	E	15	21s	37e	1410 FNL & 380 FWL	Never Drilled	0	0	na	na	na
1	30-025-41600 (in Production 2014)	Apache NEDU 544	E	15	21s	37e	1355 FNL &1190 FWL	yes	0	1	Yes	yes	no
0	30-025-42237 (Withdrawn)	Apache NEDU 648	E	15	21s	37e	1640 FNL & 1300 FWL	yes	0	1	na	na	na
1	30-025-06609	Chevron St. 002	C	15	21s	37e	660 FNL & 1980 FWL	no			na	na	na
1	30-025-06611	Chevron St. 004	C	15	21s	37e	660 FNL & 2080 FWL	no			na	na	na
1	30-025-06613	Apache NEDU 605	C	15	21s	37e	760 FNL & 1980 FWL	no			na	na	na
1	30-025-34649	Apache NEDU 622	C	15	21s	37e	1229 FNL & 2498 FWL	no			na	na	na
1	30-025-34886	Apache NEDU 524	C	15	21s	37e	160 FNL & 1350 FWL	no			na	na	na
1	30-025-39831(added 2010)	Chevron State S no. 2	C	15	21s	37e	990 FNL & 1330 FWL	yes		1	no	Will check if critical radius approaches	Will check if critical radius approaches
1	30-025-34887	Apache NEDU 624	C	15	21s	37e	1250 FNL & 1368 FWL	yes		1	no	Will check if critical radius approaches	Will check if critical radius approaches
1	30-025-41485	Brammer Engr. St No 12	C	15	21s	37e	990 FNL & 1330 FWL	yes		1	yes+++	yes	no
1	30-025-41583	Apache NEDU 661	C	15	21s	37e	1240 FNL & 1930 FWL	no			na	na	na
1	30-025-41598	Apache NEDU 558	C	15	21s	37e	150 FNL & 2295 FWL	no			na	na	na
1	30-025-06586	Chevron St. 001	D	15	21s	37e	660 FNL & 660 FWL	**yes***	1	1	yes	yes	no
1	30-025-06612	Chevron St. 005	D	15	21s	37e	660 FNL & 990 FWL	yes		1	yes	yes	no
1	30-025-06614	Apache NEDU 601	D	15	21s	37e	600 FNL & 990 FWL	yes		1	yes	yes	no
1	30-025-36809	Apache NEDU 526	D	15	21s	37e	130 FNL & 330 FWL	yes		1	no	Will check if critical radius approaches	Will check if critical radius approaches
0	30-025-45456	Apache NEDU 649	D	15	21s	37e	870 FNL & 800 FWL	**no (proposed)**	0	0	Yes	Not drilled-OK as proposed	Not drilled
1	30-025-06585	Apache St. 002	F	15	21s	37e	1980 FNL & 1980 FWL	no			na	na	na
1	30-025-06587	Apache NEDU 606	F	15	21s	37e	3375 FSL & 3225 FEL	no			na	na	na
1	30-025-06590	Apache NEDU 608	F	15	21s	37e	1980 FNL & 1880 FWL	no			na	na	na
1	30-025-41275	Apache NEDU 650	F	15	21s	37e	2550 FNL & 1925 FWL	no			na	na	na
0	30-025-42236 (Withdrawn)	Apache NEDU 647	F	15	21s	37e	1710 FNL & 2360 FWL	no			na	na	na
1	30-025-06603	Apache Argo 006	K	15	21s	37e	1650 FSL & 2310 FWL	no			na	na	na
1	30-025-06607(added 2010)	Apache Argo 011	K	15	21s	37e	2080 FSL & 1650 FWL	no			na	na	na
1	30-025-09918	Apache NEDU 703	K	15	21s	37e	1980 FSL & 1980 FWL	no			na	na	na
1	30-025-39828	Apache Argo 14	K	15	21s	37e	2190 FSL & 2130 FWL	no			na	na	na
1	30-025-34657	Apache NEDU 623	K	15	21s	37e	2540 FSL & 2482 FWL	no			na	na	na
1	30-025-06606	Apache Argo 010	L	15	21s	37e	1880 FSL & 760 FWL	no			na	na	na
1	30-025-09915	Apache Argo 007	L	15	21s	37e	2310 FSL & 990 FWL	no			na	na	na
1	30-025-09916	Apache NEDU 701	L	15	21s	37e	1980 FSL & 660 FWL	no			na	na	na
1	30-025-34888	Apache NEDU 713	L	15	21s	37e	1330 FSL & 1142 FWL	no			na	na	na
1	30-025-37238	Apache NEDU 629	L	15	21s	37e	2630 FSL & 330 FWL	yes		1	no	Will check if critical radius approaches	Will check if critical radius approaches
0	30-025-42232 (Withdrawn)	Apache NEDU 639	L	15	21s	37e	1960 FSL & 740 FWL	no			na	na	na
1	30-025-06623	Apache WBDU 057	A	16	21s	37e	660 FNL & 660 FEL	yes		1	no	Will check if critical radius approaches	Will check if critical radius approaches
1	30-025-25198	Chevron HLNCT 006	A	16	21s	37e	330 FNL & 600 FEL	no			no	na	na
1	30-025-39277	Apache WBDU 113	A	16	21s	37e	1290 FNL & 330 FEL	**yes***	1	1	yes	yes	no
1	30-025-06621	Apache WBDU 056	H	16	21s	37e	1980 FNL & 660 FEL	yes		1	no	Will check if critical radius approaches	Will check if critical radius approaches
1	30-025-06624	Chevron HLNCT 005	H	16	21s	37e	2310 FNL & 330 FEL	yes		1	no	Will check if critical radius approaches	Will check if critical radius approaches
1	30-025-36741	Chevron HLNCT 007	H	16	21s	37e	1330 FNL & 1070 FEL	no			na	na	na
1	30-025-37834	Chevron HLNCT 008	H	16	21s	37e	2310 FNL & 030 FEL	yes		1	no	Will check if critical radius approaches	Will check if critical radius approaches
0	30-025-42537 (Proposed)	Apache WBDU 164	H	17	21s	37e	2610 FNL & 300 FEL	Yes	0	0	yes	Well P&A	Well P&A
1	30-025-06617	Apache St. DA 005	I	16	21s	37e	1980 FSL & 330 FEL	no			na	na	na
1	30-025-06619	Apache WBDU078	I	16	21s	37e	1980 FSL & 660 FEL	no			na	na	na
1	30-025-37916	Apache St. DA 013	I	16	21s	37e	1650 FSL & 780 FEL	no			na	na	na
									4	18			

44 Total # of wells in adjacent quarter-sections
18 Total # of wells in 1/4 mile AOR
4 Total # of wells that are or have become within 800 ft of the outside radius of the brine well.

