### SCS ENGINEERS

January 31, 2019 SCS Project 16215106.00

Mr. Darryl Sparks **Compliance Manager** NAES Corporation 2161 Rattlesnake Road Riesel, Texas 76682

Subject: 2018 Annual Groundwater Monitoring and Corrective Action Report Submittal Sandy Creek Energy Station, McLennan County, Texas

Dear Mr. Sparks:

SCS Engineers (SCS) is pleased to submit the 2018 Annual Groundwater Monitoring and Corrective Action Report to the Sandy Creek Energy Station (SCES), in accordance with Coal Combustion Residual Rule (CCR) 40 CFR Part §257.94, and the site Groundwater Sampling and Analysis Plan (GWSAP), prepared by SCS, dated March 2, 2016.

Please contact James Lawrence at (817) 358-6106 if you have comments or require additional information.

Sincerely,

Doug Steen Staff Professional SCS ENGINEERS TBPE Registration No. F-3407

Attachments:

Dayle P Str Breett Della James Lawrence

2018 Annual Groundwater Monitoring and Corrective Action Report

Brett DeVries, Ph.D., P.E. Project Engineer SCS ENGINEERS

James Lawrence, P.G. Project Director SCS ENGINEERS

Paulette Heuer at PHeuer@lspower.com cc: Alan Riddle at ariddle@sandycreekservices.com



# 2018 ANNUAL GROUNDWATER MONITORING AND CORRECTIVE ACTION REPORT

## SANDY CREEK ENERGY STATION RIESEL, TEXAS

Prepared for:

Sandy Creek Energy Station 2161 Rattlesnake Road Riesel, Texas 76682

### SCS ENGINEERS

Project No. 16215106.00 | January 31, 2018

1901 Central Drive, Suite 550 Bedford, TX 76021 817-571-2288

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### **1.0** INTRODUCTION AND PROJECT BACKGROUND

SCS Engineers (SCS) is submitting the 2018 Annual Groundwater Monitoring and Corrective Action Report for the Sandy Creek Energy Station (SCES), in accordance with Coal Combustion Residual Rule (CCR) 40 CFR §257.93, and the site Groundwater Sampling and Analysis Plan (GWSAP). This report includes results for two semiannual detection monitoring events, conducted in June 2018 and December 2018.

SCES is a pulverized coal-fired electric generation facility which operates a landfill for disposal of dry scrubber ash and bottom ash generated during the coal combustion process at the facility. Incidental wastes generated during the operation of the facility may also be disposed in the landfill, as described in the initial registration notification to TCEQ and the most recent version of the Operations Plan for the facility. The landfill is currently comprised of two CCR disposal cells, Cells 1 and 2, which commenced receiving waste in early 2013 and October 2014, respectively. The approximate area of Cells 1 and 2 are 10.0 and 14.3 acres, respectively.

Sampling of monitoring wells is conducted in accordance with 40 CFR §257.93 and the GWSAP. Background monitoring of four wells (MW-1, MW-2, MW-3, and BW-1, as depicted in **Figure 1**) was performed for eight consecutive quarters in accordance with 40 CFR §257.94(b) (i.e., eight independent samples were collected for each well). The background monitoring described above commenced in December 2015 and was completed in August 2017. This report is for two semiannual detection monitoring events conducted at SCES. In accordance with 40 CFR §257 Appendix III and IV, the constituents for monitoring at SCES includes 18 inorganic compounds, total dissolved solids, radium-226, and radium-228. Currently, all monitoring wells are sampled and analyzed for 40 CFR §257 Appendix III constituents, in accordance with 40 CFR §257.94(a).

### **2.0** GROUNDWATER MONITORING SUMMARY

### 2.1 GROUNDWATER MONITORING SYSTEM

The current groundwater monitoring system at the SCES landfill consists of four wells (see Table 1 below). One is upgradient (BW-1) and three are downgradient (MW-1, MW-2, and MW-3). All four wells are currently in detection monitoring. Figure 1 shows monitoring well locations at the SCES.

Table 1 - Sandy Creek Energy Station Groundwater Monitoring System						
Well Name (U/D) <sup>1</sup>	Completion Date	Status	Top of Casing (TOC) Elevation (ft msl)²	Well Depth (ft below TOC) <sup>2</sup>	Screen Interval (ft bgs) <sup>2</sup>	Water Level Elevation (ft msl on 12/13/2018)
MW-1 (D)	9/21/2015	Detection	465.87	37.25	23.90 - 33.90	454.86
MW-2 (D)	9/23/2015	Detection	442.15	22.60	9.30 - 19.30	430.72
MW-3 (D)	9/1/2010	Detection	430.06	19.95	5.98 - 15.98	422.36
BW-1 (U)	9/22/2015	Detection	485.57	41.50	28.30 - 38.30	467.24

 $^{1}$  (U) = upgradient; (D) = downgradient

<sup>2</sup> Top of Casing Elevation, Well Depth, and Screen Interval information obtained from Table 1 – Monitoring Well and Piezometer Construction Details and Groundwater Elevations prepared by Geosyntec Consultants, dated March 11, 2016

ft msl = feet above mean sea level

ft bgs = feet below ground surface

### **2.2** SUMMARY OF 2018 SAMPLING EVENTS

All sampling events followed the groundwater sampling and laboratory analysis procedures outlined in the GWSAP. A duplicate sample was collected from one well during each event for Quality Assurance & Quality Control (QA/QC) purposes. All monitoring wells were sampled and analyzed for 40 CFR §257 Appendix III constituents, in accordance with 40 CFR §257.94(a).

#### June 2018 – Semiannual Detection Monitoring Event

All four wells (MW-1, MW-2, MW-3, and BW-1) were purged and sampled on June 21, 2018 using the conventional purge and sampling method with disposable PVC bailers. The results of the sampling were provided to the SCES in a report dated August 20, 2018. Field forms and laboratory results are provided in **Appendices A** & **B**, respectively.

#### December 2018 – Semiannual Detection Monitoring Event

All four wells (MW-1, MW-2, MW-3, and BW-1) were purged and sampled on December 13, 2018 using the conventional purge and sampling method with disposable PVC bailers. Field forms and laboratory results are provided in **Appendices A** & **B**, respectively.

### **3.0** RESULTS AND STATISTICAL ANALYSIS

A summary of June 2018 and December 2018 laboratory results and statistical limits for each well – constituent pair is provided below in **Appendix D**. Statistical limits were determined in accordance with 40 CFR §257.93(g) using the software program Sanitas®. Limits are presented using Shewhart-CUSUM control charts, non-parametric prediction limits, or parametric prediction limits as deemed appropriate by background data distributions. EPA MCLs are also presented for comparison to current data. Statistical limits for all constituents were calculated using eight quarterly background events from December 2015 to August 2017; these limits were originally presented in the 2017 Annual Groundwater Monitoring and Corrective Action Report, dated January 30, 2018.

Unconfirmed statistically significant exceedances (SSIs) were determined for fluoride at MW-1 and boron in MW-2 (see **Appendix D**). In accordance with 40 CFR §257.94(e), two alternate source demonstrations (ASDs) are provided in **Appendix F** to demonstrate that these unconfirmed SSIs likely result from natural variation in groundwater quality at the site, and are not indicative of impacts from the SCES landfill.

### 4.0 RECOMMENDATIONS

As outlined in the attached ASDs for fluoride in MW-1 and boron in MW-2, no confirmed SSIs were identified for any wells during the June 2018 and December 2018 semiannual detection monitoring events at the SCES. SCS therefore recommends that the facility remain in detection monitoring, in accordance with 40 CFR §257.94.

Due to the lack of confirmed SSIs for 40 CFR §257 Appendix III constituents during the June 2018 and December 2018 detection monitoring events, the facility will continue monitoring for all constituents listed in 40 CFR §257 Appendix III, in accordance with 40 CFR §257.94(a). The Appendix IV constituent list will be analyzed if any confirmed SSIs of the Appendix III list are indicated in future events. The next groundwater monitoring event is a semiannual detection monitoring event scheduled for June 2019.

### FIGURE 1

### MONITORING WELL LOCATION MAP



### APPENDIX A

### 2018 GROUNDWATER MONITORING FIELD FORMS

2018 Annual Groundwater Monitoring and Corrective Action Report Sandy Creek Energy Station

Facility name:	Sandy Creek Energy Station		1. Facility Type:	Power Station	
Permittee:	Sandy Creek Energy Associate	es, L.P.	2. Monitor well no .:	MW-1	
County:	McLennan		3. Date of sampling:	6/21/2018	
Name of sample	er: Doug	Steen	Most recent previous	sampling: <u>12/20/2017</u>	
Affiliation of sam	pler: SCS Engineers		Date of water level m	easurements: <u>6/21/2018</u>	
If split sampled,	with whom? N/A		Datum reference poir	nt: Top of Casing	
Integrity of well:	GOOD		Datum elevation*:	465.87	
Installation date:	9/21/2015		Depth to water(below	/ datum)*: <u>12.02</u>	
			4. Water level elevati	on*: 453.85	
5. Purging/San	npling method: <u>Bailer</u>	_(Enter bailer or pump)	11. Sample event: <u>D</u>	etection	
Were low-flo	w methods used? 🔲 yes 🔳	no (check one)	- Backgro	und - Corrective Action	
lf yes, wh	hat volume was purged? N/A	A_gal.	- Detection - Other		
6. Well volume	s purged: <u>2.1</u>		- Assessn	nent	
7. Was the wel	I dry before purging? □yes	no (check one)	12. Sample schedule: <u>Semi-Annual</u>		
8. Was the wel	I dry after purging? ■ yes 🛛	no (check one)	- Quarterl	y - Fourth Year	
9. How long be	fore sampling? <u>1.5</u>		- Semi-Ar	inual - Other	
10. Unit of meas	sure? <u>hours</u> (Enter val	lue as days, hours, or mins.)	- Annual		
			13. Sample type: <u>R</u>	egular	
			- Regular	- Split	
			- Duplicat	e - Other	
Field Measuren	nents:		- Resamp	le	
	14. pH	7.05			
	15. Spec. cond.	4,670	16. 🔳 umho/cm or	mmho/cm (check one)	
	17. Temp.	26.38	18. 🗆 F 🛛 or 🔳	C (check one)	
	19. Turbidity	681	20. <b>■</b> NTU		
Laboratory:					
21. Nan	ne <u>ALS</u>		PI	hone: (904) 739-2277	
Add	ress: 9143 Phillips Highway				

Facility name:	Sandy Creek Energy Station	1. Facility ⊺
Permittee:	Sandy Creek Energy Associates, L.P.	2. Monitor
County:	McLennan	3. Date of

Name of sampler:	Doug Steen
Affiliation of sampler:	SCS Engineers
If split sampled, with whom?	N/A
Integrity of well:	GOOD
Installation date: 9/23/2015	

5. Purging/Sampling method: <u>Bailer</u> (Enter bailer or pump)

1. Facility Type:	Power Station
2. Monitor well no.:	MW-2
3. Date of sampling:	6/21/2018

Most recent previous sampling: 12/20/2017				
Date of water level measurements: 6/21/2018				
Datum reference point: <u>To</u>	p of Casing			
Datum elevation*:4	42.15			
Depth to water(below datum)*:	12.13			
4. Water level elevation*:	430.02			

11. Sample event: Detection

Were low-flow me	ethods used? 🔲 yes 📲	no (check one)	- Background - Corrective Action
lf yes, what vo	blume was purged? N	/A gal.	- Detection - Other
6. Well volumes pur	ged: <u>2.7</u>		- Assessment
7. Was the well dry	before purging?	no (check one)	12. Sample schedule: <u>Semi-Annual</u>
8. Was the well dry	after purging? 🔳 yes 🛛	] no (check one)	- Quarterly - Fourth Year
9. How long before	sampling? <u>1.5</u>		- Semi-Annual - Other
10. Unit of measure?	hours (Enter va	alue as days, hours, or mins.)	- Annual
			13. Sample type: <u>Regular</u>
			- Regular - Split
			- Duplicate - Other
Field Measurements	5:		- Resample
	14. pH	6.80	
	15. Spec. cond.	12,660	16. ■ umho/cm or □mmho/cm (check one)
	17. Temp.	25.17	18. □ F or ■ C (check one)
	19. Turbidity	4.42	20. <b>■</b> NTU
Laboratory:			
21. Name	ALS		Phone: (904) 739-2277
Address:	9143 Phillips Highwa	y, Jacksonville, FL 32256	

Facility name:	Sandy Creek Energy Station		1. Facility Type: <u>I</u>	Power Station	
Permittee:	Sandy Creek Energy Associate	es, L.P.	2. Monitor well no.:	MW-3	
County:	McLennan		3. Date of sampling:	6/21/2018	
Name of sample	er: Douç	Most recent previous sampling: <u>12/20/2017</u>			
Affiliation of sar	npler: SCS Engineers		Date of water level me	easurements: <u>6/21/2018</u>	
If split sampled,	, with whom? <u>N/A</u>		Datum reference point	t: Top of Casing	
Integrity of well:	GOOD		Datum elevation*:	430.06	
Installation date	e: <u>9/1/2010</u>		Depth to water(below	datum)*: <u>11.38</u>	
			4. Water level elevatio	n*: 418.68	
5. Purging/Sa	mpling method: <u>Bailer</u>	_(Enter bailer or pump)	11. Sample event: <u>De</u>	tection	
Were low-fle	ow methods used? 🔲 yes 📲	no (check one)	- Background - Corrective Action		
lf yes, w	hat volume was purged? N/	<u>A</u> gal.	- Detection - Other		
6. Well volume	es purged: <u>2.9</u>		- Assessment		
7. Was the we	ll dry before purging? □yes	no (check one)	12. Sample schedule: Semi-Annual		
8. Was the we	ell dry after purging? 🔲 yes 🛛	no (check one)	- Quarterly	- Fourth Year	
9. How long be	efore sampling? <u>1.5</u>		- Semi-Anr	nual - Other	
10. Unit of mea	sure? <u>hours</u> (Enter va	lue as days, hours, or mins.)	- Annual		
			13. Sample type: <u>Re</u>	gular	
			- Regular	- Split	
			- Duplicate	- Other	
Field Measure	ments:		- Resample	e	
	14. pH	6.46			
	15. Spec. cond.	6,633	16. 🔳 umho/cm or	mmho/cm (check one)	
	17. Temp.	23.59	18. 🗆 F 🛛 or 🔳 🤇	C (check one)	
	19. Turbidity	51.1	20. <b>■</b> NTU		
Laboratory:					
21. Na	21. Name ALS			one: <u>(</u> 904) 739-2277	
Ado	dress: 9143 Phillips Highwa				

Facility name:	Sandy Creek Energy Station		1. Facility Type: <u>F</u>	Power Station	
Permittee:	Sandy Creek Energy Associat	es, L.P.	2. Monitor well no.: E	BW-1	
County:	McLennan		3. Date of sampling: <u>6</u>	6/21/2018	
Name of sample	er: Dou	g Steen	Most recent previous s	sampling: <u>12/20/2017</u>	
Affiliation of sar	npler: SCS Engineers		Date of water level me	asurements: <u>6/21/2018</u>	
If split sampled	, with whom? N/A		Datum reference point	: Top of Casing	
Integrity of well:	GOOD		Datum elevation*:	485.57	
Installation date	e: <u>9/22/2015</u>		Depth to water(below of	datum)*:19.44	
			4. Water level elevatio	n*: 466.13	
5. Purging/Sa	mpling method:Bailer	_(Enter bailer or pump)	11. Sample event: <u>De</u> t	tection	
Were low-fl	ow methods used? 🔲 yes 📲	no (check one)	- Background - Corrective Action		
lf yes, w	hat volume was purged? N/	A gal.	- Detection - Other		
6. Well volume	es purged: <u>3.1</u>		- Assessment		
7. Was the we	ll dry before purging? □yes	no (check one)	12. Sample schedule: <u>Semi-Annual</u>		
8. Was the we	ell dry after purging? 🔲 yes 🛛	no (check one)	- Quarterly	- Fourth Year	
9. How long b	efore sampling? 1.5		- Semi-Ann	ual - Other	
10. Unit of mea	sure? <u>hours</u> (Enter va	lue as days, hours, or mins.)	- Annual		
			13. Sample type: <u>Re</u>	gular	
			- Regular	- Split	
			- Duplicate	- Other	
Field Measure	ments:		- Resample	9	
	14. pH	6.75			
	15. Spec. cond.	7,755	16. 🔳 umho/cm or	mmho/cm (check one)	
	17. Temp.	24.79	18. 🗆 F 🛛 or 🔳 🤇	C (check one)	
	19. Turbidity	39.3	20. <b>■</b> NTU		
Laboratory:					
21. Na	21. Name ALS			one: <u>(</u> 904) 739-2277	
Ade	dress: 9143 Phillips Highwa				

Facility name:	acility name: Sandy Creek Energy Station		1. Facility Type:	Power Station	
Permittee:	Permittee: Sandy Creek Energy Associates, L.P.		2. Monitor well no .:	DUP	
County:	McLennan		3. Date of sampling:	6/21/2018	
	_				
Name of sample	Dou	ig Steen	Most recent previous	sampling: <u>N/A</u>	
Affiliation of sam	pler: SCS Engineer	8	Date of water level measurements: <u>N/A</u>		
If split sampled,	with whom? <u>N/A</u>		Datum reference poi	nt: <u>Top of Casing</u>	
Integrity of well:	N/A		Datum elevation*:	N/A	
Installation date:	: <u>N/A</u>		Depth to water(below	v datum)*: <u>N/A</u>	
			4. Water level elevati	ion*: N/A	
5. Purging/Sam	npling method: <u>N/A</u>	(Enter bailer or pump)	11. Sample event: <u>D</u>	etection	
Were low-flo	w methods used?          yes     ∣	no (check one)	- Background - Corrective Action		
lf yes, wh	at volume was purged?	I/A gal.	- Detection - Other		
6. Well volume	s purged: <u>N/A</u>		- Assessment		
7. Was the wel	I dry before purging?	🔲 no (check one)	12. Sample schedule	: Semi-Annual	
8. Was the wel	I dry after purging? 🔲 yes 🛛	☐ no (check one)	- Quarterl	y - Fourth Year	
9. How long be	fore sampling? <u>N/A</u>		- Semi-Ar	nnual - Other	
10. Unit of meas	sure? <u>N/A</u> (Enter v	alue as days, hours, or mins.)	- Annual		
			13. Sample type: <u>D</u>	uplicate	
			- Regular	- Split	
			- Duplicat	e - Other	
Field Measuren	nents:		- Resamp	le	
	14. pH	N/A			
	15. Spec. cond.	N/A	16. 🛛 umho/cm oi	n ☐mmho/cm (check one)	
	17. Temp.	N/A	18. 🗆 F 🛛 🗖	C (check one)	
	19. Turbidity	N/A	20. 🗆 NTU		
Laboratory:					
21. Nan	21. Name <u>ALS</u>			hone: (904) 739-2277	
Address: 9143 Phillips Highway, Jacksonville, FL 32256					