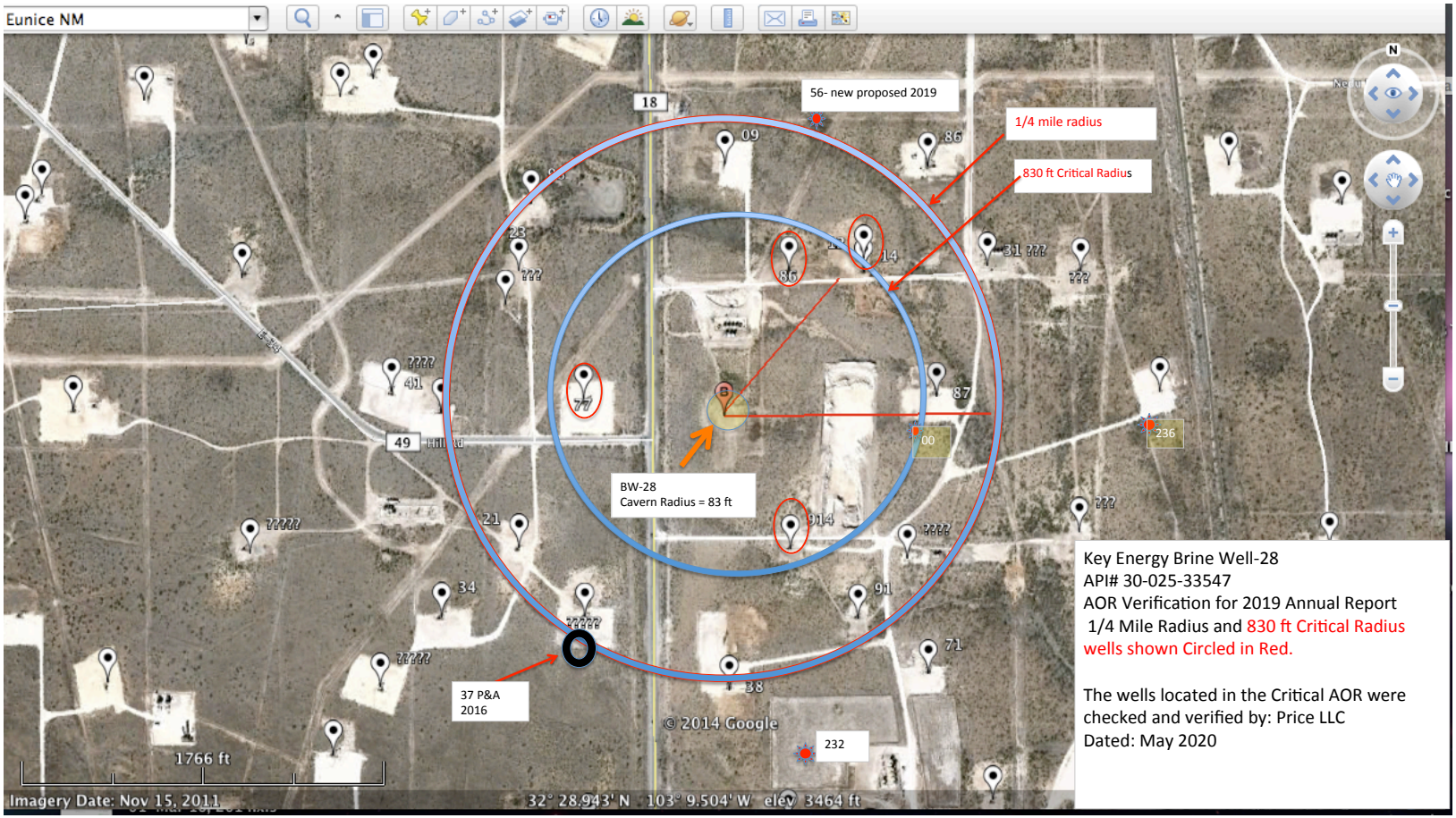
Notes:

*** Means the well is within the calculated Critical outside radius of the brine well and casing program will be checked annually.**

The Critical Radius of Review is 10x the calucated brine well radius.

**** API # 30-025-37223 not drilled too close to Brine Well**

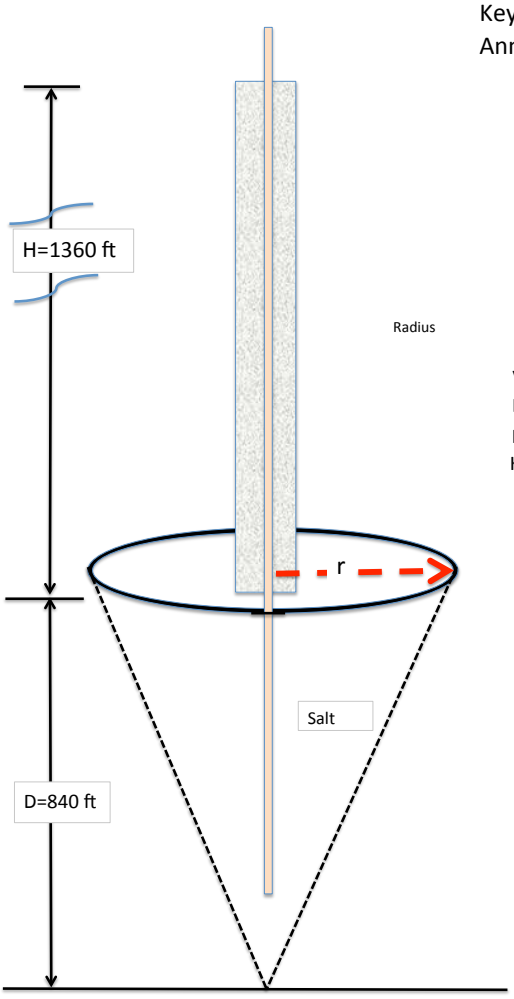
"+++checked casing 1000 sks for 714 ft3 ok between 7-5/8 and 5.5 covers salt section



Field Notes: Last two or three well digits are the last number for the Well API#.