Facility name:	Sandy Creek Energy Station		1. Facility Type:	Power Station	
Permittee:	Sandy Creek Energy Associates, L.P.		2. Monitor well no .:	MW-1	
County:	McLennan		3. Date of sampling:	12/13/2018	
Name of sample	r Doug Steen & Tyson	Milbrand	Most recent previous	sampling: 6/21/2018	
Affiliation of sam	pler: SCS Engineers		Date of water level m	easurements: 12/13/2018	
If split sampled	with whom? N/A		Datum reference poir	nt: Top of Casing	
Integrity of well:	Good		Datum elevation*:	465.87	
Installation date:	9/21/2015		Depth to water(below	v datum)*: 11.01	
			4. Water level elevati	on*: 454.86	
5. Purging/Sam	apling method: <u>Bailer</u> (Ente	r bailer or pump)	11. Sample event: <u>D</u>	etection	
Were low-flo	w methods used? 🔲 yes 🔳 no	(check one)	- Backgro	und - Corrective Action	
lf yes, wh	at volume was purged? <u>N/A</u> ga	al.	- Detection - Other		
6. Well volume	s purged: 2.1		- Assessn	nent	
7. Was the well	dry before purging? □yes ■ no	(check one)	12. Sample schedule: <u>Semi-Annual</u>		
8. Was the well	dry after purging? 🔳 yes 🛛 no	(check one)	- Quarterl	y - Fourth Year	
9. How long be	fore sampling?1		- Semi-Ar	nnual - Other	
10. Unit of meas	ure? hours (Enter value as	days, hours, or mins.)	- Annual		
			13. Sample type: R	egular	
			- Regular	- Split	
			- Duplicat	e - Other	
Field Measurem	ients:		- Resamp	le	
	14. pH	7.00			
	15. Spec. cond.	4.369	16. 🔳 mS/cm		
	17. Temp	21.68	18. 🗆 F 🛛 or 🔳	C (check one)	
	19. Turbidity	30	20. <b>■</b> NTU		
Laboratory:					
21. Nan	ne <u>ALS</u>	P	hone: (281) 530-5656		
Add	ress: <u>10450 Stancliff Rd., Suite 21</u>	0, Houston, Texas 77099			

Facility name:	Sandy Creek Energy Station		1. Facility Type:	Power Station
Permittee:	Sandy Creek Energy Associate	s, L.P.	2. Monitor well no .:	MW-2
County:	McLennan		3. Date of sampling:	12/13/2018
Nome of comple	ru Doug Stoon 9	Tugon Milbrond	Most recent providuo	compling: 6/01/0010
Affiliation of com		Tysoff Wildrand	Dete of water level m	sampling. <u>6/21/2018</u>
If aplit approach	with whom? N/A		Date of water level in	$\frac{12}{15}$
Integrity of well:	Good		Datum elevation*:	442 15
Installation date:	9/23/2015		Depth to water(below	/ datum)*: 11.43
motalialion date.	5/25/2015		4 Water level elevati	on*: 430.72
5. Purging/Sam	npling method:Bailer	(Enter bailer or pump)	11. Sample event: D	etection
Were low-flo	w methods used? 🔲 yes 🔳	no (check one)	- Backgro	ound - Corrective Action
lf yes, wh	at volume was purged? N//	A gal.	- Detectio	n - Other
6. Well volume	s purged: 3.1		- Assessr	nent
7. Was the wel	I dry before purging? □yes ■	no (check one)	12. Sample schedule	: Semi-Annual
8. Was the wel	l dry after purging? 🛛 yes 🔳	no (check one)	- Quarterl	y - Fourth Year
9. How long be	fore sampling?1		- Semi-Ar	nnual - Other
10. Unit of meas	sure? hours (Enter val	ue as days, hours, or mins.)	- Annual	
			13. Sample type: R	egular
			- Regular	- Split
			- Duplicat	e - Other
Field Measuren	nents:		- Resamp	le
	14. pH	6.68		
	15. Spec. cond.	11.89	16. 🔳 mS/cm	
	17. Temp.	22.19	18. 🗆 F 🛛 or 📕	C (check one)
	19. Turbidity	15.1	20. <b>■</b> NTU	
Laboratory:				
21. Nar	ne <u>ALS</u>		P	hone: <u>(</u> 281) 530-5656
Add	Iress: 10450 Stancliff Rd., S	uite 210, Houston, Texas 77099	)	

Facility name:	Sandy Creek Energy Station		1. Facility Type:	Power Station
Permittee:	Sandy Creek Energy Associate	es, L.P.	2. Monitor well no .:	MW-3
County:	McLennan		3. Date of sampling:	12/13/2018
Name of sample	r: Doug Steen 8	& Tyson Milbrand	Most recent previous	sampling: <u>6/21/2018</u>
Affiliation of sam	pler: SCS Engineers	<u>.</u>	Date of water level m	easurements: <u>12/13/2018</u>
If split sampled,	with whom? N/A		Datum reference poir	nt: Top of Casing
Integrity of well:	Good		Datum elevation*:	430.06
Installation date:	9/1/2010		Depth to water(below	v datum)*: 7.70
			4. Water level elevati	on*: 422.36
5. Purging/San	npling method: Bailer	(Enter bailer or pump)	11. Sample event: D	etection
Were low-flo	w methods used?	no (check one)	- Backgro	und - Corrective Action
lf yes, wh	at volume was purged?	/A gal.	- Detectio	n - Other
6. Well volume	s purged: <u>3.1</u>		- Assessr	nent
7. Was the wel	I dry before purging? □yes	no (check one)	12. Sample schedule	: Semi-Annual
8. Was the wel	l dry after purging? 🔲 yes	no (check one)	- Quarterl	y - Fourth Year
9. How long be	fore sampling?1		- Semi-Ar	nnual - Other
10. Unit of meas	sure? hours (Enter va	alue as days, hours, or mins.)	- Annual	
			13. Sample type: R	egular
			- Regular	- Split
			- Duplicat	e - Other
Field Measuren	nents:		- Resamp	le
	14. pH	6.51		
	15. Spec. cond.	4.47	16. 🔳 mS/cm	
	17. Temp.	21.60	18. 🗆 F 🛛 or 📕	C (check one)
	19. Turbidity	10.6	20. <b>■</b> NTU	
Laboratory:				
21. Nar	ne <u>ALS</u>		P	hone: <u>(</u> 281) 530-5656
Add	Iress: 10450 Stancliff Rd., Stanchiff Rd., Stanchif	Suite 210, Houston, Texas 77099		

Facility name:	Sandy Creek Energy Station		1. Facility Type:	Power Station
Permittee:	Sandy Creek Energy Associates	s, L.P.	2. Monitor well no .:	BW-1
County:	McLennan		3. Date of sampling:	12/13/2018
		<b>-</b>	<b>.</b>	
Name of sample	r: Doug Steen &	lyson Milbrand	Most recent previous	sampling: <u>6/21/2018</u>
Affiliation of sam	pier: SCS Engineers		Date of water level m	leasurements: $12/13/2018$
If split sampled,	with whom? <u>N/A</u>		Datum reference poir	
Integrity of well:	G000		Datum elevation*:	485.57
Installation date:	9/22/2015		Depth to water(below	/ datum)^: <u>18.33</u>
			4. Water level elevati	on^: 467.24
5. Purging/Sam	pling method: Bailer	(Enter bailer or pump)	11. Sample event: D	etection
Were low-flo	w methods used? 🔲 yes	no (check one)	- Backgro	ound - Corrective Action
lf yes, wh	at volume was purged? N/A	<u>A</u> gal.	- Detectio	n - Other
6. Well volumes	s purged: <u>3.1</u>		- Assessr	nent
7. Was the well	dry before purging? □yes	no (check one)	12. Sample schedule	: Semi-Annual
8. Was the well	dry after purging?	no (check one)	- Quarterl	y - Fourth Year
9. How long be	fore sampling? 1		- Semi-Ar	nnual - Other
10. Unit of meas	ure? hours (Enter val	ue as days, hours, or mins.)	- Annual	
			13. Sample type: R	egular
			- Regular	- Split
			- Duplicat	e - Other
Field Measurem	ients:		- Resamp	le
	14. pH	6.85		
	15. Spec. cond.	7.159	16. mS/cm	
	17. Temp.	21.28	18. 🗆 F 🛛 or 📕	C (check one)
	19. Turbidity	81.8	20. <b>■</b> NTU	
Laboratory:				
21. Nan	ne <u>ALS</u>		P	hone: (281) 530-5656
Add	ress: 10450 Stancliff Rd., Se	uite 210, Houston, Texas 77099		

Facility name:	Sandy Creek Energy Station		1. Facility Type:	Power Station
Permittee:	Sandy Creek Energy Associa	ates, L.P.	2. Monitor well no .:	DUP
County:	McLennan		3. Date of sampling:	12/13/2018
Name of sample	er: Doug Steer	a & Tyson Milbrand	Most recent previous	sampling: <u>N/A</u>
Affiliation of san	npler: SCS Enginee	rs	Date of water level m	neasurements: <u>N/A</u>
If split sampled,	with whom? N/A		Datum reference poin	nt: Top of Casing
Integrity of well:	N/A		Datum elevation*:	N/A
Installation date	: <u>N/A</u>		Depth to water(below	v datum)*: N/A
			4. Water level elevati	on*: N/A
5. Purging/Sar	mpling method: N/A	(Enter bailer or pump)	11. Sample event: D	Detection
Were low-flo	ow methods used? 🛛 yes	🔲 no (check one)	- Backgro	ound - Corrective Action
lf yes, wł	nat volume was purged?	N/A gal.	- Detectio	on - Other
6. Well volume	es purged: <u>N/A</u>		- Assessr	nent
7. Was the we	II dry before purging?	🔲 no (check one)	12. Sample schedule	: Semi-Annual
8. Was the we	ll dry after purging? 🛛 yes	□ no (check one)	- Quarter	ly - Fourth Year
9. How long be	efore sampling? <u>N/A</u>		- Semi-Ar	nnual - Other
10. Unit of meas	sure? <u>N/A</u> (Enter	value as days, hours, or mins.)	- Annual	
			13. Sample type: D	Duplicate
			- Regular	- Split
			- Duplicat	te - Other
Field Measurer	ments:		- Resamp	ble
	14. pH	N/A		
	15. Spec. cond.	N/A	16. 🔲 mS/cm	
	17. Temp.	N/A	18. 🗆 F 🛛 🗆	C (check one)
	19. Turbidity	N/A	20. 🗆 NTU	
Laboratory:				
21. Na	me <u>ALS</u>		P	hone: (281) 530-5656
Ado	dress: 10450 Stancliff Rd.	, Suite 210, Houston, Texas 77099	9	

### APPENDIX B

### 2018 LABORATORY REPORTS WITH CHAIN OF CUSTODY FORMS

Service Request No:J1804531



Mr. Jim Lawrence SCS Engineers 1901 Central Drive Suite 550 Bedford, TX 76021

### Laboratory Results for: Sandy Creek Groundwater

Dear Mr.Lawrence,

Enclosed are the results of the sample(s) submitted to our laboratory June 22, 2018 For your reference, these analyses have been assigned our service request number **J1804531**.

All analyses were performed according to our laboratory's quality assurance program. The test results meet requirements of the NELAP standards except as noted in the case narrative report. All results are intended to be considered in their entirety, and ALS Environmental is not responsible for use of less than the complete report. Results apply only to the items submitted to the laboratory for analysis and individual items (samples) analyzed, as listed in the report. In accordance to the NELAC 2003 Standard, a statement on the estimated uncertainty of measurement of any quantitative analysis will be supplied upon request.

Please contact me if you have any questions. My extension is 4410. You may also contact me via email at Jerry.Allen@alsglobal.com.

Respectfully submitted,

### ALS Group USA, Corp. dba ALS Environmental

Jerry Allen Project Manager



## Narrative Documents

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Client:SCS EngineersProject:Sandy Creek Groundwater/16215106.00 T131Sample Matrix:Water

Service Request:J1804531 Date Received:6/22/18

#### **CASE NARRATIVE**

All analyses were performed consistent with the quality assurance program of ALS Environmental. This report contains analytical results for samples designated for Tier II data deliverables, including results of QC samples analyzed from this delivery group. When appropriate to the procedure, method blank results have been reported with each analytical test. Analytical procedures performed by the lab are validated in accordance with NELAC standards. Parameters that are included in the NELAC Fields of Testing but are not included in the lab's NELAC accreditation are identified in the discussion of each analytical procedure.

#### Sample Receipt

5 water samples were received for analysis at ALS Environmental on 6/22/18. The samples were received in good condition and consistent with the accompanying chain of custody form. Samples are refrigerated at  $\leq 6^{\circ}$ C upon receipt at the lab except for aqueous samples designated for metals analyses, which are stored at room temperature.

#### Metals Analyses:

No significant data anomalies were noted with this analysis.

#### General Chemistry Analyses:

Method 300.0/9056: The reporting limit is elevated for analyte(s) analyzed by IC in J1804531. These sample(s) had high conductivity which precludes their analysis without prior dilution via this technique.

#### Revision Notes:

This analytical report is a revision of the original report generated on 06/29/2018. The following specific changes were made to the report: samples reported to MDL.

Approved by Date 8/20/2018



#### SAMPLE DETECTION SUMMARY

CLIENT ID: BW-1		Lab	DID: J1804	531-001		
Analyte	Results	Flag	MDL	MRL	Units	Method
Solids, Total Dissolved	6640		100	100	mg/L	SM 2540 C
Chloride	1200		3	20	mg/L	9056
рН	7.22				pH Units	9040C
Sulfate	3030		2	20	mg/L	9056
Boron, Total	3.31		0.025	0.050	mg/L	6010D
Calcium, Total	610		0.08	0.20	mg/L	6010D

CLIENT ID: MW-1		Lab	DID: J1804	531-002		
Analyte	Results	Flag	MDL	MRL	Units	Method
Solids, Total Dissolved	4270		40	40	mg/L	SM 2540 C
Chloride	247		2	10	mg/L	9056
Fluoride	0.3	J	0.2	1.0	mg/L	9056
рН	7.38				pH Units	9040C
Sulfate	2530		0.9	10	mg/L	9056
Boron, Total	1.25		0.025	0.050	mg/L	6010D
Calcium, Total	587		0.08	0.20	mg/L	6010D

CLIENT ID: MW-2		Lab	D: J1804	531-003		
Analyte	Results	Flag	MDL	MRL	Units	Method
Solids, Total Dissolved	10200		200	200	mg/L	SM 2540 C
Chloride	2840		6	50	mg/L	9056
рН	7.09				pH Units	9040C
Sulfate	3400		5	50	mg/L	9056
Boron, Total	1.90		0.025	0.050	mg/L	6010D
Calcium, Total	706		0.08	0.20	mg/L	6010D

CLIENT ID: MW-3		Lab	DID: J1804	531-004		
Analyte	Results	Flag	MDL	MRL	Units	Method
Solids, Total Dissolved	6090		100	100	mg/L	SM 2540 C
Chloride	396		3	20	mg/L	9056
рН	6.76				pH Units	9040C
Sulfate	3160		2	20	mg/L	9056
Boron, Total	1.13		0.025	0.050	mg/L	6010D
Calcium, Total	526		0.08	0.20	mg/L	6010D

CLIENT ID: DUP		Lab	DID: J1804	531-005		
Analyte	Results	Flag	MDL	MRL	Units	Method
Solids, Total Dissolved	6690		100	100	mg/L	SM 2540 C
Chloride	1210		3	20	mg/L	9056
рН	7.30				pH Units	9040C
Sulfate	3040		2	20	mg/L	9056
Boron, Total	3.30		0.025	0.050	mg/L	6010D
Calcium, Total	609		0.08	0.20	mg/L	6010D



# Sample Receipt Information

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#### SAMPLE CROSS-REFERENCE

<u>SAMPLE #</u>	CLIENT SAMPLE ID	DATE	TIME
J1804531-001	BW-1	6/21/2018	1140
J1804531-002	MW-1	6/21/2018	1205
J1804531-003	MW-2	6/21/2018	1220
J1804531-004	MW-3	6/21/2018	1245
J1804531-005	DUP	6/21/2018	0000

Project	: SANDY CREE	Y GRIVINDI	NATER	хециезі #.		Sh:	ipping naid	bv A
Cooler	received on (0.77.19	and opened	ton 1 77.18	bv	KB	Yes	No	0,1
COUR	IER: ALS UPS FEDE	X DHL Client	Other	Airbill	# 3106	4500		
1	Wore custody cool		o alor?		·· <u>·</u>			
1	If yes, how many a	s on ouiside of c			4. 1	on lid	-41	•
2	Were seals intact a	nd signature and	date correct?		TVes	No	other N/A	
- 3	Were custody pape	rs properly filled	l out?		Yes	No	N/A	
4	Temperature of coole	er(s) upon receipt	(Should be 0°C and ≤ 6°	c) (	).(9°°			
5	Thermometer ID	.,			T136		·····	
6	Temperature Blank	Present?			(Yes)	No	<u></u>	
7	Were Ice or Ice Pac	ks present			lce	Ice I	acks	No
8	Did all bottles arrive	e in good conditi	on (unbroken, etc	.)?	Yes	No	N/A	
9	Type of packing mat	terial present			Netting	Vial H	older Bubble	Wra
					Paper	Styrofo	am Other	(N/
10	Were all bottle labels	s complete (sam	ple ID, preservation	, etc)?	tes	No	N/A	
11	Did all bottle labels a	and tags agree w	ith custody papers?		(es)	No	N/A	
12	Were the correct bott	les used for the	tests indicated?		<u>(es</u> )	No	N/A	
13	Were all of the preserved NNO3 pH<2 H2SO4 Preservative additions noted belo	bottles received wit pH<2 ZnAc2/	h the appropriate preser NaOH pH>9 NaOl	vative? I pH>12	Yes) HCI pH<2	No	N/A	
14	Were all samples rece	vived within anal	lysis holding times?		Yes	No	N/A	
15	Were VOA vials free of air	r bubbles greater the	an 6mm? If present, not	e below	Yes	No	N/A)	
16	Where did the bottles	originate?			(ALS)	Client	- <u>.,</u>	
	Sample ID	Reagent	Lot #	ml added	Initials D	ate/Time	7	
							-	
							4	
ļ							]	
ŀ								
L	omments and/or explana	tion of all discre	pancies noted abov	e:	······		•	
tional co						·		
tional co								
tional co				<u> </u>			·····.	

A

CHAIN OF CUSTODY/LABORATOR	Y ANALYSIS REQUE	ST FORM	J180453)
9143 Philips Highway, Ste 200 • Jacksonville, FL 32256 (904) 739-2277 • 800-695-72	2 x06 • FAX (904) 739-2011 PAGE	OF Cas	Contract
Project Name Séridy Creek Grainimater 16215106.00 7131	ANALYSIS REQUESTED	nclude Method Number and Contain	er Preservative)
Project Manager / Email Address Jim Lawrence JLawence Scongineer Scon	VATIVE		
Company Address SCS Envineers	/ / / / / /	J1804531	5 <sup>1</sup> Preservative Key
901 Certar Dr. Ste 550	H N N N N	Scs Engineers Sandy Creek Groundwater Jushi Millialian an m	HCL HNO3 5. H2SO4
Redford TX 76021	うちっていて		. NaOH J. Zn. Acetate J. MeOH
Phone # FAX#	1 2 2 2 2 2 /2 /2 /2 /2 /2 /2 /2 /2 /2 /2		7. NaHSO4 8. Other
Sampler's Signature O. S. Sampler's Ported Name 54.een \$	x/5/80/20/20/20/20/		REMARKS/ ALTERNATE DESCRIPTION
CLIENT SAMPLE ID LAB ID DATE TIME MATRIX			
DW-1 6/21/8/1:40 H,0 2 >	XXXXX		
< C 1 50121 , 1 12102 1 2 NW			
$\langle \mathcal{C}     022     027$	XXXXXX		
MW-3 NW-3	XXXXXX		
	XXXXX		
SPECIAL I NSTRUCTIONS/COMMENTS	TURNAROUND REQUIREMENTS RUSH (SUIRCHARGES APPI VI	REPORT REQUIREMENTS	INVOICE INFORMATION
6610 Metals- Boron + Cali -11			
And working the	REQUESTED FAX DATE	IL. results + dc summaries (LCS, DUP, MS/MSD as required)	PO#
		III. Results + QC and Calibration Summaries	BILL TO:
	REQUESTED REPORT DATE	IV. Data Validation Report with Raw Data	
See QAPP		V. Specialized Forms / Custom Report	
SAMPLE RECEIPT: CONDITION/COOLER TEMP: $O$ / $C$ CUSTODY SEALS: Y N		Edata Yes No	
RELINQUISHED BY RECEIVED BY RELINQUISHED BY	RECEIVED BY	RELINQUISHED BY	RECEIVED BY
Signature Dayla Day Signature	Signature	Signature	Signature
Printed Name Dova Steen Martined Name	Printed Name	Printed Name	Printed Name
Film ScS Film ALC Film	Firm	Firm	Firm
Date/Time 621/18 15:157 Date/Time/22/18 CGTS Date/Time	Date/Time	Date/Time	Date/Time
Distribution: White - Return to Originator, Yellow - Retained by Client	-		Convrinth 2012 by AIS Group

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## Miscellaneous Forms

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### **REPORT QUALIFIERS AND DEFINITIONS**

#### **INORGANIC DATA**

- \* The result is an outlier. See case narrative.
- # The control limit criteria are not applicable. See case narrative.
- B The analyte was found in the associated method blank at a level that is significant relative to the sample result.
- E The result is an estimated amount because the value exceeded the instrument calibration range.
- J The result is an estimated concentration that is less than the MRL but greater than or equal to the MDL.
- U The compound was analyzed for, but was not detected ("Non-detect") at or above the MRL/MDL.
- Z Too many colonies were present (TNTC). The numeric value represents the filtration volume.
- i The MRL/MDL has been elevated due to matrix interference.
- X See case narrative.

#### **METALS DATA**

- \* The result is an outlier. See case narrative.
- # The control limit criteria are not applicable. See case narrative.
- J The result is an estimated concentration that is less than the MRL but greater than or equal to the MDL.
- E The reported value is estimated because of the presence of matrix interference.
- M The duplicate injection precision was not met.
- N The Matrix Spike sample recovery is not within control limits. See case narrative.
- S The result was determined by Method of Standard Additions (MSA).
- U The compound was analyzed for, but was not detected ("Non-detect") at or above the MRL/MDL.
- W The post-digestion spike for furnace AA analysis is out of control limits, while sample absorbance is less than 50% of spike absorbance.
- i The MRL/MDL has been elevated due to matrix interference.
- X See case narrative.
- + The correlation coefficient for the MSA is less than 0.995.

#### **ORGANIC DATA**

- \* The result is an outlier. See case narrative.
- # The control limit criteria are not applicable. See case narrative.
- A The tentatively identified compound is a suspected aldol-condensation product.
- B The analyte was found in the associated method blank at a level that is significant relative to the sample result.
- C The analyte was qualitatively confirmed using GC/MS techniques, pattern recognition, or by comparing to historical data.
- D The reported result is from a dilution.
- E The result is an estimated amount because the value exceeded the instrument calibration range.
- J The result is an estimated concentration that is less than the MRL but greater than or equal to the MDL.
- N The result is presumptive. The analyte was tentatively identified, but a confirmation analysis was not performed.
- P The GC or HPLC confirmation criteria were exceeded. The relative percent difference is greater than 40% between the two analytical results (25% for CLP Pesticides)
- U The compound was analyzed for, but was not detected ("Non-detect") at or above the MRL/MDL.
- i The MRL/MDL has been elevated due to a chromatographic interference.
- X See case narrative.

#### PETROLEUM HYDROCARBON SPECIFIC

- F The chromatographic fingerprint of the sample matches the elution pattern of the calibration standard.
- L The chromatographic fingerprint of the sample resembles a petroleum product, but the elution pattern indicates the presence of a greater amount of lighter molecular weight constituents than the calibration standard.
- H The chromatographic fingerprint of the sample resembles a petroleum product, but the elution pattern indicates the presence of a greater amount of heavier molecular weight constituents than the calibration standard.
- O The chromatographic fingerprint of the sample resembles an oil, but does not match the calibration standard.



- Y The chromatographic fingerprint of the sample resembles a petroleum product eluting in approximately the correct carbon range, but the elution pattern does not match the calibration standard.
- Z The chromatographic fingerprint does not resemble a petroleum product.



#### Jacksonville Lab ID # for State Certifications<sup>1</sup>

Agency	Number	Expiration Date
Department of Defense	66206	6/30/2020
Florida Department of Health	E82502	6/30/2019
Georgia Department of Natural Resources	958	6/30/2019
Kentucky Division of Waste Management	123042	6/30/2019
Louisiana Department of Environmental	02086	6/30/2019
Quality		
Maine Department of Health and Human	2017003	2/3/2019
Services		
North Carolina Department of	527	12/31/2018
Environment and Natural Resources		
Pennsylvania Department of	68-04835	8/31/2018
Environmental Protection		
South Carolina Department of Health and	96021001	6/30/2018
Environmental Control		
Texas Commission on Environmental	T104704197-18-10	5/31/2019
Quality		
Virginia Environmental Accreditation	460191	12/14/2018
Program		

<sup>1</sup> Analyses were performed according to our laboratory's NELAP-approved quality assurance program and any applicable state or agency requirements. The test results meet requirements of the current NELAP/TNI standards or state or agency requirements, where applicable, except as noted in the laboratory case narrative provided. For a specific list of accredited analytes, refer to http://www.alsglobal.com/en/Our-Services/Life-Sciences/Environmental/Downloads/North-America-Downloads



### **ACRONYMS**

ASTM	American Society for Testing and Materials
A2LA	American Association for Laboratory Accreditation
CARB	California Air Resources Board
CAS Number	Chemical Abstract Service registry Number
CFC	Chlorofluorocarbon
CFU	Colony-Forming Unit
DEC	Department of Environmental Conservation
DEQ	Department of Environmental Quality
DHS	Department of Health Services
DOE	Department of Ecology
DOH	Department of Health
EPA	U. S. Environmental Protection Agency
ELAP	Environmental Laboratory Accreditation Program
GC	Gas Chromatography
GC/MS	Gas Chromatography/Mass Spectrometry
LUFT	Leaking Underground Fuel Tank
Μ	Modified
MCL	Maximum Contaminant Level is the highest permissible concentration of a substance allowed in drinking water as established by the USEPA.
MDL	Method Detection Limit
MPN	Most Probable Number
MRL	Method Reporting Limit
NA	Not Applicable
NC	Not Calculated
NCASI	National Council of the Paper Industry for Air and Stream Improvement
ND	Not Detected
NIOSH	National Institute for Occupational Safety and Health
PQL	Practical Quantitation Limit
RCRA	Resource Conservation and Recovery Act
SIM	Selected Ion Monitoring
TPH	Total Petroleum Hydrocarbons
tr	Trace level is the concentration of an analyte that is less than the PQL but greater than or equal to the MDL.

#### ALS Group USA, Corp. dba ALS Environmental

Analyst Summary report

Client:SCS EngineersProject:Sandy Creek Groundwater/16215106.00 T131

Service Request: J1804531

Sample Name:BW-1Date Collected: 06/21/18Lab Code:J1804531-001Date Received: 06/22/18Sample Matrix:WaterDate Received: 06/22/18

<b>Analysis Method</b> 6010D 9040C 9056 SM 2540 C		<b>Extracted/Digested By</b> EGARDNER	<b>Analyzed By</b> EGARDNER HHERNANDEZ HHERNANDEZ ALANE
Sample Name: Lab Code: Sample Matrix:	MW-1 J1804531-002 Water	D	Date Collected: 06/21/18 Date Received: 06/22/18
<b>Analysis Method</b> 6010D 9040C 9056 SM 2540 C		<b>Extracted/Digested By</b> EGARDNER	<b>Analyzed By</b> EGARDNER HHERNANDEZ HHERNANDEZ ALANE
Sample Name: Lab Code: Sample Matrix:	MW-2 J1804531-003 Water	D	Date Collected: 06/21/18 Date Received: 06/22/18
<b>Analysis Method</b> 6010D 9040C 9056 SM 2540 C		<b>Extracted/Digested By</b> EGARDNER	<b>Analyzed By</b> EGARDNER HHERNANDEZ HHERNANDEZ ALANE
Sample Name:	MW-3	D	ate Collected: 06/21/18

Sample Name:MW-3Lab Code:J1804531-004Sample Matrix:Water

**Analysis Method** 6010D

Printed 8/20/2018 9:12:22 AM

**Extracted/Digested By** EGARDNER **Analyzed By** EGARDNER

**Date Received:** 06/22/18

#### ALS Group USA, Corp. dba ALS Environmental

Analyst Summary report

Client:SCS EngineersProject:Sandy Creek Groundwater/16215106.00 T131

Service Request: J1804531

Sample Name:MW-3Date Collected: 06/21/18Lab Code:J1804531-004Date Received: 06/22/18Sample Matrix:WaterVater

Analysis Method		Extracted/Digested By	Analyzed By
9040C			HHERNANDEZ
9056			HHERNANDEZ
SM 2540 C			ALANE
Sample Name:	DUP	Date	<b>Collected:</b> 06/21/18
Lab Code:	J1804531-005	Date	<b>Received:</b> 06/22/18
Sample Matrix:	Water		
Analysis Method		Extracted/Digested By	Analyzed By
6010D		EGARDNER	EGARDNER
9040C			HHERNANDEZ
9056			HHERNANDEZ
SM 2540 C			ALANE



# Sample Results

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# Metals

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Analytical Report

SCS Engineers	Service Request: J1804531
Sandy Creek Groundwater/16215106.00 T131	<b>Date Collected:</b> 06/21/18 11:40
Water	<b>Date Received:</b> 06/22/18 09:15
BW-1	Basis: NA
J1804531-001	
	SCS Engineers Sandy Creek Groundwater/16215106.00 T131 Water BW-1 J1804531-001

	Analysis							Date	
Analyte Name	Method	Result	Units	PQL	MDL	Dil.	Date Analyzed	Extracted	Q
Boron, Total	6010D	3.31	mg/L	0.050	0.025	1	06/22/18 23:06	06/22/18	
Calcium, Total	6010D	610	mg/L	0.20	0.08	2	06/25/18 18:09	06/22/18	

Analytical Report

Client:	SCS Engineers	Service Request: J1804531
Project:	Sandy Creek Groundwater/16215106.00 T131	<b>Date Collected:</b> 06/21/18 12:05
Sample Matrix:	Water	<b>Date Received:</b> 06/22/18 09:15
Sample Name:	MW-1	Basis: NA
Lab Code:	J1804531-002	

	Analysis							Date	
Analyte Name	Method	Result	Units	PQL	MDL	Dil.	Date Analyzed	Extracted	Q
Boron, Total	6010D	1.25	mg/L	0.050	0.025	1	06/22/18 23:17	06/22/18	
Calcium, Total	6010D	587	mg/L	0.20	0.08	2	06/25/18 18:14	06/22/18	

Analytical Report

SCS Engineers	Service Request: J1804531
Sandy Creek Groundwater/16215106.00 T131	<b>Date Collected:</b> 06/21/18 12:20
Water	<b>Date Received:</b> 06/22/18 09:15
MW-2	Basis: NA
J1804531-003	
	SCS Engineers Sandy Creek Groundwater/16215106.00 T131 Water MW-2 J1804531-003

	Analysis							Date	
Analyte Name	Method	Result	Units	PQL	MDL	Dil.	Date Analyzed	Extracted	Q
Boron, Total	6010D	1.90	mg/L	0.050	0.025	1	06/22/18 23:28	06/22/18	
Calcium, Total	6010D	706	mg/L	0.20	0.08	2	06/25/18 18:19	06/22/18	

Analytical Report

Client:	SCS Engineers	Service Request: J1804531
Project:	Sandy Creek Groundwater/16215106.00 T131	<b>Date Collected:</b> 06/21/18 12:45
Sample Matrix:	Water	<b>Date Received:</b> 06/22/18 09:15
Sample Name:	MW-3	Basis: NA
Lab Code:	J1804531-004	

	Analysis							Date	
Analyte Name	Method	Result	Units	PQL	MDL	Dil.	Date Analyzed	Extracted	Q
Boron, Total	6010D	1.13	mg/L	0.050	0.025	1	06/22/18 23:39	06/22/18	
Calcium, Total	6010D	526	mg/L	0.20	0.08	2	06/25/18 18:24	06/22/18	

Analytical Report

Client:	SCS Engineers	Service Request: J1804531
Project:	Sandy Creek Groundwater/16215106.00 T131	<b>Date Collected:</b> 06/21/18 00:00
Sample Matrix:	Water	<b>Date Received:</b> 06/22/18 09:15
Sample Name:	DUP	Basis: NA
Lab Code:	J1804531-005	

	Analysis							Date	
Analyte Name	Method	Result	Units	PQL	MDL	Dil.	Date Analyzed	Extracted	Q
Boron, Total	6010D	3.30	mg/L	0.050	0.025	1	06/23/18 00:05	06/22/18	
Calcium, Total	6010D	609	mg/L	0.20	0.08	2	06/25/18 18:29	06/22/18	



# **General Chemistry**

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Analytical Report

Client:	SCS Engineers	Service Request: J1804531
Project:	Sandy Creek Groundwater/16215106.00 T131	<b>Date Collected:</b> 06/21/18 11:40
Sample Matrix:	Water	<b>Date Received:</b> 06/22/18 09:15
Sample Name:	BW-1	Basis: NA
Lab Code:	J1804531-001	

	Analysis							
Analyte Name	Method	Result	Units	PQL	MDL	Dil.	Date Analyzed	Q
Chloride	9056	1200	mg/L	20	3	20	06/22/18 13:38	
Fluoride	9056	0.3 U	mg/L	2.0	0.3	20	06/22/18 13:38	
pH	9040C	7.22	pH Units	-	-	1	06/22/18 15:10	Н
Solids, Total Dissolved	SM 2540 C	6640	mg/L	100	100	10	06/25/18 17:18	
Sulfate	9056	3030	mg/L	20	2	20	06/22/18 13:38	

Analytical Report

Client:	SCS Engineers	Service Request: J1804531
Project:	Sandy Creek Groundwater/16215106.00 T131	<b>Date Collected:</b> 06/21/18 12:05
Sample Matrix:	Water	<b>Date Received:</b> 06/22/18 09:15
Sample Name:	MW-1	Basis: NA
Lab Code:	J1804531-002	

	Analysis							
Analyte Name	Method	Result	Units	PQL	MDL	Dil.	Date Analyzed	Q
Chloride	9056	247	mg/L	10	2	10	06/22/18 14:44	
Fluoride	9056	0.3 J	mg/L	1.0	0.2	10	06/22/18 14:44	
pH	9040C	7.38	pH Units	-	-	1	06/22/18 15:12	Н
Solids, Total Dissolved	SM 2540 C	4270	mg/L	40	40	4	06/25/18 17:18	
Sulfate	9056	2530	mg/L	10	0.9	10	06/22/18 14:44	

Analytical Report

Client:	SCS Engineers	Service Request: J1804531
Project:	Sandy Creek Groundwater/16215106.00 T131	<b>Date Collected:</b> 06/21/18 12:20
Sample Matrix:	Water	<b>Date Received:</b> 06/22/18 09:15
Sample Name:	MW-2	Basis: NA
Lab Code:	J1804531-003	

	Analysis							
Analyte Name	Method	Result	Units	PQL	MDL	Dil.	Date Analyzed	Q
Chloride	9056	2840	mg/L	50	6	50	06/22/18 15:06	
Fluoride	9056	0.6 U	mg/L	5.0	0.6	50	06/22/18 15:06	
pH	9040C	7.09	pH Units	-	-	1	06/22/18 15:14	Н
Solids, Total Dissolved	SM 2540 C	10200	mg/L	200	200	20	06/25/18 17:18	
Sulfate	9056	3400	mg/L	50	5	50	06/22/18 15:06	

Analytical Report

Client:	SCS Engineers	Service Request: J1804531
Project:	Sandy Creek Groundwater/16215106.00 T131	<b>Date Collected:</b> 06/21/18 12:45
Sample Matrix:	Water	<b>Date Received:</b> 06/22/18 09:15
Sample Name:	MW-3	Basis: NA
Lab Code:	J1804531-004	

	Analysis							
Analyte Name	Method	Result	Units	PQL	MDL	Dil.	Date Analyzed	Q
Chloride	9056	396	mg/L	20	3	20	06/22/18 15:28	
Fluoride	9056	0.3 U	mg/L	2.0	0.3	20	06/22/18 15:28	
pH	9040C	6.76	pH Units	-	-	1	06/22/18 15:15	Н
Solids, Total Dissolved	SM 2540 C	6090	mg/L	100	100	10	06/25/18 17:18	
Sulfate	9056	3160	mg/L	20	2	20	06/22/18 15:28	

Analytical Report

Client:	SCS Engineers	Service Request: J1804531
Project:	Sandy Creek Groundwater/16215106.00 T131	<b>Date Collected:</b> 06/21/18 00:00
Sample Matrix:	Water	<b>Date Received:</b> 06/22/18 09:15
Sample Name:	DUP	Basis: NA
Lab Code:	J1804531-005	

	Analysis							
Analyte Name	Method	Result	Units	PQL	MDL	Dil.	Date Analyzed	Q
Chloride	9056	1210	mg/L	20	3	20	06/22/18 17:39	
Fluoride	9056	0.3 U	mg/L	2.0	0.3	20	06/22/18 17:39	
pH	9040C	7.30	pH Units	-	-	1	06/22/18 15:20	Н
Solids, Total Dissolved	SM 2540 C	6690	mg/L	100	100	10	06/25/18 17:18	
Sulfate	9056	3040	mg/L	20	2	20	06/22/18 17:39	



# QC Summary Forms

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# Metals

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Analytical ReportClient:SCS EngineersService Request:J1804531Project:Sandy Creek Groundwater/16215106.00 T131Date Collected:NASample Matrix:WaterDate Received:NASample Name:Method BlankBasis:NALab Code:J1804531-MBCollected:NA

	Analysis							Date	
Analyte Name	Method	Result	Units	PQL	MDL	Dil.	Date Analyzed	Extracted	Q
Boron, Total	6010D	0.025 U	mg/L	0.050	0.025	1	06/22/18 20:41	06/22/18	
Calcium, Total	6010D	0.04 U	mg/L	0.10	0.04	1	06/22/18 20:40	06/22/18	

QA/QC Report

Client: Project:	SCS Engineers Sandy Creek Grour	ndwater/16215106	5.00 T131	Service Request: Date Analyzed:	J1804531 06/22/18
Sample Matrix:	Water			Date Extracted:	06/22/18
		Lab	Control Sample Summary		
		]	Inorganic Parameters		
Analysis Method:	6010D			Units:	mg/L
Prep Method:	EPA 3005A			Basis:	NA
				Analysis Lot:	595951
			Lab Control Sample J1804531-LCS		
Analyte Name		Result	Spike Amount	% Rec	% Rec Limits
Boron, Total		2.53	2.50	101	80-120
Calcium. Total		5.15	5.00	103	80-120



# **General Chemistry**

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Analytical ReportClient:SCS EngineersService Request:J1804531Project:Sandy Creek Groundwater/16215106.00 T131Date Collected:NASample Matrix:WaterDate Received:NASample Name:Method BlankBasis:NALab Code:J1804531-MBMethod BlankBasis:

	Analysis							
Analyte Name	Method	Result	Units	PQL	MDL	Dil.	Date Analyzed	Q
Chloride	9056	0.2 U	mg/L	1.0	0.2	1	06/22/18 12:11	
Fluoride	9056	0.02 U	mg/L	0.10	0.02	1	06/22/18 12:11	
Solids, Total Dissolved	SM 2540 C	10 U	mg/L	10	10	1	06/25/18 17:18	
Sulfate	9056	0.09 U	mg/L	1.0	0.09	1	06/22/18 12:11	

QA/QC Report

Client:	SCS Engineers
Project:	Sandy Creek Groundwater/16215106.00 T131
Sample Matrix:	Water

# Service Request:J1804531 Date Collected:06/21/18 Date Received:06/22/18 Date Analyzed:6/22/18

## Matrix Spike Summary General Chemistry Parameters

Sample Name:	BW-1	Units:mg/L
Lab Code:	J1804531-001	Basis:NA

#### Matrix Spike J1804531-001MS

Analyte Name	Method	Sample Result	Result	Spike Amount	% Rec	% Rec Limits
Chloride	9056	1200	2170	1000	97	90-110
Fluoride	9056	0.3 U	105	100	105	90-110
Sulfate	9056	3030	3890	1000	86 *	90-110

Results flagged with an asterisk (\*) indicate values outside control criteria.