Appendix D – Cavity calculations, well bore superimposed on log, and mass balance.

Key Energy Eunice BW-28
Annual Cavity Calculation

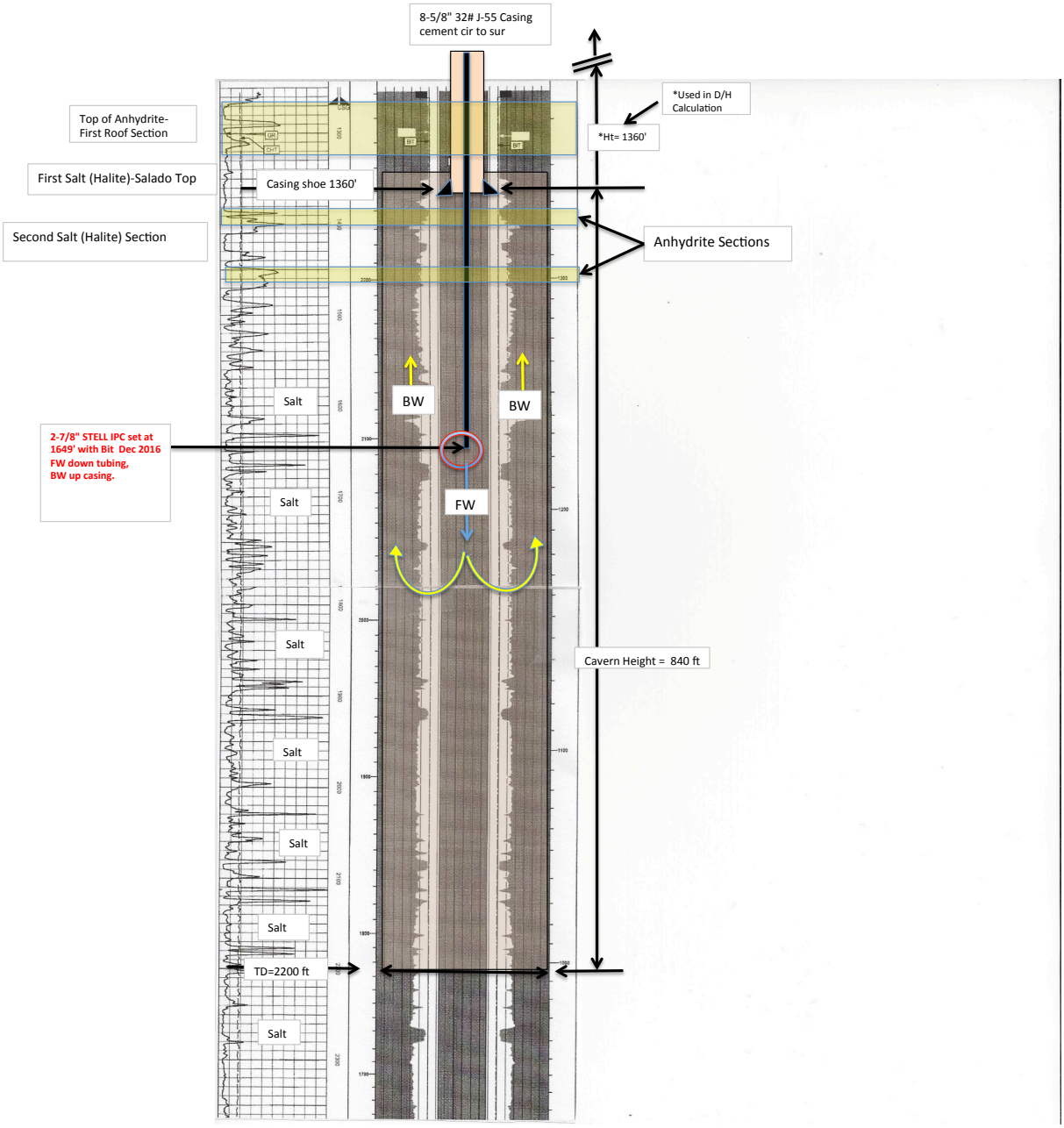


2019 Calculations

Radius r=SqRtV(V*3/π*D)

V	Volume	=	6,004,319	bbls	Inputs
D	Depth	=	840	ft	
H	Height	=	1360	ft	
Kf	ft3 salt/bbl		1	est	
	r	=	83	ft	formula
	Diameter		165	ft	formula
	D/H=		0.12		formula

Key BW-28 Cavern Superimposed on the Apache
NEDU 544D well Log Located 600 ft west of Brine Well.
BW-28 orginally Completed w 2074' of 2-7/8" FG Tubing Aug 96.
Last Completed w 2-7/8" STELL IPC set at 1649' with Bit Dec 2016.
Last Radius Calculation = 166 ft. D/ht = .12
Annotated by Price LLC May 19, 2020



BW-28 Mass Balance

Measured Salt Removed vs Calculated Salt Removed

Independent Inputs

Formulas | Dependent Variables

2019 year End total Production Volume	6,004,319	BBls	Independent variable
Average Density #/gal produced water measured	9.92	lbs/gal	Independent variable — Seven year Average
Average Salt Density-Est	80	lbs/ft3	Independent variable — Used OCD number for salt density
FT3/bbl	7.35	ft3/bbl	Independent variable
LBs of salt per gal	1.586	Lbs/gal	Dependent Variable
LBs of Salt per BBL	87.23	Lbs/bbl	Dependent Variable
Total LBs of Salt Removed	523,756,746	LBS	Dependent Variable
Ft3 of salt removed	6,546,959	Ft3	Estimated Cavern Size calculated from Production Numbers

Geo-Physical Worst Case Cone Calculation

V= ∏R2h / 3

Radius — Radius	83	ft	Dependent Variable
Height from Log	840	ft	Independent Variable
Volume of Worst Case Cone	6,056,809	Ft3	Calculated using "Worst Case Cone"