Results flagged with a pound (#) indicate the control criteria is not applicable.

Percent recoveries and relative percent differences (RPD) are determined by the software using values in the calculation which have not been rounded.

#### QA/QC Report

Client:	SCS Engineers	Service Request:	J1804531
Project	Sandy Creek Groundwater/16215106.00 T131	Date Collected:	06/21/18
Sample Matrix:	Water	Date Received:	06/22/18
		Date Analyzed:	06/22/18 - 06/25/18
	Replicate Sample Summary		
	<b>General Chemistry Parameters</b>		
Sample Name:	BW-1	Units:	mg/L
Lah Code	1180/1531-001	Bacic.	NΔ

Luo couci	01001001001					Duc		
	Analysis			Sample	Duplicate Sample J1804531- 001DUP			
Analyte Name	Method	PQL	MDL	Result	Result	Average	RPD	RPD Limit
Chloride	9056	20	3	1200	1200	1200	<1	20
Fluoride	9056	2.0	0.3	0.3 U	0.3 U	NC	NC	20
Solids, Total Dissolved	SM 2540 C	100	100	6640	6700	6670	<1	10
Sulfate	9056	20	2	3030	3000	3020	1	20

Results flagged with an asterisk (\*) indicate values outside control criteria.

Results flagged with a pound (#) indicate the control criteria is not applicable.

Percent recoveries and relative percent differences (RPD) are determined by the software using values in the calculation which have not been rounded.

QA/QC Report

Client:SCS EngineersProject:Sandy Creek Groundwater/16215106.00 T131Sample Matrix:Water

# Lab Control Sample Summary General Chemistry Parameters

Service Request: J1804531 Date Analyzed: 06/22/18 - 06/25/18

> Units:mg/L Basis:NA

# Lab Control Sample J1804531-LCS

Analyte Name	Analytical Method	Result	Spike Amount	% Rec	% Rec Limits
Chloride	9056	50.7	50.0	101	90-110
Fluoride	9056	5.24	5.00	105	90-110
Solids, Total Dissolved	SM 2540 C	275	300	92	85-115
Sulfate	9056	51.4	50.0	103	90-110



10450 Stancliff Rd. Suite 210 Houston, TX 77099 T: +1 281 530 5656 F: +1 281 530 5887

January 04, 2019

Jim Lawrence SCS Engineers 1901 Central Drive Suite 550 Bedford, TX 76021

Work Order: HS18120889

Laboratory Results for: Sandy Creek Groundwater 16215106

Dear Jim,

ALS Environmental received 5 sample(s) on Dec 14, 2018 for the analysis presented in the following report.

The analytical data provided relates directly to the samples received by ALS Environmental and for only the analyses requested. Results are expressed as "as received" unless otherwise noted.

QC sample results for this data met EPA or laboratory specifications except as noted in the Case Narrative or as noted with qualifiers in the QC batch information. Should this laboratory report need to be reproduced, it should be reproduced in full unless written approval has been obtained by ALS Environmental. Samples will be disposed in 30 days unless storage arrangements are made.

If you have any questions regarding this report, please feel free to call me.

Sincerely,

Generated By: DAYNA.FISHER Dane J. Wacasey

Page 1 of 22

# Client:SCS EngineersProject:Sandy Creek Groundwater 16215106Work Order:HS18120889

#### SAMPLE SUMMARY

Lab Samp ID	Client Sample ID	Matrix	TagNo	Collection Date	Date Received	Hold
HS18120889-01	BW-1	Groundwater		13-Dec-2018 11:45	14-Dec-2018 10:00	
HS18120889-02	MW-1	Groundwater		13-Dec-2018 11:55	14-Dec-2018 10:00	
HS18120889-03	MW-2	Groundwater		13-Dec-2018 12:05	14-Dec-2018 10:00	
HS18120889-04	MW-3	Groundwater		13-Dec-2018 12:20	14-Dec-2018 10:00	
HS18120889-05	DUP	Groundwater		13-Dec-2018 00:00	14-Dec-2018 10:00	

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**CASE NARRATIVE** 

# Client:SCS EngineersProject:Sandy Creek Groundwater 16215106Work Order:HS18120889

#### Work Order Comments

• Sample received outside method holding time for pH. pH is an immediate test. Sample results are flagged with an "H" qualifier.

The temperature at the time of pH is reported. Please note that all pH results are already normalized to a temperature of 25 °C.

#### Metals by Method SW6020

#### Batch ID: 135989

#### Sample ID: HS18120868-06MS

• MS is for an unrelated sample

## WetChemistry by Method SW9056

#### Batch ID: R330328

#### Sample ID: CCB

• All reported samples bracketed by this CCB are 10 times greater than the Sulfate content in the associated CCBs.

#### Sample ID: HS18121459-04MS

• MS and MSD are for an unrelated sample (Chloride,Sulfate)

#### Batch ID: R330228

#### Sample ID: MW-3 (HS18120889-04MSD)

• The MS and/or MSD recovery was outside of the control limits; however, the result in the parent sample is greater than 4x the spike amount. (Sulfate)

#### WetChemistry by Method SW9040

#### Batch ID: R329934

• The test results meet requirements of the current NELAP standards, state requirements or programs where applicable.

## WetChemistry by Method M2540C

#### Batch ID: R329753

• The test results meet requirements of the current NELAP standards, state requirements or programs where applicable.

Client:	SCS Engineers	ANALYTICAL REPORT
Project:	Sandy Creek Groundwater 16215106	WorkOrder:HS18120889
Sample ID:	BW-1	Lab ID:HS18120889-01
Collection Date:	13-Dec-2018 11:45	Matrix:Groundwater

ANALYSES	RESULT	QUAL	MDL	REPORT LIMIT	UNITS	DILUTION FACTOR	DATE ANALYZED	
ICP-MS METALS BY SW6020A		Method:	SW6020		Prep:SW3010A	/ 24-Dec-2018	Analyst: JHD	)
Boron	3,250		220	400	ug/L	20	03-Jan-2019 13:46	6
Calcium	637,000		680	10000	ug/L	20	03-Jan-2019 13:46	6
TOTAL DISSOLVED SOLIDS BY SM	Method:	M2540C				Analyst: KAF	-	
Total Dissolved Solids (Residue, Filterable)	6,400		5.00	10.0	mg/L	1	20-Dec-2018 17:20	0
PH BY SW9040C		Method:	SW9040				Analyst: MZE	C
рН	7.10	Н	0.100	0.100	pH Units	1	26-Dec-2018 11:50	0
Temp Deg C @pH	21.0	Н	0	0	DEG C	1	26-Dec-2018 11:50	0
ANIONS BY SW9056A		Method:	SW9056				Analyst: KML	J
Chloride	1,120		20.0	50.0	mg/L	100	28-Dec-2018 23:5	7
Fluoride	0.586		0.250	0.500	mg/L	5	31-Dec-2018 15:00	0
Sulfate	2,780		20.0	50.0	mg/L	100	28-Dec-2018 23:57	7

Client:	SCS Engineers	ANALYTICAL REPORT
Project:	Sandy Creek Groundwater 16215106	WorkOrder:HS18120889
Sample ID:	MW-1	Lab ID:HS18120889-02
Collection Date:	13-Dec-2018 11:55	Matrix:Groundwater

ANALYSES	RESULT	QUAL	MDL	REPORT LIMIT	UNITS	DILUTION FACTOR	DATE ANALYZED
ICP-MS METALS BY SW6020A		Method:	SW6020		Prep:SW3010A	/ 24-Dec-2018	Analyst: JHD
Boron	1,350		220	400	ug/L	20	03-Jan-2019 13:49
Calcium	515,000		680	10000	ug/L	20	03-Jan-2019 13:49
TOTAL DISSOLVED SOLIDS BY SM	Method:	M2540C				Analyst: KAH	
Total Dissolved Solids (Residue, Filterable)	4,100		5.00	10.0	mg/L	1	20-Dec-2018 17:20
PH BY SW9040C		Method:	SW9040				Analyst: MZD
рН	7.52	Н	0.100	0.100	pH Units	1	26-Dec-2018 11:50
Temp Deg C @pH	21.6	Н	0	0	DEG C	1	26-Dec-2018 11:50
ANIONS BY SW9056A		Method:	SW9056				Analyst: KMU
Chloride	241		2.00	5.00	mg/L	10	29-Dec-2018 01:53
Fluoride	0.585		0.250	0.500	mg/L	5	31-Dec-2018 15:22
Sulfate	2,570		20.0	50.0	mg/L	100	31-Dec-2018 12:59

Client:	SCS Engineers	ANALYTICAL REPORT
Project:	Sandy Creek Groundwater 16215106	WorkOrder:HS18120889
Sample ID:	MW-2	Lab ID:HS18120889-03
Collection Date:	13-Dec-2018 12:05	Matrix:Groundwater

ANALYSES	RESULT	QUAL	MDL	REPORT LIMIT	UNITS	DILUTION FACTOR	DATE ANALYZED
ICP-MS METALS BY SW6020A		Method:	SW6020		Prep:SW3010A	/ 24-Dec-2018	Analyst: JHD
Boron	2,580		550	1000	ug/L	50	03-Jan-2019 13:51
Calcium	690,000		1700	25000	ug/L	50	03-Jan-2019 13:51
TOTAL DISSOLVED SOLIDS BY SI	Method:	M2540C				Analyst: KAH	
Total Dissolved Solids (Residue, Filterable)	10,500		5.00	10.0	mg/L	1	20-Dec-2018 17:20
PH BY SW9040C		Method:	SW9040				Analyst: MZD
рН	6.71	Н	0.100	0.100	pH Units	1	26-Dec-2018 11:50
Temp Deg C @pH	21.8	Н	0	0	DEG C	1	26-Dec-2018 11:50
ANIONS BY SW9056A		Method:	SW9056				Analyst: KMU
Chloride	2,740		20.0	50.0	mg/L	100	29-Dec-2018 00:26
Fluoride	0.618		0.250	0.500	mg/L	5	31-Dec-2018 15:43
Sulfate	3,220		20.0	50.0	mg/L	100	29-Dec-2018 00:26

Client:	SCS Engineers	ANALYTICAL REPORT
Project:	Sandy Creek Groundwater 16215106	WorkOrder:HS18120889
Sample ID:	MW-3	Lab ID:HS18120889-04
Collection Date:	13-Dec-2018 12:20	Matrix:Groundwater

ANALYSES	RESULT	QUAL	MDL	REPORT LIMIT	UNITS	DILUTION FACTOR	DATE ANALYZED
ICP-MS METALS BY SW6020A		Method:	SW6020		Prep:SW3010A	24-Dec-2018	Analyst: JHD
Boron	1,080		110	200	ug/L	10	03-Jan-2019 16:10
Calcium	327,000		1700	25000	ug/L	50	03-Jan-2019 13:53
TOTAL DISSOLVED SOLIDS BY S	Method:	M2540C				Analyst: KAH	
Total Dissolved Solids (Residue, Filterable)	3,520		5.00	10.0	mg/L	1	20-Dec-2018 17:20
PH BY SW9040C		Method:	SW9040				Analyst: MZD
рН	6.61	Н	0.100	0.100	pH Units	1	26-Dec-2018 11:50
Temp Deg C @pH	21.7	Н	0	0	DEG C	1	26-Dec-2018 11:50
ANIONS BY SW9056A		Method:	SW9056				Analyst: KMU
Chloride	206		2.00	5.00	mg/L	10	29-Dec-2018 00:41
Fluoride	0.662		0.250	0.500	mg/L	5	31-Dec-2018 19:41
Sulfate	1,790		20.0	50.0	mg/L	100	31-Dec-2018 13:20

Client:	SCS Engineers	ANALYTICAL REPORT
Project:	Sandy Creek Groundwater 16215106	WorkOrder:HS18120889
Sample ID:	DUP	Lab ID:HS18120889-05
Collection Date:	13-Dec-2018 00:00	Matrix:Groundwater

ANALYSES	RESULT	QUAL	MDL	REPORT LIMIT	UNITS	DILUTION FACTOR	DATE ANALYZED
ICP-MS METALS BY SW6020A		Method:	SW6020		Prep:SW3010A	/ 24-Dec-2018	Analyst: JHD
Boron	3,730		550	1000	ug/L	50	03-Jan-2019 14:55
Calcium	614,000		1700	25000	ug/L	50	03-Jan-2019 14:55
TOTAL DISSOLVED SOLIDS BY SM	Method:	M2540C				Analyst: KAH	
Total Dissolved Solids (Residue, Filterable)	6,300		5.00	10.0	mg/L	1	20-Dec-2018 17:20
PH BY SW9040C		Method:	SW9040				Analyst: MZD
рН	6.93	Н	0.100	0.100	pH Units	1	26-Dec-2018 11:50
Temp Deg C @pH	21.5	Н	0	0	DEG C	1	26-Dec-2018 11:50
ANIONS BY SW9056A		Method:	SW9056				Analyst: KMU
Chloride	1,160		20.0	50.0	mg/L	100	29-Dec-2018 02:22
Fluoride	0.589		0.250	0.500	mg/L	5	31-Dec-2018 20:02
Sulfate	2,930		20.0	50.0	mg/L	100	29-Dec-2018 02:22

# WEIGHT LOG

# Client:SCS EngineersProject:Sandy Creek Groundwater 16215106WorkOrder:HS18120889

Batch ID: 135989	Metho	d: ICP-MS	METALS BY	SW6020A	Prep: 3010A
SampID	Container	Sample Wt/Vol	Final Volume	Prep Factor	
HS18120889-01	1	10	10 (mL)	1	
HS18120889-02	1	10	10 (mL)	1	
HS18120889-03	1	10	10 (mL)	1	
HS18120889-04	1	10	10 (mL)	1	
HS18120889-05	1	10	10 (mL)	1	

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DATES REPORT

Client:	SCS Engineers
Project:	Sandy Creek Groundwater 16215106
WorkOrder:	HS18120889

Sample ID	Client San	np ID	Collection Date	TCLP Date	Prep Date	Analysis Date	DF
Batch ID 135989	9	Test Name :	ICP-MS METALS BY SW	/6020A	Matrix: G	roundwater	
HS18120889-01	BW-1		13 Dec 2018 11:45		24 Dec 2018 13:00	03 Jan 2019 13:46	20
HS18120889-02	MW-1		13 Dec 2018 11:55		24 Dec 2018 13:00	03 Jan 2019 13:49	20
HS18120889-03	MW-2		13 Dec 2018 12:05		24 Dec 2018 13:00	03 Jan 2019 13:51	50
HS18120889-04	MW-3		13 Dec 2018 12:20		24 Dec 2018 13:00	03 Jan 2019 16:10	10
HS18120889-04	MW-3		13 Dec 2018 12:20		24 Dec 2018 13:00	03 Jan 2019 13:53	50
HS18120889-05	DUP		13 Dec 2018 00:00		24 Dec 2018 13:00	03 Jan 2019 14:55	50
Batch ID R3297	53	Test Name :	TOTAL DISSOLVED SO	LIDS BY SM2540C	Matrix: G	roundwater	
HS18120889-01	BW-1		13 Dec 2018 11:45			20 Dec 2018 17:20	1
HS18120889-02	MW-1		13 Dec 2018 11:55			20 Dec 2018 17:20	1
HS18120889-03	MW-2		13 Dec 2018 12:05			20 Dec 2018 17:20	1
HS18120889-04	MW-3		13 Dec 2018 12:20			20 Dec 2018 17:20	1
HS18120889-05	DUP		13 Dec 2018 00:00			20 Dec 2018 17:20	1
Batch ID R3299	34	Test Name :	PH BY SW9040C		Matrix: G	roundwater	
HS18120889-01	BW-1		13 Dec 2018 11:45			26 Dec 2018 11:50	1
HS18120889-02	MW-1		13 Dec 2018 11:55			26 Dec 2018 11:50	1
HS18120889-03	MW-2		13 Dec 2018 12:05			26 Dec 2018 11:50	1
HS18120889-04	MW-3		13 Dec 2018 12:20			26 Dec 2018 11:50	1
HS18120889-05	DUP		13 Dec 2018 00:00			26 Dec 2018 11:50	1
Batch ID R3302	28	Test Name :	ANIONS BY SW9056A		Matrix: G	roundwater	
HS18120889-01	BW-1		13 Dec 2018 11:45			28 Dec 2018 23:57	100
HS18120889-02	MW-1		13 Dec 2018 11:55			29 Dec 2018 01:53	10
HS18120889-03	MW-2		13 Dec 2018 12:05			29 Dec 2018 00:26	100
HS18120889-04	MW-3		13 Dec 2018 12:20			29 Dec 2018 00:41	10
HS18120889-05	DUP		13 Dec 2018 00:00			29 Dec 2018 02:22	100
Batch ID R3303	28	Test Name :	ANIONS BY SW9056A		Matrix: G	roundwater	
HS18120889-01	BW-1		13 Dec 2018 11:45			31 Dec 2018 15:00	5
HS18120889-02	MW-1		13 Dec 2018 11:55			31 Dec 2018 15:22	5
HS18120889-02	MW-1		13 Dec 2018 11:55			31 Dec 2018 12:59	100
HS18120889-03	MW-2		13 Dec 2018 12:05			31 Dec 2018 15:43	5
HS18120889-04	MW-3		13 Dec 2018 12:20			31 Dec 2018 19:41	5
HS18120889-04	MW-3		13 Dec 2018 12:20			31 Dec 2018 13:20	100
HS18120889-05	DUP		13 Dec 2018 00:00			31 Dec 2018 20:02	5

# Client:SCS EngineersProject:Sandy Creek Groundwater 16215106WorkOrder:HS18120889

Batch ID:	135989	Instr	ument:	ICPMS04		Metho	od: SW602	0	
MBLK Client ID:	Sample ID:	MBLK-135989 Run IE	): ICPMS	Units: \$04_330403	<b>mg/L</b> SeqNo: <b>48</b> SPK Ref	Ana 9 <b>2971</b>	alysis Date: PrepDate: Control	03-Jan-2019 24-Dec-2018 RPD Ref	9 12:50 3 DF: 1 RPD
Analyte		Result	PQL	SPK Val	Value	%REC	Limit	Value	%RPD Limit Qual
Boron		< 0.0110	0.0200						
MBLK Client ID:	Sample ID:	MBLK-135989 Run II	): ICPMS	Units: 604_330335	mg/L SeqNo: 48	Ana 91329	alysis Date: PrepDate:	02-Jan-2019 24-Dec-2018	9 15:57 3 DF: 1
Analyte		Result	PQL	SPK Val	Value	%REC	Limit	Value	RPD %RPD Limit Qual
Calcium		< 0.0340	0.500						
LCS Client ID:	Sample ID:	LCS-135989 Run II	D: ICPMS	Units: 604_330403	mg/L SeqNo: 48	Ana 92972	alysis Date: PrepDate:	03-Jan-2019 24-Dec-2018	9 12:52 3 DF: 1
Analyte		Result	PQL	SPK Val	Value	%REC	Limit	Value	%RPD Limit Qual
Boron		0.5688	0.0200	0.5	0	114	80 - 120		
LCS	Sample ID:	LCS-135989		Units:	mg/L	Ana	alysis Date:	02-Jan-2019	) 15:59
Client ID:		Run II	: ICPMS	604_330335	SeqNo: 48	91330	PrepDate:	24-Dec-2018	3 DF: 1
Analyte		Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	RPD %RPD Limit Qual
Calcium		5.079	0.500	5	0	102	80 - 120		
мѕ	Sample ID:	HS18120868-06MS		Units:	mg/L	Ana	alysis Date:	03-Jan-2019	) 12:59
Client ID:		Run II	: ICPMS	604_330403	SeqNo: 48	92976	PrepDate:	24-Dec-2018	3 DF: 1
Analyte		Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	RPD %RPD Limit Qual
Boron		1.007	0.0200	0.5	0.4898	103	80 - 120		
мѕ	Sample ID:	HS18120868-06MS		Units:	mg/L	Ana	alysis Date:	02-Jan-2019	) 16:06
Client ID:		Run II	: ICPMS	604_330335	SeqNo: 48	91333	PrepDate:	24-Dec-2018	3 DF: 1
Analyte		Result	PQL	SPK Val	Value	%REC	Limit	Value	RPD %RPD Limit Qual
Calcium		116.5	0.500	5	108.1	169	80 - 120		S

#### Client: SCS Engineers Project: Sandy Creek Groundwater 16215106 WorkOrder: HS18120889

Batch ID:	135989	Instr	ument:	ICPMS04		Metho	od: SW602	0		
MSD	Sample ID:	HS18120868-06MSD		Units:	mg/L	Ana	alysis Date:	03-Jan-2019	13:01	
Client ID:		Run IE	: ICPM	S04_330403	SeqNo: 4	892977	PrepDate:	24-Dec-2018	DF: <b>1</b>	
Analyte		Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	RP %RPD Lin	PD nit Qual
Boron		1.013	0.0200	0.5	0.4898	105	80 - 120	1.007	0.622	20
MSD	Sample ID:	HS18120868-06MSD		Units:	mg/L	Ana	alysis Date:	02-Jan-2019	16:08	
Client ID:		Run IE	: ICPM	S04_330335	SeqNo: 4	891334	PrepDate:	24-Dec-2018	DF: <b>1</b>	
Analyte		Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	RP %RPD Lin	PD nit Qual
Calcium		112.6	0.500	5	108.1	89.3	80 - 120	116.5	3.48	20 O
PDS	Sample ID:	HS18120868-06PDS		Units:	mg/L	Ana	alysis Date:	03-Jan-2019	13:03	
Client ID:		Run ID	: ICPM	S04_330403	SeqNo: 4	892978	PrepDate:	24-Dec-2018	DF: <b>1</b>	
Analyte		Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	RP %RPD Lin	PD nit Qual
Boron		1.481	0.0200	1	0.4898	99.1	75 - 125			
PDS	Sample ID:	HS18120868-06PDS		Units:	mg/L	Ana	alysis Date:	02-Jan-2019	16:11	
Client ID:		Run ID	: ICPM	S04_330335	SeqNo: 4	891335	PrepDate:	24-Dec-2018	DF: <b>1</b>	
Analyte		Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	RP %RPD Lin	PD nit Qual
Calcium		115.9	0.500	10	108.1	78.5	75 - 125			0
SD	Sample ID:	HS18120868-06SD		Units:	mg/L	Ana	alysis Date:	02-Jan-2019	16:04	
Client ID:		Run IE	: ICPM	S04_330335	SeqNo: 4	891332	PrepDate:	24-Dec-2018	DF: 5	
Analyte		Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%D Lin	D nit Qual
Calcium		109.7	2.50					108.1	1.46	10
The followin	g samples were analyze	ed in this batch: HS181208	89-01	HS1812088	39-02	HS181208	89-03	HS18120889	-04	

HS18120889-05

# Client:SCS EngineersProject:Sandy Creek Groundwater 16215106WorkOrder:HS18120889

Batch ID:	R329753		Instrumen	t: Balance1		Metho	od: M2540C	:		
MBLK	Sample ID:	WBLK-122018		Units:	mg/L	Ana	alysis Date:	20-Dec-2018	3 17:20	
Client ID:		R	aun ID: Ba	lance1_329753	SeqNo: 4	877884	PrepDate:		DF: <b>*</b>	I
Analyte		Result	PQI	_ SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	R %RPD L	PD imit Qual
Total Dissol Filterable)	ved Solids (Residue,	< 5.00	10.0	)						
LCS	Sample ID:	WLCS-122018		Units:	mg/L	Ana	alysis Date:	20-Dec-2018	3 17:20	
Client ID:		R	Run ID: Ba	lance1_329753	SeqNo: 4	877885	PrepDate:		DF: *	l
Analyte		Result	PQI	_ SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	R %RPD L	PD imit Qual
Total Dissol Filterable)	ved Solids (Residue,	1026	10.0	0 1000	0	103	85 - 115			
DUP	Sample ID:	HS18120988-01D	UP	Units:	mg/L	Ana	alysis Date:	20-Dec-2018	3 17:20	
Client ID:		R	aun ID: Ba	lance1_329753	SeqNo: 4	877883	PrepDate:		DF: <b>*</b>	I
Analyte		Result	PQI	_ SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	R %RPD L	PD imit Qual
Total Dissol Filterable)	ved Solids (Residue,	< 5.00	10.0	)				2	0	5
DUP	Sample ID:	HS18120768-01D	UP	Units:	mg/L	Ana	alysis Date:	20-Dec-2018	3 17:20	
Client ID:		R	aun ID: Ba	lance1_329753	SeqNo: 4	877863	PrepDate:		DF: <b>*</b>	I
Analyte		Result	PQI	_ SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	R %RPD L	PD imit Qual
Total Dissol Filterable)	ved Solids (Residue,	1132	10.0	)				1174	3.64	5
The following	g samples were analyze	d in this batch: HS18 HS18	8120889-01 8120889-05	HS181208	89-02	HS181208	89-03	HS18120889	-04	

Client:	SCS Engineers
Project:	Sandy Creek Groundwater 16215106
WorkOrder:	HS18120889

QC BATCH REPORT

Batch ID:	R3299	34	Instru	ument:	WetChem_	HS	Metho	d: SW904	0	
DUP		Sample ID:	HS18120889-05DUP		Units:	pH Units	Ana	lysis Date:	26-Dec-2018	3 11:50
Client ID:	DUP		Run ID	WetC	hem_HS_3299	34 SeqNo:	4882100	PrepDate:		DF: <b>1</b>
Analyte			Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	RPD %RPD Limit Qual
pН			6.99	0.100					6.93	0.862 10
Temp Deg	C @pH		21.6	0					21.5	0.464 10
The following samples were analyzed in this batch: HS13 HS13				89-01 89-05	HS1812088	39-02	HS1812088	39-03	HS18120889	-04

# Client:SCS EngineersProject:Sandy Creek Groundwater 16215106WorkOrder:HS18120889

Batch ID:	R3302	28		Instrument:	ICS2100		Metho	od: SW905	6	
MBLK		Sample ID:	WBLKW1-122818		Units:	mg/L	Ana	alysis Date:	28-Dec-2018	3 17:04
Client ID:			R	un ID: ICS2	100_330228	SeqNo: 4	1888425	PrepDate:		DF: <b>1</b>
Analyte			Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	RPD %RPD Limit Qua
Chloride			< 0.200	0.500						
Sulfate			< 0.200	0.500						
LCS		Sample ID:	WLCSW1-122818		Units:	mg/L	Ana	alysis Date:	28-Dec-201{	3 17:19
Client ID:		·	R	un ID: ICS2	100_330228	- SeqNo: 4	4888426	PrepDate:		DF: <b>1</b>
Analyte			Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	RPD %RPD Limit Qua <sup>l</sup>
Chloride			20.32	0.500	20	0	102	80 - 120		
Sulfate			20.21	0.500	20	0	101	80 - 120		
		Sample ID:	WI CSDW1-12281	R	Units:	ma/l	An	alvsis Date:	28-Dec-201{	2 17-33
Client ID:		Gampie iz.	F	un ID: ICS2	100 330228	SeaNo: 4	4888427	PrenDate:	20-260 2010	DF: 1
Analyte			Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	RPD %RPD Limit Qua
Chloride			19.82	0.500	20	0	99.1	<u><u></u><u></u><u></u><u></u><u></u><u></u><u></u><u></u><u></u><u></u><u></u><u></u><u></u><u></u><u></u><u></u><u></u><u></u><u></u></u>	20.32	2 40 20
			19.02	0.500		0	99.1	80 - 120	20.02	2.49 20
										2.00 20
MS		Sample ID:	HS18120889-04M	S	Units:	mg/L Ana		alysis Date:	29-Dec-2018	3 00:55
Client ID:	MW-3		R	un ID: ICS24	100_330228	SeqNo: 4	1888437	PrepDate:		DF: <b>10</b>
Analyte			Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	RPD %RPD Limit Qual
Chloride			310	5.00	100	206.2	104	80 - 120		
Sulfate			1753	5.00	100	1638	116	80 - 120		E
MSD		Sample ID:	HS18120889-04MSD		Units:	mg/L	Ana	alysis Date:	29-Dec-2018	3 01:10
Client ID:	MW-3		R	un ID: ICS2	100_330228	SeqNo: 4	4888438	PrepDate:		DF: <b>10</b>
Analyte			Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	RPD %RPD Limit Qua <sup>!</sup>
Chloride			295.9	5.00	100	206.2	89.7	80 - 120	310	4.67 20
Sulfate			1663	5.00	100	1638	25.4	80 - 120	1753	5.29 20 SE
The following samples were analyzed in this batch: HS18120889-01 HS18120889-02 HS18120889-03 HS18120889-04   HS18120889-05 HS18120889-05 HS18120889-03 HS18120889-04									HS18120889	-04
**QC BATCH REPORT** 

# Client:SCS EngineersProject:Sandy Creek Groundwater 16215106WorkOrder:HS18120889

Batch ID:	R330328	Ins	strument:	ICS3K2		Metho	od: SW905	6	
MBLK	Sample ID:	WBLKW1-123118		Units:	mg/L	Ana	alysis Date:	31-Dec-2018	8 18:36
Client ID:		Run	ID: ICS3K2	2_330328	SeqNo: 4	890588	PrepDate:		DF: <b>1</b>
Analyte		Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	RPD %RPD Limit Qual
Fluoride		< 0.0500	0.100						
Sulfate		< 0.200	0.500						
LCS	Sample ID:	WLCSW1-123118		Units:	mg/L	Ana	alysis Date:	31-Dec-2018	8 18:58
Client ID:		Run	ID: ICS3K2	2_330328	SeqNo: 4	890589	PrepDate:		DF: <b>1</b>
Analyte		Result	POI	SPK Val	SPK Ref	%REC	Control	RPD Ref	RPD %RPD_Limit_Oual
Analyte		Kesuit			Value	/iiteo	Ennit	value	
Fluoride		4.102	0.100	4	0	103	80 - 120		
Sulfate		19.27	0.500	20	0	96.3	80 - 120		
LCSD	Sample ID:	WLCSDW1-123118		Units:	mg/L	Ana	alysis Date:	31-Dec-2018	8 19:19
Client ID:		Run	ID: ICS3K2	2_330328	SeqNo: 4	890590	PrepDate:		DF: <b>1</b>
Analyte		Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	RPD %RPD Limit Qual
Fluoride		4.064	0.100	4	0	102	80 - 120	4.102	2 0.931 20
Sulfate		19.36	0.500	20	0	96.8	80 - 120	19.27	0.482 20
мѕ	Sample ID:	HS18121459-04MS		Units:	mg/L	Ana	alysis Date:	01-Jan-2019	9 10:04
Client ID:		Run	ID: ICS3K2	2_330328	SeqNo: 4	890631	PrepDate:		DF: <b>1</b>
Analyte		Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	RPD %RPD Limit Qual
Fluoride		2.52	0.100	2	0.464	103	80 - 120		
Sulfate		223	0.500	10	216.3	66.2	80 - 120		SE
ме	Sample ID:	HS18121/5/-06MS		L Inite:	ma/l	An	alveis Date:	01- lan-2010	0.03-35
Client ID <sup>.</sup>	Gampie ID.	Run		2 330328	SeaNo <sup>.</sup> 4	890613	PrepDate:	01-001-201	DF <sup>.</sup> 500
Analyte		Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	RPD %RPD Limit Qual
Fluoride		983.5	50.0	1000	0	98.4	80 - 120		
Sulfate		9634	250	5000	4636	100.0	80 - 120		

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# Client:SCS EngineersProject:Sandy Creek Groundwater 16215106WorkOrder:HS18120889

Batch ID:	R330328	Inst	trument:	ICS3K2		Metho	d: SW9050	6		
MSD	Sample ID:	HS18121459-04MSD		Units:	mg/L	Ana	Ilysis Date:	01-Jan-2019	10:25	
Client ID:		Run I	D: ICS3K	2_330328	SeqNo: 4	890632	PrepDate:		DF: <b>1</b>	
Analyte		Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	RPD %RPD Limit	Qual
Fluoride		2.546	0.100	2	0.464	104	80 - 120	2.52	1.03 20	
Sulfate		224.5	0.500	10	216.3	82.0	80 - 120	223	0.704 20	EO
MSD	Sample ID:	HS18121454-06MSD		Units:	mg/L	Ana	Ilysis Date:	01-Jan-2019	03:57	
Client ID:		Run I	D: ICS3K	2_330328	SeqNo: 4	890614	PrepDate:		DF: <b>500</b>	
Analyte		Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	RPD %RPD Limit	Qual
Fluoride		990.5	50.0	1000	0	99.0	80 - 120	983.5	0.704 20	
Sulfate		9670	250	5000	4636	101	80 - 120	9634	0.37 20	
The following	g samples were analyze	d in this batch: HS18120 HS18120	889-01 889-05	HS1812088	39-02	HS181208	89-03	HS18120889	-04	

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#### QC BATCH REPORT

#### ALS Houston, US

Client: Project: WorkOrder:	SCS Engineers Sandy Creek Groundwater 16215106 HS18120889	QUALIFIERS, ACRONYMS, UNITS
Qualifier	Description	
*	Value exceeds Regulatory Limit	
а	Not accredited	
B	Analyte detected in the associated Method Blank above the Reporting Limit	
E	Value above quantitation range	
Н	Analyzed outside of Holding Time	
J	Analyte detected below quantitation limit	
М	Manually integrated, see raw data for justification	
n	Not offered for accreditation	
ND	Not Detected at the Reporting Limit	
0	Sample amount is > 4 times amount spiked	
Р	Dual Column results percent difference > 40%	
R	RPD above laboratory control limit	
S	Spike Recovery outside laboratory control limits	
U	Analyzed but not detected above the MDL/SDL	
Acronym	Description	
DCS	Detectability Check Study	
DUP	Method Duplicate	
LCS	Laboratory Control Sample	
LCSD	Laboratory Control Sample Duplicate	
MBLK	Method Blank	
MDL	Method Detection Limit	
MQL	Method Quantitation Limit	
MS	Matrix Spike	
MSD	Matrix Spike Duplicate	
PDS	Post Digestion Spike	
PQL	Practical Quantitaion Limit	
SD	Serial Dilution	
SDL	Sample Detection Limit	
TRRP	Texas Risk Reduction Program	
Unit Reported	Description	

µg/L

Micrograms per Liter

#### **CERTIFICATIONS, ACCREDITATIONS & LICENSES**

Agency	Number	Expire Date
Arkansas	88-0356	27-Mar-2019
Texas	T10470231-18-21	30-Apr-2019
North Dakota	R193 2018-2019	30-Apr-2019
Illinois	004438	29-Jun-2019
Louisiana	03087	30-Jun-2019
Kentucky	123043 - 2018	30-Apr-2019
Kansas	E-10352 2018-2019	31-Jul-2019
Oklahoma	2018-156	31-Aug-2019