7% Within 10 % Passes

" Plus % = Means Cone Calulation is less than measured salt removed

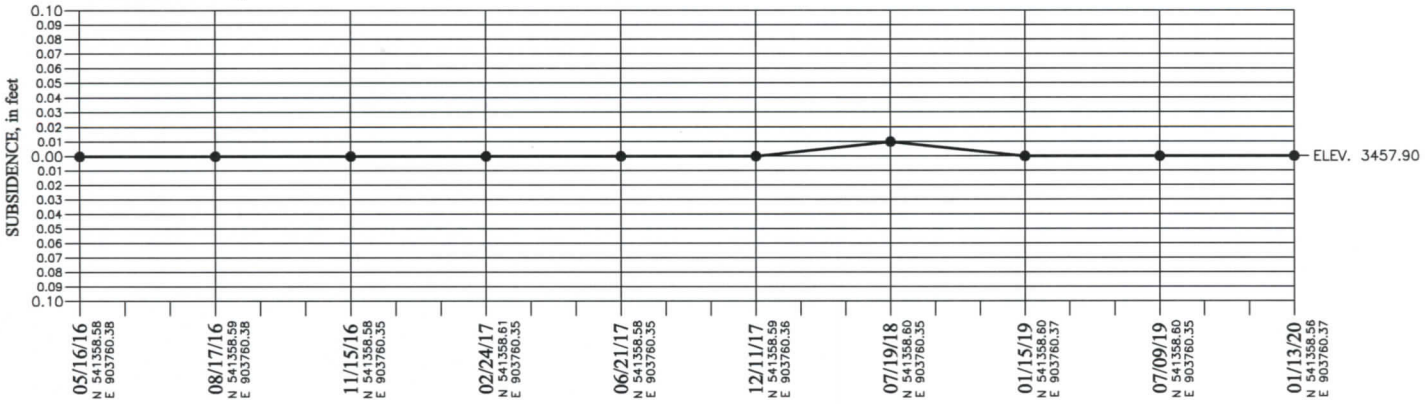
" Neg % = Means Cone Calculaton is more than measured salt remove

Appendix E – Subsidence Reports

VERTICAL SUBSIDENCE TABLE
KEY ENERGY SERVICES, LLC. – STATE #1

NEW MEXICO EAST NAD 83

MONUMENT #1



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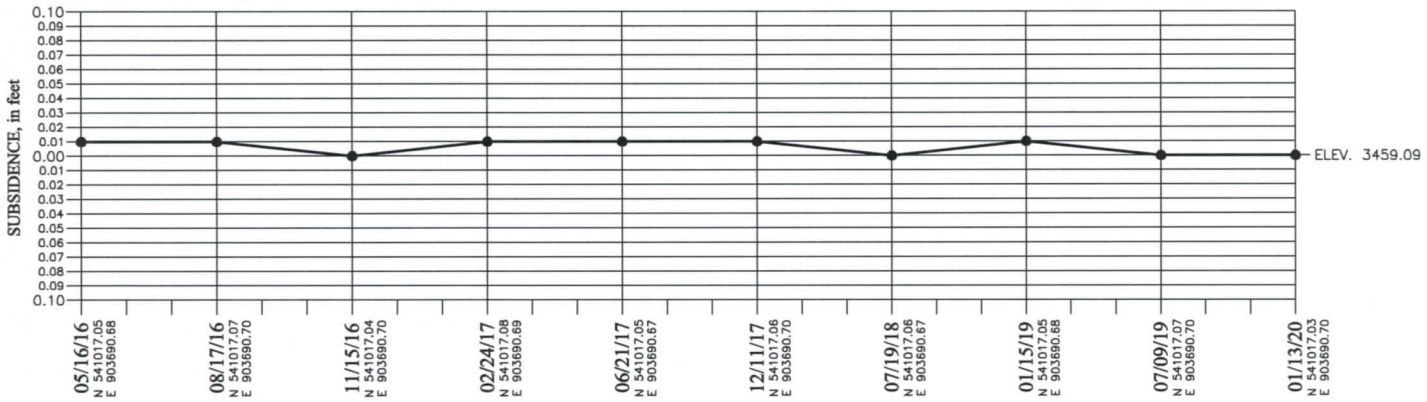

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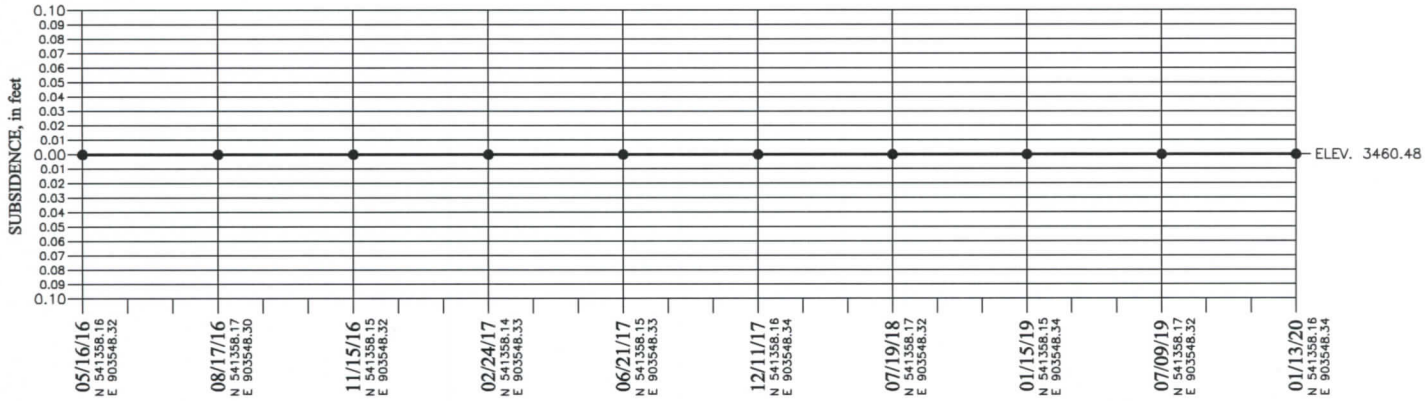


BASIS OF ELEVATIONS: US C & GS BENCH MARK
"L–98 1935" – CVO320
ELEV. = 3434.37

SURVEYORS CERTIFICATE

I, TERRY J. ASEL, NEW MEXICO PROFESSIONAL SURVEYOR NO. 15079, DO HEREBY CERTIFY THAT I CONDUCTED AND AM RESPONSIBLE FOR THIS SURVEY, THAT THIS SURVEY IS TRUE AND CORRECT TO THE BEST OF MY KNOWLEDGE AND BELIEF, AND MEETS THE "MINIMUM STANDARDS FOR SURVEYING IN NEW MEXICO" AS ADOPTED BY THE NEW MEXICO STATE BOARD OF REGISTRATION FOR PROFESSIONAL ENGINEERS AND SURVEYORS.