#### ALS Houston, US

					Sample Receipt Checklis	st
Client Name: SCS E	NGINEERS - Bedford TX		Date/	Time Received:	<u>14-Dec-2018 10:00</u>	
Work Order: HS181	120889		Recei	ved by:	JRM	
Checklist completed by	y: <u>Paresh M. Giga</u> eSignature	15-Dec-2018 Date	Reviewed by:	<u>Corey</u> Gra. eSignature	ndits 19-Dec-2018 Date	
Matrices: <u>G</u>	Groundwater		Carrier name:	<u>FedEx</u>		
Shipping container/coc Custody seals intact or Custody seals intact or Chain of custody prese Chain of custody signe Chain of custody agree Samples in proper con Sample containers inta TX1005 solids received Sufficient sample volur All samples received w Container/Temp Blank	oler in good condition? In shipping container/cooler? In sample bottles? ent? ed when relinquished and receive es with sample labels? tainer/bottle? act? d in hermetically sealed vials? me for indicated test? vithin holding time? temperature in compliance?	ed?	Yes V Yes V Yes V Yes V Yes V Yes V Yes V Yes V Yes V Yes V	No	Not Present	
Temperature(s)/Therm	iometer(s):	.1	c/2.5c U/c		IR11	٦
Cooler(s)/Kit(s):		25	5696		Л	Ţ
Date/Time sample(s) s	ent to storage:	12	2/14/18 20:00			
Water - VOA vials have	e zero headspace?		Yes	No	No VOA vials submitted	
water - pH acceptable	upon receipt?		res 🗹			
pH adjusted by:						٦
Login Notes:		L				
Client Contacted:	D	ate Contacted:		Person Cor	ntacted:	
Contacted By:	R	egarding:				
Comments:						]
Corrective Action:						

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	ALS)	Cincinnati, OH +1 513 733 5336 Everett, WA +1 425 356 2600	Fort Col +1 970 - Holland +1 616 :	lins, CO 490 1511 , MI 399 6070 Г		Chain Pag C	of Cus = <u>1</u> of OC ID: <u>1</u>	stody F  9305	orr	<b>n</b> 	S	Sandy	HS SC Creek	S181 S En	208 ginee	<b>89</b> rs r 162	21510(	3	wv
	Customer Information				Projec	A t Informat	LS Projec	t Manager											
Purchase Order	16215106.00T132		Project	Name	Sand	V Crock C-		10010100		-									
Work Order			Project Nu	mber	4004	y Greek Gr	oundwater	16215106		pH_W	_9040(	C (904	0 pH)						•
Company Name	SCS Engineers		Bill To Con	npany	1021	5100.0011	32		В	9056_4	anions	_W (90	056 CI,	F, S04	4)				
Send Report To	Jim Lawrence		Invoice	Attn	Knet	citigineers	. (D)			TDS_V	V 2540	C (254	10C T	DS)					
Address	1901 Central Drive Suite 550		Ado	dress	1901 Suite	Central Dri 550	ve		E	ICP_T	N (602	0 Bord	on, Cal	cium)					×
City/State/Zip	Bedford, TX 76021		City/Stat	e/Zip	Bedfo	rd TX 760	04		G										
Phone	(817) 571-2288		P	hone	(817)	571.2289			н			· · · · · · · · · · · · · · · · · · ·							
Fax				Fax	(017)	57 1-2200													
e-Mail Address	JLawrence@scsengine	ers.com	e-Mail Add	tress	kkuntz	/@scsenci	neers com												
No.	Sample Description		Date	Tir	ne	Matrix	Pres.	# Bottles	Δ	B			E						
1 BW-1		ĺ	2/13/18	11:	45	Groundwa	2.8	2	X	X	v	v			G	H		J	Hold
2 MW-1			1	11:<	$\overline{\mathbf{x}}$	Groundwa	28	2											
3 MW-2				12!	05	Groundwa	28	2				 							
4 MW-3				17	20	Groundwa	2,0	2			A	X							
5 DUP			$\checkmark$	16.	_	Groundwa	2,0	2	A	X	X	X							
6			•			Cioundiva	2,0	2	X	X	X	X							
7																			
8																			
9																			
10																			
Sampler(s) Please Pr	INT& Sign TEEN Dury	L PSt	Shipmer	nt Metho	d	Requ	ired Turnaro TD 10 Wk Day	ound Time: (C s 5	heck Wk Da	Box) [ ys [	] Othe	nr Days			Resu	lts Du	e Date:		
Dou 6 51 Relinquished by:	TEEN	ž/13/18	3:15	Received	i by:				Notes	San	dy Cre	ek GV	/		le				
Logged by (Laboratory):	2 Dat	2/14/18 Time		Heceived Checked	by (Labo	ratory): VAYV ratory):			ده مح 2 ح	oler ID 696	Coole	r Temp. LC		ackage: Level II S Level III S	(Check Or Std QC	Date	Below)	TRRP Ch	
Preservative Key:	1-HCI 2-HNO <sub>3</sub> 3-H	<sub>2</sub> SO <sub>4</sub> 4-NaOH	5-Na <sub>2</sub> S <sub>2</sub> O <sub>3</sub>	6-N	aHSO₄	7-Other	8-4°C	9-5035			cs	$\frac{n!!}{0!4}$		Level IV	SW846/CLF	1			rui 19

Any changes must be made in writing once samples and COC Form have been submitted to ALS Environmental.
 Unless otherwise agreed in a formal contract, services provided by ALS Environmental are expressly limited to the terms and conditions stated on the reverse.
 The Chain of Custody is a legal document. All information must be completed accurately.

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## APPENDIX C

## HISTORICAL GROUNDWATER ANALYTICAL DATA

	2161 RATTLESNAKE ROAD RIESEL, TX 76682																								
	Water Level	Conductiviy	Turbidity	Boron	Calcium	Chloride	pH at 25°C	Sulfate	Total Dissolved Solids	Antimony	Arsenic	Barium	Beryllium	Cadmium	Chromium	Cobalt	read	Lithium	Mercury	Molybdenum	Selenium	Thallium	Radium-226	Radium-228	Combined Radium
Units	ft msl	mS/cm	NTU	mg/L	mg/L	mg/L	Std. Units	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	pCi/L	pCi/L	pCi/L
1W-1 12/14/2015 2/25/2016 5/11/2016 8/16/2016 11/17/2016 2/23/2017 6/7/2017 8/24/2017 12/20/2017 6/21/2018 12/13/2018	453.53 453.38 454.14 453.67 454.43 454.72 454.42 454.69 454.22 453.85 454.86	4.51 4.98 4.83 4.47 4.45 5.08 4.77 4.58 4.287 4.67 4.369	25.2 >800 >800 17.7 452 500 223 66.2 681 30	1.2 1.4 2.6 1.3 1.2 1.3 1.2 1.3 1.25 1.35	454 520 1030 535 542 531 530 518 548 548 548 587 515	253 236 402 239 216 223 203 241 248 247 241	7.6 7.5 7.2 6.8 7 7 7.5 7.1 7.4 7.38 7.52	2090 2190 2580 2300 2130 2350 2010 2620 2340 2530 2570	4090 4060 5260 3880 3720 3980 3680 4550 4250 4270 4100	<0.0010 <0.0010 <0.0010 <0.0010 <0.0010 <0.0010 <0.0010 <0.0010 n/a n/a	<0.0050 <0.0050 <b>0.12</b> <0.0050 <0.0050 <0.0050 <0.0050 <0.0060 n/a n/a	0.044 0.033 1 0.022 0.018 <0.20 0.019 0.02 0.017 n/a n/a	<0.0010 <0.0010 <b>0.029</b> <0.0010 <0.0010 <0.0010 <0.0010 <0.0010 n/a n/a	<0.0010 <0.0010 <0.0010 <0.0010 <0.0050 <0.0010 <0.0010 <0.0050 n/a n/a	0.0073 0.0074 0.69 <0.0050 <0.0050 <0.0050 <0.0050 <0.0070 n/a n/a	<0.0025 <0.0025 <b>0.087</b> <0.0025 <0.0025 <0.010 <0.0025 <0.0025 <0.0025 n/a n/a	<0.0050 <b>0.0084</b> <b>0.21</b> <0.0050 <0.0050 <0.0050 <0.0050 <0.0010 n/a n/a	0.43 0.39 0.78 0.41 0.37 0.44 0.36 0.395 0.38 n/a n/a	<0.00020 <0.00020 <0.00020 <0.00020 <0.00020 <0.00020 <0.00020 <0.00020 n/a n/a	<0.010 <0.010 <0.020 <0.010 <0.020 <0.020 <0.020 <0.030 n/a n/a	0.16 0.2 0.039 0.13 0.16 0.066 0.15 0.17 0.18 n/a n/a	<0.00050 <0.00050 <b>0.00050</b> <0.00050 <0.00050 <0.00050 <0.00050 <0.00050 n/a n/a	$\begin{array}{c} \textbf{1.04 \pm 0.838} \\ \textbf{0.922 \pm 0.720} \\ \textbf{3.94 \pm 1.31} \\ \textbf{0.593 \pm 0.620} \\ \textbf{0.338 \pm 0.339} \\ \textbf{-0.207 \pm 0.945} \\ \textbf{0.000 \pm 0.449} \\ \textbf{0.577 \pm 0.429} \\ \textbf{1.26 \pm 0.680} \\ \textbf{n/a} \\ \textbf{n/a} \end{array}$	$1.09 \pm 0.523$ $1.46 \pm 0.496$ $8.39 \pm 1.74$ $3.29 \pm 0.828$ $2.49 \pm 0.783$ $3.13 \pm 0.908$ $1.30 \pm 0.518$ $1.69 \pm 0.634$ $2.46 \pm 0.888$ $n/a$ $n/a$	2.13 2.382 12.33 3.883 2.828 2.923 1.3 2.267 3.72 n/a n/a
IW-2 12/14/2015 2/25/2016 5/11/2016 8/16/2016 11/17/2016 2/23/2017 6/7/2017 8/24/2017 12/20/2017 6/21/2018 12/13/2018	424.11 429.50 430.72 430.78 430.80 430.85 431.12 431.20 429.47 430.02 430.72	10.6 11.3 10.8 11.9 10.7 13.7 11 11.4 6.198 12.66 11.89	2.8 52.2 23.7 5.5 0.4 6.2 30.5 8.1 37.7 4.42 15.1	1.9 2.4 2.2 2.1 1.9 1.9 1.9 1.9 2.2 1.9 2.58	569 697 613 680 701 646 640 664 716 706 690	1890 2080 2340 2440 2140 2320 2420 2520 2590 2840 2740	6.7 7.3 6.7 6.7 6.9 7.5 6.8 7.2 7.09 6.71	2810 2890 3010 3080 2770 3110 2970 3710 3100 3400 3220	8520 8070 9930 7870 9680 9630 14200 9600 9600 10200 10500	<0.0010 <0.0010 <0.0020 <0.0010 <0.0010 <0.0010 <0.0010 <0.0010 n/a n/a	<0.0050 0.014 0.0059 <0.0050 <0.010 <0.010 <0.012 n/a n/a	0.031 0.038 0.027 0.021 0.024 <0.20 0.016 0.017 0.022 n/a n/a	<0.0010 <0.0010 <0.0010 <0.0010 <0.0050 <0.0010 <0.0010 <0.0010 n/a n/a	<0.0010 <0.0010 <0.0010 <0.0010 <0.0050 <0.0010 <0.0020 <0.010 n/a n/a	<0.0050 <0.0050 <0.0050 <0.0050 <0.010 <0.0050 <0.014 n/a n/a	0.0061 <0.011 0.0079 0.0084 0.0064 <0.010 0.0051 0.0065 0.0072 n/a n/a	<0.0050 <0.0050 <0.0050 <0.0050 <0.0050 <0.0050 <0.010 <0.020 n/a n/a	0.69 0.74 0.87 0.84 0.82 0.8 0.75 0.729 0.74 n/a n/a	<0.00020 <0.00020 <0.00020 <0.00020 <0.00020 <0.00020 <0.00020 <0.00020 n/a n/a	<0.010 <0.010 <0.010 <b>0.024</b> <0.010 <0.020 <0.020 <0.030 n/a n/a	<0.010 <0.010 <0.010 <0.010 <0.020 <0.010 <b>0.026</b> <0.040 n/a n/a	<0.00050 <0.00050 <0.0010 <0.00050 <0.00050 <0.00050 <0.00050 <0.00050 n/a n/a	$\begin{array}{c} 1.41 \pm 0.938 \\ 0.857 \pm 0.590 \\ 0.859 \pm 0.561 \\ 0.237 \pm 0.329 \\ 0.923 \pm 0.594 \\ 1.52 \pm 1.50 \\ 0.344 \pm 0.415 \\ 1.12 \pm 0.610 \\ 0.945 \pm 0.578 \\ n/a \\ n/a \\ n/a \end{array}$	2.76 $\pm$ 0.771 2.57 $\pm$ 0.665 3.13 $\pm$ 0.822 3.28 $\pm$ 0.775 3.16 $\pm$ 0.826 4.27 $\pm$ 1.07 3.82 $\pm$ 0.931 3.78 $\pm$ 0.960 4.07 $\pm$ 0.940 n/a n/a	4.17 3.427 3.989 3.517 4.083 5.79 4.164 4.9 5.015 n/a n/a
1W-3 12/14/2015 2/25/2016 5/11/2016 8/16/2016 11/17/2016 2/23/2017 6/7/2017 8/24/2017 12/20/2017 6/21/2018 12/13/2018	421.77 421.66 421.94 420.42 421.03 422.58 422.23 419.66 421.08 418.68 422.36	1.17 6.04 3.82 6.01 5.43 6.79 3.68 6.55 6.459 6.633 4.47	11.9 93.3 197 101 87 82 145 82.6 22.4 51.1 10.6	0.35 1.2 1.1 1.2 1.1 1.1 1.2 1.1 1.3 1.13 1.08	67.6 479 465 505 494 389 486 519 563 526 327	12.3 347 349 381 322 202 327 401 380 396 206	7.2 7 6.5 7.3 6.6 7 7.1 6.5 6.8 6.76 6.61	135 2430 2330 2950 2420 1450 2260 2890 2830 3160 1790	586 5400 5440 5680 5420 2900 4740 6160 5790 6090 3520	<0.0010 <0.0010 <0.0010 <0.0010 <0.0010 <0.0010 <0.0010 <0.0010 n/a n/a	<0.0050 <b>0.0061</b> <0.0050 <0.0050 <0.010 <0.0050 <0.010 <0.0060 n/a n/a	0.021 0.052 0.024 0.018 0.028 <0.20 0.015 0.014 0.034 n/a n/a	<0.0010 <0.0010 <0.0010 <0.0010 <0.0050 <0.0010 <0.0010 <0.0010 n/a n/a	<0.0010 <0.0010 <0.0010 <0.0010 <0.0050 <0.0010 <0.0020 <0.0050 n/a n/a	<0.0050 <0.0050 <0.0050 <0.0050 <0.010 <0.0050 <0.0050 <0.0070 n/a n/a	<0.0025 0.0098 0.0059 0.006 0.0068 <0.010 0.0058 0.0084 0.0086 n/a n/a	<0.0050 <0.0050 <0.0050 <0.0050 <0.0050 <0.0050 <0.010 <0.010 n/a n/a	<0.050 <b>0.85</b> <b>0.98</b> <b>0.94</b> <b>0.7</b> <b>0.62</b> <b>1.03</b> <b>0.92</b> n/a n/a	<0.00020 <0.00020 <0.00020 <0.00020 <0.00020 <0.00020 <0.00020 <0.00020 <0.00020 n/a n/a	<0.010 <0.010 <0.010 <0.020 <0.020 <0.020 <0.020 <0.030 n/a n/a	<0.010 <0.010 <0.010 <0.010 <0.020 <0.020 <0.020 <0.020 n/a n/a	<0.00050 <0.00050 <0.00050 <0.00050 <0.00050 <0.00050 <0.00050 <0.00050 n/a n/a	$\begin{array}{c} \textbf{0.997 \pm 0.813} \\ \textbf{1.26 \pm 0.762} \\ \textbf{1.54 \pm 0.797} \\ \textbf{0.891 \pm 0.626} \\ \textbf{0.872 \pm .0579} \\ \textbf{-0.239 \pm 1.09} \\ \textbf{0.941 \pm 0.658} \\ \textbf{1.26 \pm 0.600} \\ \textbf{0.626 \pm 0.567} \\ \textbf{n/a} \\ \textbf{n/a} \end{array}$	$\begin{array}{c} \textbf{0.736 \pm 0.505} \\ \textbf{3.02 \pm 0.791} \\ \textbf{1.62 \pm 0.547} \\ \textbf{5.10 \pm 1.13} \\ \textbf{5.23 \pm 1.30} \\ \textbf{4.07 \pm 1.03} \\ \textbf{2.76 \pm 0.765} \\ \textbf{4.41 \pm 1.07} \\ \textbf{2.77 \pm 0.728} \\ \textbf{n/a} \\ \textbf{n/a} \end{array}$	1.733 4.28 3.16 5.991 6.102 3.831 3.701 5.67 3.396 n/a n/a
W-1 12/14/2015 2/25/2016 5/11/2016 8/16/2016 11/17/2016 2/23/2017 6/7/2017 8/24/2017 12/20/2017	465.60 465.44 465.56 465.71 466.12 466.57 466.17 466.38 466.51	5.35 5.8 7.5 7.52 7.36 7.17 7.58 7.81 7.063	155 307 866 56 8.1 245 852 162 180	1.8 3.5 4 3.7 2.8 3.1 3.8 3.4 3.5	465 586 566 548 532 539 531 658	727 1050 1120 1130 991 1080 1020 1160 1030	9.5 7.4 7 7.2 6.8 7.2 7.7 7.1 7.1 7.2	2130 2690 2610 2720 2590 2760 2220 2870 2620	4900 6420 6360 6280 6400 6280 7320 7260 6140	<0.0010 <0.0010 <0.0010 <0.0010 <0.0010 <0.0010 <0.0010 <0.0010 <0.0010	<0.0050 0.015 0.0084 0.0064 0.0066 <0.010 <0.0050 <0.010 <0.0060	0.17 0.055 0.04 0.04 0.023 <0.20 0.026 0.037 0.044	<0.0010 <0.0010 <0.0010 <0.0010 <0.0010 <0.0050 <0.0010 <0.0010 <0.0010	<0.0010 <0.0010 <0.0010 <0.0010 <0.0010 <0.0050 <0.0010 <0.0020 <0.0050	0.015 0.0053 0.011 0.0073 <0.0050 <0.010 <0.0050 <0.0050 <0.0070	0.0026 0.0035 0.0035 0.0029 <0.0025 <0.010 <0.0025 <0.0050 0.0034	<0.0050 0.0069 0.0091 <0.0050 <0.0050 <0.0050 <0.0050 <0.010 <0.010	0.7 0.71 0.79 0.78 0.74 0.73 0.79 0.738 0.73	<0.00020 <0.00020 <0.00020 <0.00020 <0.00020 <0.00020 <0.00020 <0.00020 <0.00020	<0.010 <0.010 <0.010 <0.010 <b>0.022</b> <0.010 <0.020 <0.020 <0.030	<0.010 <0.010 <0.010 <0.010 <0.010 <0.020 <0.010 <0.020 <0.020	0.00073 <0.00050 <0.00050 <0.00050 <0.00050 <0.00050 <0.00050 <0.00050 <0.00050	$\begin{array}{c} 0.900 \pm 0.728 \\ 0.887 \pm 0.697 \\ 2.40 \pm 0.944 \\ 0.610 \pm 0.483 \\ 0.605 \pm 0.548 \\ 0.816 \pm .0983 \\ 1.36 \pm 0.685 \\ 1.58 \pm 0.602 \\ 1.07 \pm 0.681 \end{array}$	$1.13 \pm 0.513$ $1.82 \pm 0.541$ $2.80 \pm 0.710$ $3.42 \pm 0.777$ $2.94 \pm 0.799$ $4.07 \pm 1.08$ $3.13 \pm 0.783$ $2.80 \pm 0.759$ $3.13 \pm 0.788$	2.03 2.707 5.2 4.03 3.545 4.886 4.49 4.38 4.2