TERRY J. ASEL NEW MEXICO 15079 REGISTERED PROFESSIONAL LAND SURVEYOR

Terry J. Asel 1/15/2020

Terry J. Asel N.M. R.P.L.S. No. 15079

Asel Surveying

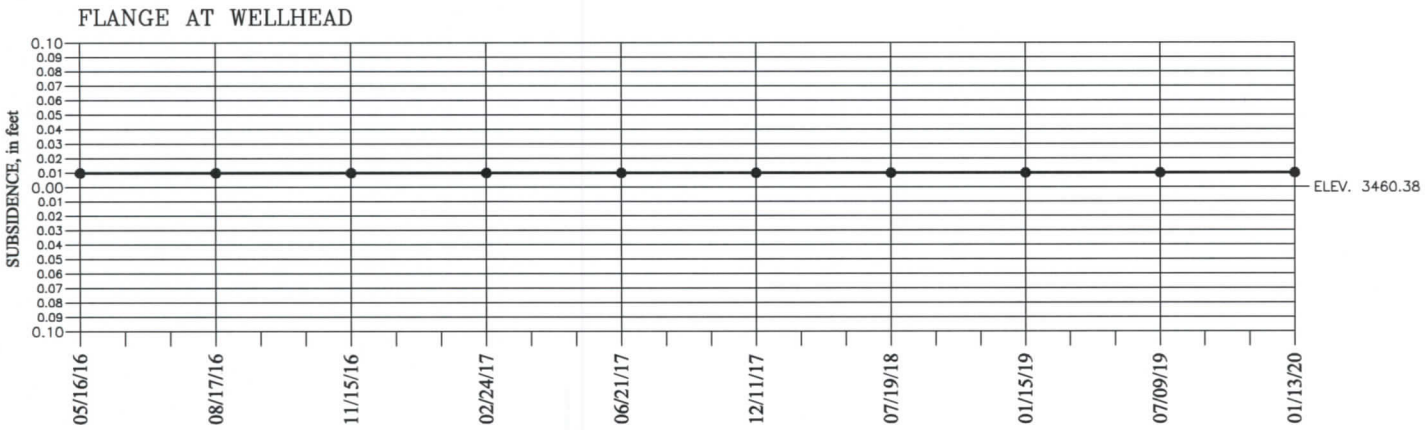
P.O. BOX 393 – 310 W. TAYLOR
HOBBS, NEW MEXICO – 575–393–9146

KEY ENERGY SERVICES, LLC.

SUBSIDENCE MONITORING FOR THE KEY ENERGY SERVICES, LLC. – EUNICE STATE #1 WELL IN SECTION 15, TOWNSHIP 21 SOUTH, RANGE 37 EAST, N.M.P.M., LEA COUNTY, NEW MEXICO

Survey Date: 01/13/20	Sheet 1 of 2 Sheets	
W.O. Number: 200113MS	Drawn By: KA	Rev:
Date: 01/14/20	200113MS	Scale:1"=1000'

VERTICAL ELEVATION TABLE
KEY ENERGY SERVICES, LLC. – STATE #1



TERRY J ASEL NEW MEXICO 15079 REGISTERED PROFESSIONAL LAND SURVEYOR

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Terry J. Asel 1/15/2020

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P.O. BOX 393 – 310 W. TAYLOR
HOBBS, NEW MEXICO – 575-393-9146

BASIS OF ELEVATIONS: US C & GS BENCH MARK
"L-98 1935" – CV0320
ELEV. = 3434.37

KEY ENERGY SERVICES, LLC.

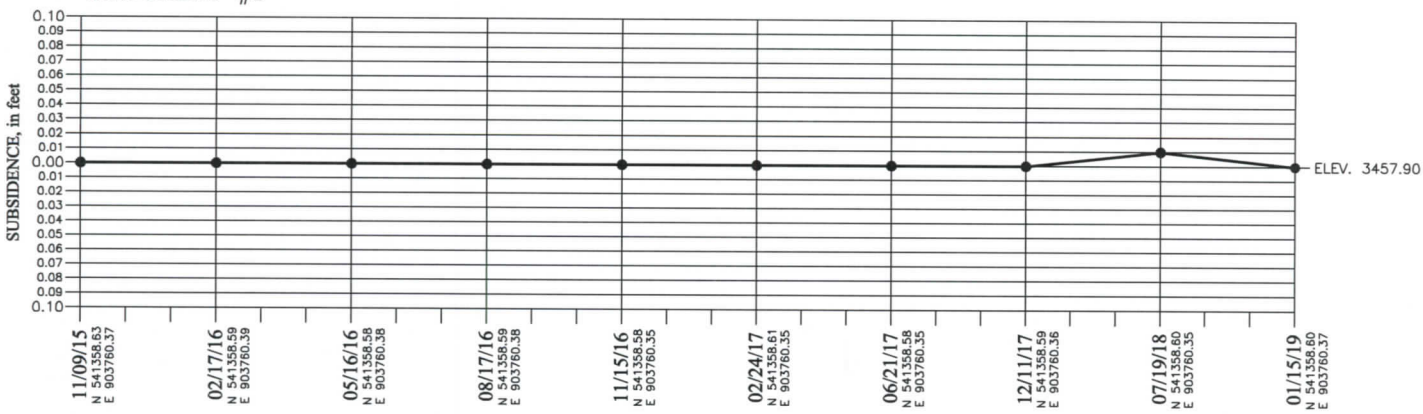
ELEVATIONS FOR THE KEY ENERGY SERVICES, LLC. – EUNICE STATE #1 WELL IN SECTION 15, TOWNSHIP 21 SOUTH, RANGE 37 EAST, N.M.P.M., LEA COUNTY, NEW MEXICO

Survey Date: 01/13/20	Sheet 2 of 2 Sheets	
W.O. Number: 200113MS	Drawn By: KA	Rev:
Date: 01/14/20	200113MS	Scale: 1"=1000'

VERTICAL SUBSIDENCE TABLE
KEY ENERGY SERVICES, LLC. – STATE #1

NEW MEXICO EAST NAD 83

MONUMENT #1



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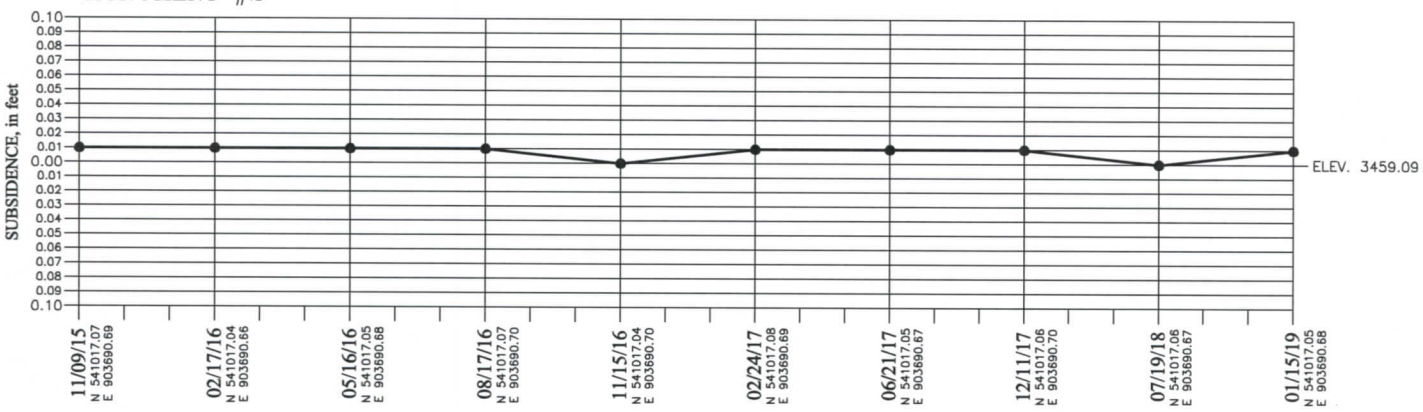

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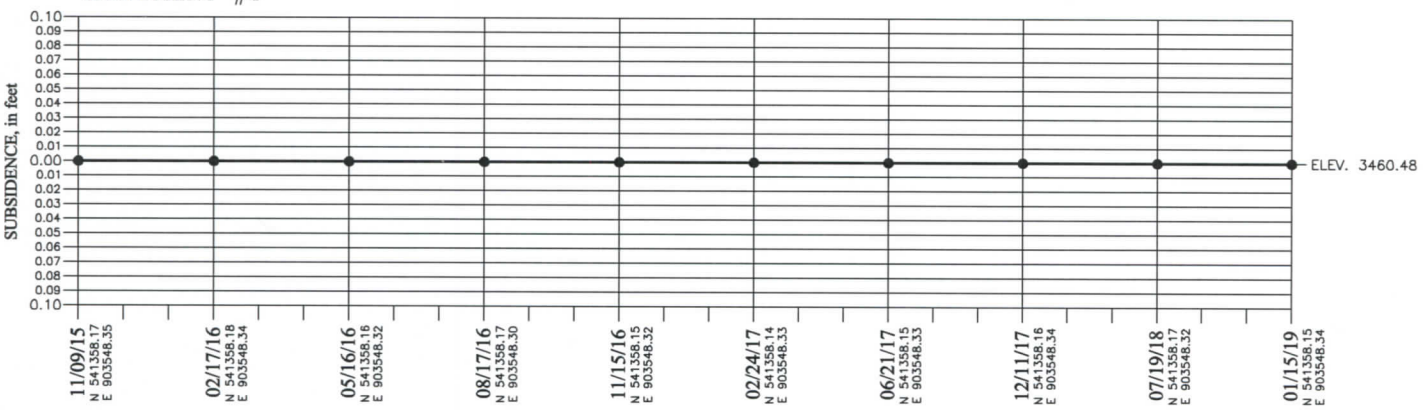

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Terry J. Asel 1/16/2019

Terry J. Asel N.M. R.P.L.S. No. 15079

TERRY J ASEL NEW MEXICO 15079 REGISTERED PROFESSIONAL LAND SURVEYOR

BASIS OF ELEVATIONS: US C & GS BENCH MARK "L–98 1935" – CVO320 ELEV. = 3434.37

Asel Surveying

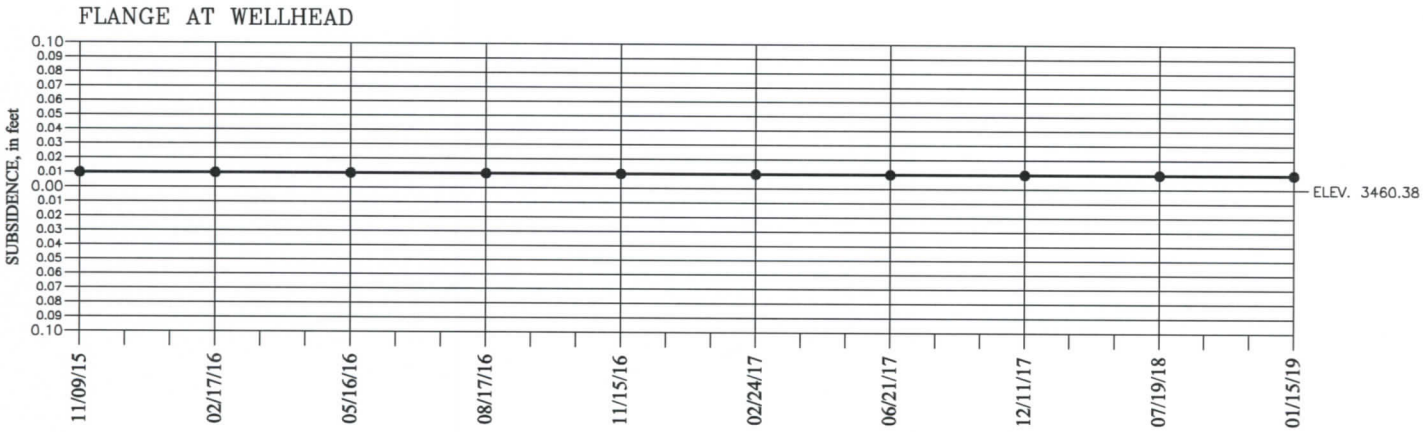
P.O. BOX 393 – 310 W. TAYLOR
HOBBS, NEW MEXICO – 575–393–9146

KEY ENERGY SERVICES, LLC.