MCL - EPA Primary Drinking Water Maximum Contaminant Level

n/a

1200

1120

0.015 Exceedance of EPA Primary MCL

40 CFR 257 Appendix III Constituent

40 CFR 257 Appendix IV Constituent

610

637

n/a

MW-1

MW-2

MW-3

BW-1

6/21/2018

12/13/2018

MCL

466.13

467.24

7.755

7.159

39.3

81.8

3.31

3.25

n/a

40 CFR 257 Appendix III & IV Constituent

"<" - Indicates analyte was not detected above the laboratory reporting limit "n/a" - Indicates constituent has no EPA Primary MCL

7.22

7.1

n/a n/a

3030

2780

6640

6400

n/a

n/a

n/a

0.006 0.01

n/a

n/a

n/a

n/a

2

n/a

n/a

0.004 0.005

n/a

n/a

n/a

n/a

0.1

n/a

n/a

n/a

n/a 0.015

n/a

n/a

n/a

n/a

n/a

n/a

0.002

n/a

n/a

n/a

n/a

n/a

0.05

n/a

n/a

0.002

n/a

n/a

n/a

n/a

n/a

n/a

APPENDIX C - GROUNDWATER ANALYTICAL DATA

2018 ANNUAL GROUNDWATER MONITORING AND CORRECTIVE ACTION

SANDY CREEK ENERGY STATION

mg/L

<0.30 <0.30

<0.30

0.35

<0.30

<0.30 <0.30

0.4

1.1

0.3 J

0.585

0.98

<0.30

<0.30

0.64 0.35

0.46

1.3

0.32 <0.50

<0.6

0.618

0.62

0.9 <0.30

<0.30 <0.30

0.45

0.57

<0.30

0.61

<0.3

0.662

<0.30

0.67

0.32

0.94

0.85

<0.30 <0.30

0.37

<0.50

<0.3

0.586

4

n/a

n/a

5

## APPENDIX D

## 2018 RESULTS AND STATISTICAL LIMITS

	Appendix D – 2018 Results and Statistical Limits - MW-1												
MW-ID	CFR 257 Appendix	Constituent	June 2018 Lab Result	December 2018 Lab Result	MCL	Statistical Limit	Statistical Method						
		Boron (mg/L)	1.25	1.35	n/a	2.6	Non-Parametric Prediction Limit						
		Calcium (mg/L)	587	515	n/a	1030	Non-Parametric Prediction Limit						
		Chloride (mg/L)	247	241	n/a	402	Non-Parametric Prediction Limit						
		pH at 25°C	7.38	7.52	n/a	6.136 - 8.289	Parametric Prediction Limit						
		Sulfate (mg/L)	2530	2570	n/a	3402	Shewhart-Cusum Control Chart						
		TDS (mg/L)	4270	4100	n/a	6765	Shewhart-Cusum Control Chart						
		Fluoride (mg/L)	0.3 J	0.585	4	0.4	Non-Parametric Prediction Limit						
		Antimony (mg/L)	n/a	n/a	0.006	0.001	Non-Parametric Prediction Limit						
		Arsenic (mg/L)	n/a	n/a	0.01	0.12	Non-Parametric Prediction Limit						
		Barium (mg/L)	n/a	n/a	2	1	Non-Parametric Prediction Limit						
		Beryllium (mg/L)	n/a	n/a	0.004	0.029	Non-Parametric Prediction Limit						
N 414/ 1		Cadmium (mg/L)	n/a	n/a	0.005	0.001	Non-Parametric Prediction Limit						
10100-1		Chromium (mg/L)	n/a	n/a	0.1	0.69	Non-Parametric Prediction Limit						
		Cobalt (mg/L)	n/a	n/a	n/a	0.087	Non-Parametric Prediction Limit						
		Lead (mg/L)	n/a	n/a	0.015	0.21	Non-Parametric Prediction Limit						
	IV	Lithium (mg/L)	n/a	n/a	n/a	0.78	Non-Parametric Prediction Limit						
		Mercury (mg/L)	n/a	n/a	0.002	0.0002	Non-Parametric Prediction Limit						
		Molybdenum (mg/L)	n/a	n/a	n/a	0.02	Non-Parametric Prediction Limit						
		Selenium (mg/L)	n/a	n/a	0.05	0.2535	Shewhart-Cusum Control Chart						
		Thallium (mg/L)	n/a	n/a	0.002	0.00089	Non-Parametric Prediction Limit						
		Radium - 226 (pCi/L)	n/a	n/a	n/a	n/a	n/a						
		Radium - 228 (pCi/L)	n/a	n/a	n/a	n/a	n/a						
		Combined Radium (pCi/L)	n/a	n/a	5	12.33	Non-Parametric Prediction Limit						
		Fluoride (mg/L)	0.3 J	0.585	4	0.4	Non-Parametric Prediction Limit						

	Appendix D – 2018 Results and Statistical Limits - MW-2												
MW-ID	CFR 257 Appendix	Constituent	June 2018 Lab Result	ne 2018 Lab Result Result Result		Statistical Limit	Statistical Method						
		Boron (mg/L)	1.9	2.58	n/a	2.4	Non-Parametric Prediction Limit						
		Calcium (mg/L)	706	690	n/a	874.4	Shewhart-Cusum Control Chart						
		Chloride (mg/L)	2840	2740	n/a	3336	Shewhart-Cusum Control Chart						
	ш	pH at 25°C	7.09	6.71	n/a	6.7 - 7.5	Non-Parametric Prediction Limit						
		Sulfate (mg/L)	3400	3220	n/a	4635	Shewhart-Cusum Control Chart						
		TDS (mg/L)	10200	10500	n/a	23969	Shewhart-Cusum Control Chart						
		Fluoride* (mg/L)	<0.6	0.618	4	2.831	Shewhart-Cusum Control Chart						
		Antimony (mg/L)	n/a	n/a	0.006	0.001	Non-Parametric Prediction Limit						
		Arsenic (mg/L)	n/a	n/a	0.01	0.014	Non-Parametric Prediction Limit						
		Barium (mg/L)	n/a	n/a	2	0.5299	Shewhart-Cusum Control Chart						
		Beryllium (mg/L)	n/a	n/a	0.004	0.001	Non-Parametric Prediction Limit						
N414/ 2		Cadmium (mg/L)*	n/a	n/a	0.005	0.002	Non-Parametric Prediction Limit						
10100-2		Chromium (mg/L)*	n/a	n/a	0.1	0.005	Non-Parametric Prediction Limit						
		Cobalt (mg/L)	n/a	n/a	n/a	0.02189	Shewhart-Cusum Control Chart						
		Lead (mg/L)	n/a	n/a	0.015	0.01	Non-Parametric Prediction Limit						
	IV	Lithium (mg/L)	n/a	n/a	n/a	1.09	Shewhart-Cusum Control Chart						
		Mercury (mg/L)	n/a	n/a	0.002	0.0002	Non-Parametric Prediction Limit						
		Molybdenum (mg/L)	n/a	n/a	n/a	0.024	Non-Parametric Prediction Limit						
		Selenium (mg/L)	n/a	n/a	0.05	0.026	Non-Parametric Prediction Limit						
		Thallium (mg/L)	n/a	n/a	0.002	0.0005	Non-Parametric Prediction Limit						
		Radium - 226 (pCi/L)	n/a	n/a	n/a	n/a	n/a						
		Radium - 228 (pCi/L)	n/a	n/a	n/a	n/a	n/a						
		Combined Radium (pCi/L)	n/a	n/a	5	8.09	Shewhart-Cusum Control Chart						
		Fluoride* (mg/L)	<0.6	0.618	4	2.831	Shewhart-Cusum Control Chart						

	Appendix D – 2018 Results and Statistical Limits - MW-3													
MW-ID	CFR 257 Appendix	Constituent	June 2018 Lab Result	December 2018 Lab Result	MCL	Statistical Limit	Statistical Method							
		Boron (mg/L)	1.13	1.08	n/a	1.2	Non-Parametric Prediction Limit							
		Calcium (mg/L)	526	327	n/a	688.1	Shewhart-Cusum Control Chart							
		Chloride (mg/L)	396	206	n/a	606.9	Shewhart-Cusum Control Chart							
	ш	pH at 25°C	6.76	6.61	n/a	5.71 - 8.09	Parametric Prediction Limit							
		Sulfate (mg/L)	3160	1790	n/a	4447	Shewhart-Cusum Control Chart							
		TDS (mg/L)	6090	6300	n/a	9375	Shewhart-Cusum Control Chart							
		Fluoride* (mg/L)	<0.3	0.662	4	2.201	Shewhart-Cusum Control Chart							
		Antimony (mg/L)	n/a	n/a	0.006	0.001	Non-Parametric Prediction Limit							
		Arsenic (mg/L)	n/a	n/a	0.01	0.0061	Non-Parametric Prediction Limit							
		Barium (mg/L)	n/a	n/a	2	0.3241	Shewhart-Cusum Control Chart							
		Beryllium (mg/L)	n/a	n/a	0.004	0.001	Non-Parametric Prediction Limit							
NA14/ 2		Cadmium (mg/L)	n/a	n/a	0.005	0.002	Non-Parametric Prediction Limit							
10100-5		Chromium (mg/L)	n/a	n/a	0.1	0.005	Non-Parametric Prediction Limit							
		Cobalt (mg/L)	n/a	n/a	n/a	0.02018	Shewhart-Cusum Control Chart							
		Lead (mg/L)	n/a	n/a	0.015	0.01	Non-Parametric Prediction Limit							
	IV	Lithium (mg/L)	n/a	n/a	n/a	2.336	Shewhart-Cusum Control Chart							
		Mercury (mg/L)	n/a	n/a	0.002	0.0002	Non-Parametric Prediction Limit							
		Molybdenum (mg/L)	n/a	n/a	n/a	0.02	Non-Parametric Prediction Limit							
		Selenium (mg/L)	n/a	n/a	0.05	0.02	Non-Parametric Prediction Limit							
		Thallium (mg/L)	n/a	n/a	0.002	0.0005	Non-Parametric Prediction Limit							
		Radium - 226 (pCi/L)	n/a	n/a	n/a	n/a	n/a							
		Radium - 228 (pCi/L)	n/a	n/a	n/a	n/a	n/a							
		Combined Radium (pCi/L)	n/a	n/a	5	11.97	Shewhart-Cusum Control Chart							
		Fluoride* (mg/L)	<0.3	0.662	4	2.201	Shewhart-Cusum Control Chart							

	Appendix D –2018 Results and Statistical Limits - BW-1												
MW-ID	CFR 257 Appendix	Constituent	June 2018 Lab Result	December 2018 Lab Result	MCL	Statistical Limit	Statistical Method						
		Boron (mg/L)	3.31	3.25	n/a	6.787	Shewhart-Cusum Control Chart						
		Calcium (mg/L)	610	637	n/a	723.7	Shewhart-Cusum Control Chart						
		Chloride (mg/L)	1200	1120	n/a	1540	Shewhart-Cusum Control Chart						
		pH at 25°C	7.22	7.1	n/a	6.8 - 9.5	Non-Parametric Prediction Limit						
		Sulfate (mg/L)	3030	2780	n/a	3884	Shewhart-Cusum Control Chart						
		TDS (mg/L)	6640	6400	n/a	10119	Shewhart-Cusum Control Chart						
		Fluoride* (mg/L)	<0.3	0.586	4	2.356	Shewhart-Cusum Control Chart						
		Antimony (mg/L)	n/a	n/a	0.006	0.001	Non-Parametric Prediction Limit						
		Arsenic (mg/L)	n/a	n/a	0.01	0.02645	Shewhart-Cusum Control Chart						
		Barium (mg/L)	n/a	n/a	2	0.4562	Shewhart-Cusum Control Chart						
		Beryllium (mg/L)	n/a	n/a	0.004	0.001	Non-Parametric Prediction Limit						
D\A/ 1		Cadmium (mg/L)	n/a	n/a	0.005	0.002	Non-Parametric Prediction Limit						
DVV-1		Chromium (mg/L)	n/a	n/a	0.1	0.02912	Shewhart-Cusum Control Chart						
		Cobalt (mg/L)	n/a	n/a	n/a	0.04052	Shewhart-Cusum Control Chart						
		Lead (mg/L)	n/a	n/a	0.015	0.0091	Non-Parametric Prediction Limit						
	IV	Lithium (mg/L)	n/a	n/a	n/a	0.9244	Shewhart-Cusum Control Chart						
		Mercury (mg/L)	n/a	n/a	0.002	0.0002	Non-Parametric Prediction Limit						
		Molybdenum (mg/L)	n/a	n/a	n/a	0.022	Non-Parametric Prediction Limit						
		Selenium (mg/L)	n/a	n/a	0.05	0.02	Non-Parametric Prediction Limit						
		Thallium (mg/L)	n/a	n/a	0.002	0.00073	Non-Parametric Prediction Limit						
		Radium - 226 (pCi/L)	n/a	n/a	n/a	n/a	n/a						
		Radium - 228 (pCi/L)	n/a	n/a	n/a	n/a	n/a						
		Combined Radium (pCi/L)	n/a	n/a	5	9.354	Shewhart-Cusum Control Chart						
		Fluoride* (mg/L)	<0.3	0.586	4	2.356	Shewhart-Cusum Control Chart						

## APPENDIX E

### 2018 STATISTICAL ANALYSIS GRAPHS



Constituent: Boron Analysis Run 1/4/2019 11:03 AM Sandy Creek Energy Station Client: Sandy Creek Data: Sandy Creek GWdata (Sanitas)\_1.4.2019

mg/L



Constituent: Calcium Analysis Run 1/4/2019 11:03 AM Sandy Creek Energy Station Client: Sandy Creek Data: Sandy Creek GWdata (Sanitas)\_1.4.2019

mg/L





Constituent: Chloride Analysis Run 1/4/2019 11:03 AM Sandy Creek Energy Station Client: Sandy Creek Data: Sandy Creek GWdata (Sanitas)\_1.4.2019

Sanitas<sup>™</sup> v.9.5.32 Software licensed to SCS Engineers. UG Hollow symbols indicate censored values.





Constituent: Fluoride Analysis Run 1/4/2019 11:03 AM Sandy Creek Energy Station Client: Sandy Creek Data: Sandy Creek GWdata (Sanitas)\_1.4.2019

mg/L





Std Units



Constituent: Sulfate Analysis Run 1/4/2019 11:03 AM Sandy Creek Energy Station Client: Sandy Creek Data: Sandy Creek GWdata (Sanitas)\_1.4.2019



Constituent: Total Dissolved Solids Analysis Run 1/4/2019 11:03 AM Sandy Creek Energy Station Client: Sandy Creek Data: Sandy Creek GWdata (Sanitas)\_1.4.2019

0

12/14/15

7/20/16

2/24/17

#### Within Limit

## Prediction Limit

Intrawell Non-parametric



mg/L

Non-parametric test used in lieu of parametric prediction limit because the Shapiro Wilk normality test showed the data to be non-normal at the 0.05 alpha level. Limit is highest of 8 background values. Report alpha = 0.1111. Most recent point compared to limit. Insufficient data to test for seasonality: data were not deseasonalized.

5/8/18

12/13/18

10/1/17

Constituent: Boron Analysis Run 1/4/2019 11:10 AM Sandy Creek Energy Station Client: Sandy Creek Data: Sandy Creek GWdata (Sanitas)\_1.4.2019 440

220

0

12/14/15

7/20/16

2/24/17

#### Within Limit

## Prediction Limit

Intrawell Non-parametric



mg/L

Limit = 1030

Non-parametric test used in lieu of parametric prediction limit because the Shapiro Wilk normality test showed the data to be non-normal at the 0.05 alpha level. Limit is highest of 8 background values. Report alpha = 0.1111. Most recent point compared to limit. Insufficient data to test for seasonality: data were not deseasonalized.

5/8/18

12/13/18

10/1/17

Constituent: Calcium Analysis Run 1/4/2019 11:10 AM Sandy Creek Energy Station Client: Sandy Creek Data: Sandy Creek GWdata (Sanitas)\_1.4.2019

#### Within Limit

## **Prediction Limit**

Intrawell Non-parametric



Non-parametric test used in lieu of parametric prediction limit because the Shapiro Wilk normality test showed the data to be non-normal at the 0.05 alpha level. Limit is highest of 8 background values. Report alpha = 0.1111. Most recent point compared to limit. Insufficient data to test for seasonality: data were not deseasonalized.

Constituent: Chloride Analysis Run 1/4/2019 11:11 AM Sandy Creek Energy Station Client: Sandy Creek Data: Sandy Creek GWdata (Sanitas)\_1.4.2019 Sanitas<sup>™</sup> v.9.5.32 Software licensed to SCS Engineers. EPA Hollow symbols indicate censored values.

**Exceeds** Limit

### **Prediction Limit**

Intrawell Non-parametric



Non-parametric test used in lieu of parametric prediction limit because censored data exceeded 50%. Limit is highest of 8 background values. 75% NDs. Report alpha = 0.1111. Most recent point compared to limit. Insufficient data to test for seasonality: data were not deseasonalized.

Constituent: Fluoride Analysis Run 1/4/2019 11:14 AM Sandy Creek Energy Station Client: Sandy Creek Data: Sandy Creek GWdata (Sanitas)\_1.4.2019

#### Within Limits

# Prediction Limit



Background Data Summary: Mean=7.213, Std. Dev.=0.29, n=8. Insufficient data to test for seasonality: data were not deseasonalized. Normality test: Shapiro Wilk @alpha = 0.05, calculated = 0.9179, critical = 0.818. Report alpha = 0.01. Most recent point compared to limit.

Constituent: pH Analysis Run 1/4/2019 11:12 AM Sandy Creek Energy Station Client: Sandy Creek Data: Sandy Creek GWdata (Sanitas)\_1.4.2019



Background Data Summary: Mean=2284, Std. Dev.=223.7, n=8. Insufficient data to test for seasonality: data were not deseasonalized. Normality test: Shapiro Wilk @alpha = 0.05, calculated = 0.9231, critical = 0.818. Report alpha = 0.006982. Dates ending 8/24/2017 used for control stats. Standardized h=5, SCL=4.5.

Constituent: Sulfate Analysis Run 1/4/2019 11:13 AM Sandy Creek Energy Station Client: Sandy Creek Data: Sandy Creek GWdata (Sanitas)\_1.4.2019



Background Data Summary: Mean=4153, Std. Dev.=522.5, n=8. Insufficient data to test for seasonality: data were not deseasonalized. Normality test: Shapiro Wilk @alpha = 0.05, calculated = 0.8305, critical = 0.818. Report alpha = 0.006982. Dates ending 8/24/2017 used for control stats. Standardized h=5, SCL=4.5.