SUBSIDENCE MONITORING FOR THE KEY ENERGY SERVICES, LLC. – EUNICE STATE #1 WELL IN SECTION 15, TOWNSHIP 21 SOUTH, RANGE 37 EAST, N.M.P.M., LEA COUNTY, NEW MEXICO

Survey Date: 01/15/19	Sheet 1 of 2 Sheets	
W.O. Number: 190115MS	Drawn By: KA	Rev:
Date: 01/16/19	190115MS	Scale:1"=1000'

VERTICAL ELEVATION TABLE
KEY ENERGY SERVICES, LLC. – STATE #1



TERRY J ASEL
NEW MEXICO
15079
REGISTERED PROFESSIONAL LAND SURVEYOR

SURVEYORS CERTIFICATE

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Terry J. Asel 1/16/2019

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Asel Surveying

P.O. BOX 393 – 310 W. TAYLOR
HOBBS, NEW MEXICO – 575-393-9146

BASIS OF ELEVATIONS: US C & GS BENCH MARK
"L-98 1935" – CV0320
ELEV. = 3434.37

KEY ENERGY SERVICES, LLC.

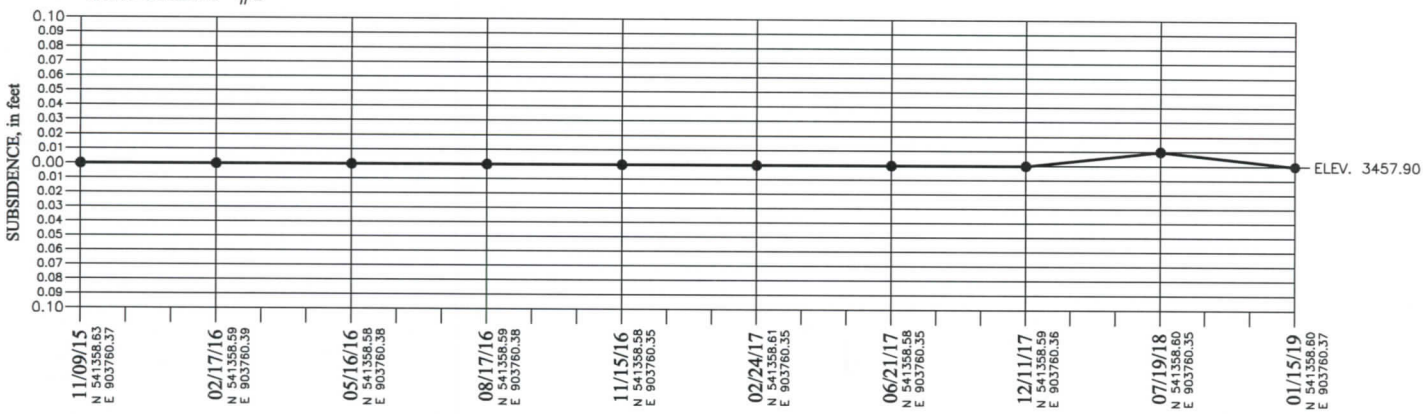
ELEVATIONS FOR THE KEY ENERGY SERVICES, LLC. – EUNICE STATE #1 WELL IN SECTION 15, TOWNSHIP 21 SOUTH, RANGE 37 EAST, N.M.P.M., LEA COUNTY, NEW MEXICO

Survey Date: 01/15/19	Sheet 2 of 2 Sheets	
W.O. Number: 190115MS	Drawn By: KA	Rev:
Date: 01/16/19	190115MS	Scale: 1"=1000'

VERTICAL SUBSIDENCE TABLE
KEY ENERGY SERVICES, LLC. – STATE #1

NEW MEXICO EAST NAD 83

MONUMENT #1



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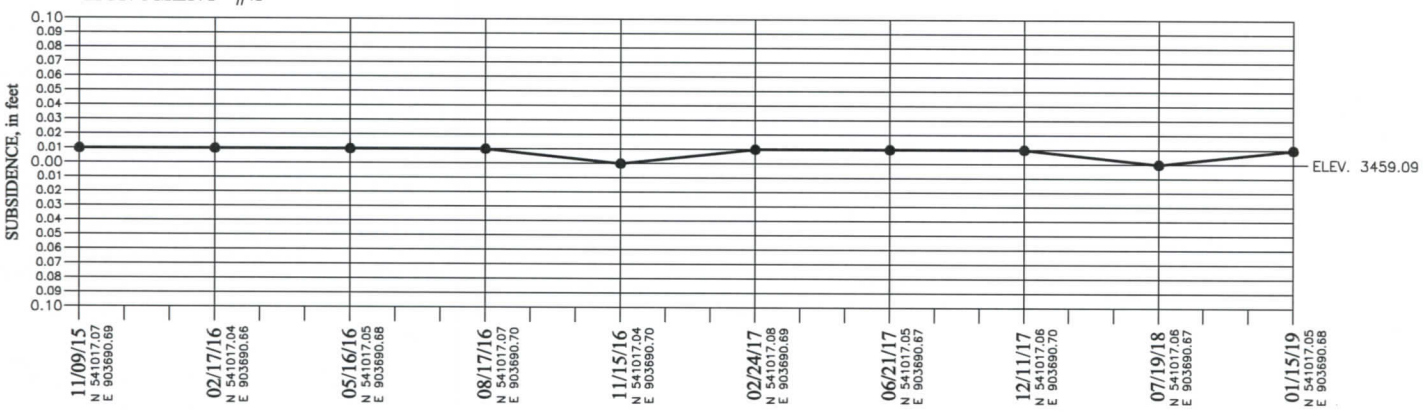

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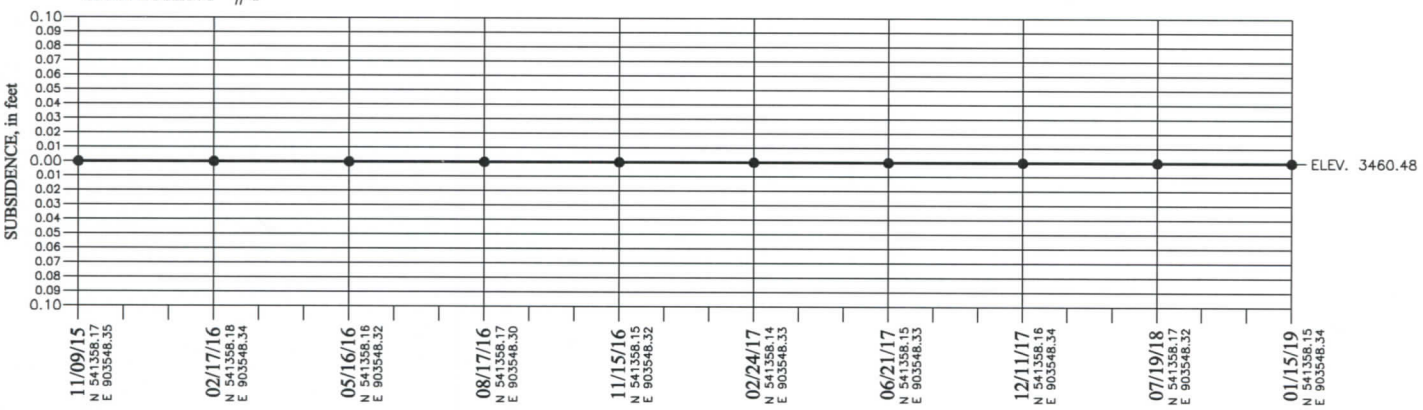

SURVEYORS CERTIFICATE

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Terry J. Asel 1/16/2019

Terry J. Asel N.M. R.P.L.S. No. 15079

TERRY J ASEL NEW MEXICO 15079 REGISTERED PROFESSIONAL LAND SURVEYOR

BASIS OF ELEVATIONS: US C & GS BENCH MARK "L–98 1935" – CVO320 ELEV. = 3434.37

Asel Surveying

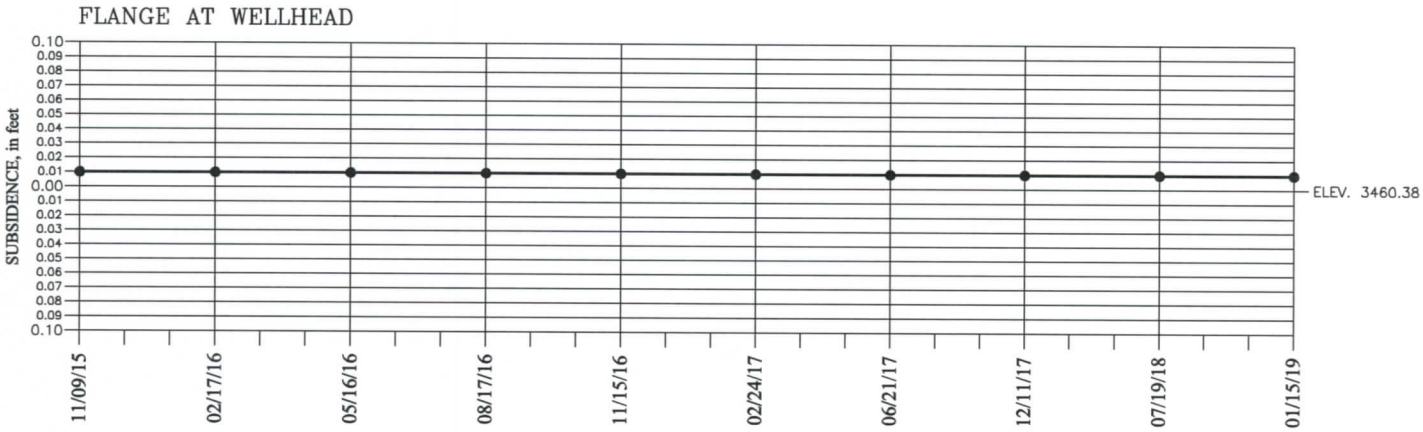
P.O. BOX 393 – 310 W. TAYLOR
HOBBS, NEW MEXICO – 575–393–9146

KEY ENERGY SERVICES, LLC.

SUBSIDENCE MONITORING FOR THE KEY ENERGY SERVICES, LLC. – EUNICE STATE #1 WELL IN SECTION 15, TOWNSHIP 21 SOUTH, RANGE 37 EAST, N.M.P.M., LEA COUNTY, NEW MEXICO

Survey Date: 01/15/19	Sheet 1 of 2 Sheets	
W.O. Number: 190115MS	Drawn By: KA	Rev:
Date: 01/16/19	190115MS	Scale:1"=1000'

VERTICAL ELEVATION TABLE
KEY ENERGY SERVICES, LLC. – STATE #1



TERRY J ASEL
NEW MEXICO
15079
REGISTERED PROFESSIONAL LAND SURVEYOR

SURVEYORS CERTIFICATE

I, TERRY J. ASEL, NEW MEXICO PROFESSIONAL SURVEYOR NO. 15079, DO HEREBY CERTIFY THAT I CONDUCTED AND AM RESPONSIBLE FOR THIS SURVEY, THAT THIS SURVEY IS TRUE AND CORRECT TO THE BEST OF MY KNOWLEDGE AND BELIEF, AND MEETS THE "MINIMUM STANDARDS FOR SURVEYING IN NEW MEXICO" AS ADOPTED BY THE NEW MEXICO STATE BOARD OF REGISTRATION FOR PROFESSIONAL ENGINEERS AND SURVEYORS.

Terry J. Asel 1/16/2019

Terry J. Asel N.M. R.P.L.S. No. 15079

Asel Surveying

P.O. BOX 393 – 310 W. TAYLOR
HOBBS, NEW MEXICO – 575-393-9146

BASIS OF ELEVATIONS: US C & GS BENCH MARK
"L-98 1935" – CV0320
ELEV. = 3434.37

KEY ENERGY SERVICES, LLC.

ELEVATIONS FOR THE KEY ENERGY SERVICES, LLC. – EUNICE STATE #1 WELL IN SECTION 15, TOWNSHIP 21 SOUTH, RANGE 37 EAST, N.M.P.M., LEA COUNTY, NEW MEXICO

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