Constituent: Total Dissolved Solids Analysis Run 1/4/2019 11:13 AM Sandy Creek Energy Station Client: Sandy Creek Data: Sandy Creek GWdata (Sanitas)\_1.4.2019

#### **Exceeds** Limit

## Prediction Limit





Non-parametric test used in lieu of parametric prediction limit because the Shapiro Wilk normality test showed the data to be non-normal at the 0.05 alpha level. Limit is highest of 8 background values. Report alpha = 0.1111. Most recent point compared to limit. Insufficient data to test for seasonality: data were not deseasonalized.

Constituent: Boron Analysis Run 1/4/2019 11:17 AM Sandy Creek Energy Station Client: Sandy Creek Data: Sandy Creek GWdata (Sanitas)\_1.4.2019



Background Data Summary: Mean=651.3, Std. Dev.=44.62, n=8. Insufficient data to test for seasonality: data were not deseasonalized. Normality test: Shapiro Wilk @alpha = 0.05, calculated = 0.9396, critical = 0.818. Report alpha = 0.006982. Dates ending 8/24/2017 used for control stats. Standardized h=5, SCL=4.5.

Constituent: Calcium Analysis Run 1/4/2019 11:18 AM Sandy Creek Energy Station Client: Sandy Creek Data: Sandy Creek GWdata (Sanitas)\_1.4.2019



Background Data Summary: Mean=2269, Std. Dev.=213.4, n=8. Insufficient data to test for seasonality: data were not deseasonalized. Normality test: Shapiro Wilk @alpha = 0.05, calculated = 0.9324, critical = 0.818. Report alpha = 0.006982. Dates ending 8/24/2017 used for control stats. Standardized h=5, SCL=4.5.

Constituent: Chloride Analysis Run 1/4/2019 11:19 AM Sandy Creek Energy Station Client: Sandy Creek Data: Sandy Creek GWdata (Sanitas)\_1.4.2019 Sanitas™ v.9.5.32 Software licensed to SCS Engineers. EPA Hollow symbols indicate censored values.



Background Data Summary (after Cohen's Adjustment): Mean=0.5048, Std. Dev.=0.4652, n=8, 25% NDs. Insufficient data to test for seasonality: data were not deseasonalized. Normality test: Shapiro Wilk @alpha = 0.05, calculated = 0.8855, critical = 0.818. Report alpha = 0.006982. Dates ending 8/24/2017 used for control stats. Standardized h=5, SCL=4.5.

Constituent: Fluoride Analysis Run 1/4/2019 11:21 AM Sandy Creek Energy Station Client: Sandy Creek Data: Sandy Creek GWdata (Sanitas) 1.4.2019

#### Within Limits

## Prediction Limit



Intrawell Non-parametric

Non-parametric test used in lieu of parametric prediction limit because the Shapiro Wilk normality test showed the data to be non-normal at the 0.05 alpha level. Limits are highest and lowest of 8 background values. Report alpha = 0.2222. Most recent point compared to limit. Insufficient data to test for seasonality: data were not deseasonalized.

Constituent: pH Analysis Run 1/4/2019 11:20 AM Sandy Creek Energy Station Client: Sandy Creek Data: Sandy Creek GWdata (Sanitas)\_1.4.2019



Background Data Summary (based on square root transformation): Mean=55.12, Std. Dev.=2.592, n=8. Insufficient data to test for seasonality: data were not deseasonalized. Normality test: Shapiro Wilk @alpha = 0.05, calculated = 0.8189, critical = 0.818. Report alpha = 0.006982. Dates ending 8/24/2017 used for control stats. Standardized h=5, SCL=4.5.

Constituent: Sulfate Analysis Run 1/4/2019 11:20 AM Sandy Creek Energy Station Client: Sandy Creek Data: Sandy Creek GWdata (Sanitas)\_1.4.2019



Background Data Summary (based on natural log transformation): Mean=9.163, Std. Dev.=0.1844, n=8. Insufficient data to test for seasonality: data were not deseasonalized. Normality test: Shapiro Wilk @alpha = 0.05, calculated = 0.833, critical = 0.818. Report alpha = 0.006982. Dates ending 8/24/2017 used for control stats. Standardized h=5, SCL=4.5.

Constituent: Total Dissolved Solids Analysis Run 1/4/2019 11:21 AM Sandy Creek Energy Station Client: Sandy Creek Data: Sandy Creek GWdata (Sanitas)\_1.4.2019
#### Within Limit

# Prediction Limit

Intrawell Non-parametric



Non-parametric test used in lieu of parametric prediction limit because the Shapiro Wilk normality test showed the data to be non-normal at the 0.05 alpha level. Limit is highest of 8 background values. Report alpha = 0.1111. Most recent point compared to limit. Insufficient data to test for seasonality: data were not deseasonalized.

Constituent: Boron Analysis Run 1/4/2019 11:24 AM Sandy Creek Energy Station Client: Sandy Creek Data: Sandy Creek GWdata (Sanitas)\_1.4.2019



Background Data Summary (based on cube transformation): Mean=9.7e7, Std. Dev.=4.6e7, n=8. Insufficient data to test for seasonality: data were not deseasonalized. Normality test: Shapiro Wilk @alpha = 0.05, calculated = 0.828, critical = 0.818. Report alpha = 0.006982. Dates ending 8/24/2017 used for control stats. Standardized h=5, SCL=4.5.

Constituent: Calcium Analysis Run 1/4/2019 11:25 AM Sandy Creek Energy Station Client: Sandy Creek Data: Sandy Creek GWdata (Sanitas)\_1.4.2019



Background Data Summary (based on square transformation): Mean=99968, Std. Dev.=53670, n=8. Insufficient data to test for seasonality: data were not deseasonalized. Normality test: Shapiro Wilk @alpha = 0.05, calculated = 0.8926, critical = 0.818. Report alpha = 0.006982. Dates ending 8/24/2017 used for control stats. Standardized h=5, SCL=4.5.

Constituent: Chloride Analysis Run 1/4/2019 11:27 AM Sandy Creek Energy Station Client: Sandy Creek Data: Sandy Creek GWdata (Sanitas)\_1.4.2019 Sanitas™ v.9.5.32 Software licensed to SCS Engineers. EPA Hollow symbols indicate censored values.



Background Data Summary (after Cohen's Adjustment): Mean=0.3213, Std. Dev.=0.376, n=8, 50% NDs. Insufficient data to test for seasonality: data were not deseasonalized. Normality test: Shapiro Wilk @alpha = 0.05, calculated = 0.8281, critical = 0.818. Report alpha = 0.006982. Dates ending 8/24/2017 used for control stats. Standardized h=5, SCL=4.5.

Constituent: Fluoride Analysis Run 1/4/2019 11:37 AM Sandy Creek Energy Station Client: Sandy Creek Data: Sandy Creek GWdata (Sanitas) 1.4.2019

mg/L

#### Within Limits

# Prediction Limit



Background Data Summary: Mean=6.9, Std. Dev.=0.3207, n=8. Insufficient data to test for seasonality: data were not deseasonalized. Normality test: Shapiro Wilk @alpha = 0.05, calculated = 0.8729, critical = 0.818. Report alpha = 0.01. Most recent point compared to limit.

Constituent: pH Analysis Run 1/4/2019 11:27 AM Sandy Creek Energy Station Client: Sandy Creek Data: Sandy Creek GWdata (Sanitas)\_1.4.2019



Background Data Summary (based on square transformation): Mean=5184141, Std. Dev.=2918787, n=8. Insufficient data to test for seasonality: data were not deseasonalized. Normality test: Shapiro Wilk @alpha = 0.05, calculated = 0.9173, critical = 0.818. Report alpha = 0.006982. Dates ending 8/24/2017 used for control stats. Standardized h=5, SCL=4.5.

Constituent: Sulfate Analysis Run 1/4/2019 11:32 AM Sandy Creek Energy Station Client: Sandy Creek Data: Sandy Creek GWdata (Sanitas)\_1.4.2019



Background Data Summary (based on square transformation): Mean=2.4e7, Std. Dev.=1.3e7, n=8. Insufficient data to test for seasonality: data were not deseasonalized. Normality test: Shapiro Wilk @alpha = 0.05, calculated = 0.8631, critical = 0.818. Report alpha = 0.006982. Dates ending 8/24/2017 used for control stats. Standardized h=5, SCL=4.5.

Constituent: Total Dissolved Solids Analysis Run 1/4/2019 11:35 AM Sandy Creek Energy Station Client: Sandy Creek Data: Sandy Creek GWdata (Sanitas)\_1.4.2019



Background Data Summary: Mean=3.263, Std. Dev.=0.705, n=8. Insufficient data to test for seasonality: data were not deseasonalized. Normality test: Shapiro Wilk @alpha = 0.05, calculated = 0.8884, critical = 0.818. Report alpha = 0.006982. Dates ending 8/24/2017 used for control stats. Standardized h=5, SCL=4.5.

Constituent: Boron Analysis Run 1/4/2019 11:39 AM Sandy Creek Energy Station Client: Sandy Creek Data: Sandy Creek GWdata (Sanitas)\_1.4.2019



Background Data Summary: Mean=541.6, Std. Dev.=36.41, n=8. Insufficient data to test for seasonality: data were not deseasonalized. Normality test: Shapiro Wilk @alpha = 0.05, calculated = 0.887, critical = 0.818. Report alpha = 0.006982. Dates ending 8/24/2017 used for control stats. Standardized h=5, SCL=4.5.

Constituent: Calcium Analysis Run 1/4/2019 11:41 AM Sandy Creek Energy Station Client: Sandy Creek Data: Sandy Creek GWdata (Sanitas)\_1.4.2019



Background Data Summary (based on square transformation): Mean=1087101, Std. Dev.=257064, n=8. Insufficient data to test for seasonality: data were not deseasonalized. Normality test: Shapiro Wilk @alpha = 0.05, calculated = 0.8544, critical = 0.818. Report alpha = 0.006982. Dates ending 8/24/2017 used for control stats. Standardized h=5, SCL=4.5.

Constituent: Chloride Analysis Run 1/4/2019 11:42 AM Sandy Creek Energy Station Client: Sandy Creek Data: Sandy Creek GWdata (Sanitas)\_1.4.2019 Sanitas<sup>™</sup> v.9.5.32 Software licensed to SCS Engineers. EPA Hollow symbols indicate censored values.



Background Data Summary (after Cohen's Adjustment): Mean=0.4018, Std. Dev.=0.3908, n=8, 37.5% NDs. Insufficient data to test for seasonality: data were not deseasonalized. Normality test: Shapiro Wilk @alpha = 0.05, calculated = 0.8478, critical = 0.818. Report alpha = 0.006982. Dates ending 8/24/2017 used for control stats. Standardized h=5, SCL=4.5.

Constituent: Fluoride Analysis Run 1/4/2019 11:45 AM Sandy Creek Energy Station Client: Sandy Creek Data: Sandy Creek GWdata (Sanitas)\_1.4.2019

#### Within Limits

# **Prediction Limit**

Intrawell Non-parametric



Non-parametric test used in lieu of parametric prediction limit because the Shapiro Wilk normality test showed the data to be non-normal at the 0.05 alpha level. Limits are highest and lowest of 8 background values. Report alpha = 0.2222. Most recent point compared to limit. Insufficient data to test for seasonality: data were not deseasonalized.

Constituent: pH Analysis Run 1/4/2019 11:43 AM Sandy Creek Energy Station Client: Sandy Creek Data: Sandy Creek GWdata (Sanitas)\_1.4.2019



Background Data Summary: Mean=2574, Std. Dev.=262.1, n=8. Insufficient data to test for seasonality: data were not deseasonalized. Normality test: Shapiro Wilk @alpha = 0.05, calculated = 0.8672, critical = 0.818. Report alpha = 0.006982. Dates ending 8/24/2017 used for control stats. Standardized h=5, SCL=4.5.

Constituent: Sulfate Analysis Run 1/4/2019 11:44 AM Sandy Creek Energy Station Client: Sandy Creek Data: Sandy Creek GWdata (Sanitas)\_1.4.2019



Background Data Summary: Mean=6403, Std. Dev.=743.2, n=8. Insufficient data to test for seasonality: data were not deseasonalized. Normality test: Shapiro Wilk @alpha = 0.05, calculated = 0.8391, critical = 0.818. Report alpha = 0.006982. Dates ending 8/24/2017 used for control stats. Standardized h=5, SCL=4.5.

Constituent: Total Dissolved Solids Analysis Run 1/4/2019 11:45 AM Sandy Creek Energy Station Client: Sandy Creek Data: Sandy Creek GWdata (Sanitas)\_1.4.2019

# APPENDIX F DECEMBER 2018 ALTERNATE SOURCE DEMONSTRATIONS: FLUORIDE IN MW-1 BORON IN MW-2

# SCS ENGINEERS

January 31, 2019 SCS Project 16215106.00

Mr. Darryl Sparks Compliance Manager NAES Corporation 2161 Rattlesnake Road Riesel, Texas 76682

Subject: Alternate Source Demonstration for Fluoride in MW-1 and Boron in MW-2 2018 Annual Groundwater Monitoring and Corrective Action Report Sandy Creek Energy Station McLennan County, Texas

Dear Mr. Sparks:

On behalf of the Sandy Creek Energy Station (SCES), SCS Engineers (SCS) is submitting this Alternate Source Demonstration (ASD) in accordance with the site Groundwater Sampling and Analysis Plan (GWSAP) prepared by SCS, dated March 2, 2016, and Coal Combustion Residual Rule (CCR) 40 CFR §257.94(e)(2) for fluoride and boron detections in groundwater monitoring wells MW-1 and MW-2, respectively. During the December 2018 groundwater monitoring event, fluoride was detected in MW-1 at 0.585 mg/L, and boron was detected in MW-2 at 2.58 mg/L. These ASDs are being submitted to demonstrate that the fluoride and boron detections likely result from natural variation in groundwater quality at the site, and are not indicative of impacts from the SCES landfill. In accordance with 40 CFR §257.94(e)(2), these ASDs are being submitted within 90 days of detecting an unconfirmed statistically significant increase (SSI) above background values.

#### Project Background

SCES is a pulverized coal-fired electric generation facility which operates a landfill for disposal of dry scrubber ash and bottom ash generated during the coal combustion process at the facility. Incidental wastes generated during the operation of the facility may also be disposed in the landfill, as described in the initial registration notification to TCEQ and the most recent version of the Operations Plan for the facility. The landfill is currently comprised of two CCR disposal cells, Cells 1 and 2, which commenced receiving waste in early 2013 and October 2014, respectively. The approximate area of Cells 1 and 2 are 10.0 and 14.3 acres, respectively.

In accordance with 40 CFR §257 Appendix III and IV, the list of constituents for monitoring at SCES includes 18 inorganic compounds, total dissolved solids, radium-226, and radium-228. Currently, all monitoring wells are sampled and analyzed for 40 CFR §257 Appendix III constituents, in accordance with 40 CFR §257.94(a).

#### **December 2018 Fluoride and Boron Detections**

Fluoride (0.585 mg/L) and boron (2.58 mg/L) were detected in MW-1 and MW-2, respectively, during the December 2018 semiannual groundwater monitoring event.



Mr. Darryl Sparks January 31, 2019 Page 2

#### Naturally Occurring Fluoride and Boron in Texas Soils

The Texas Commission on Environmental Quality (TCEQ) Texas-Specific Soil Background Concentration (TSBC) for boron is 30 mg/kg (equivalent mg/L) in soil (see attached TCEQ TSBC guidance). The TCEQ TSBC for fluoride is 190 mg/kg. We note that these naturally-occurring median boron and fluoride concentrations expected in Texas soils are more than an order of magnitude greater than the concentrations that are the subject of this ASD, detected in groundwater on December 13, 2018.

#### **Statistical Analysis**

Initial statistical analysis of fluoride in MW-1 and boron in MW-2 included the use of non-parametric prediction limits, using background data collected from only each respective monitoring well. This test is appropriate because the background data pools for fluoride in MW-1 boron in MW-2 are each nonnormally distributed. Therefore, the intrawell statistical limit for each constituent-well pair is represented as the highest of the eight background values from fluoride in MW-1 and boron in MW-2 (see "Intrawell Limit" in Table 1).

Since the December 2018 laboratory results for fluoride in MW-1 and boron in MW-2 exceeded their respective intrawell limits, additional statistical evaluation was performed in accordance with 40 CFR §257.94(e)(2). This additional analysis consisted of calculating interwell parametric prediction limits (see "Interwell Limit" in Table 1 and attachments). This test is commonly used to provide a comparison between a detection in a downgradient monitoring well and a statistical limit derived from background data from one or more upgradient monitoring wells. If the detection falls below the interwell statistical limit, it can be inferred that the detection likely resulted from natural variations in groundwater quality at the site.

MW- ID	Constituent	Lab Result	Intrawell Limit	Interwell Limit
MW-1	Fluoride	0.585	0.4	1.187
MW-2	Boron	2.58	2.4	4.679

Table 1 – December 2018 Unconfirmed SSIs (mg/L)

#### Conclusion

As a result of this analysis comparing upgradient to downgradient data, the interwell statistical limits were raised above the December 2018 laboratory results for fluoride in MW-1 and boron in MW-2, respectively. The constituents appear to be coming from a non-landfill, upgradient source, so no further action is recommended. The detections are most likely a naturally-derived component of the site geology, which can result in a natural variation in groundwater quality.

Mr. Darryl Sparks January 31, 2019 Page 3

#### Closing

Attached are the interwell statistical graphs and data, as well as the ANOVA calculations demonstrating a lack of significant spatial variation of the constituents between upgradient and downgradient wells.

SCS recommends that the facility remain in detection monitoring, in accordance with 40 CFR §257.94, as these ASDs satisfy the 90-day demonstration period requirement outlined in 40 CFR §257.94(e)(2). Please contact Jim Lawrence at (817) 358-6106 if you have comments or require additional information.

Sincerely,

Doug Steen Staff Professional SCS ENGINEERS TBPE Registration No. F-3407

Attachments:

Dayle P Str Brett Della

Brett DeVries, Ph.D., P.E. **Project Engineer** SCS ENGINEERS

James Lawrence

James Lawrence, P.G. **Project Director** SCS ENGINEERS

Interwell Statistical Graphs and Data ANOVA Calculations and Data TCEQ Texas-Specific Soil Background Concentrations Guidance



#### Within Limit

# Prediction Limit



Background Data Summary: Mean=3.263, Std. Dev.=0.705, n=8. Insufficient data to test for seasonality; not deseasonalized. Normality test: Shapiro Wilk @alpha = 0.05, calculated = 0.8884, critical = 0.818. Report alpha = 0.05. Most recent point compared to limit.

Constituent: Boron Analysis Run 1/4/2019 3:23 PM Sandy Creek Energy Station Client: Sandy Creek Data: Sandy Creek GWdata (Sanitas)\_1.4.2019

### **Prediction Limit**

Constituent: Boron (mg/L) Analysis Run 1/4/2019 3:23 PM

Sandy Creek Energy Station Client: Sandy Creek Data: Sandy Creek GWdata (Sanitas)\_1.4.2019

	MW-2	BW-1 (bg)
12/14/2015	1.9	1.8
2/25/2016	2.4	3.5
5/11/2016	2.2	4
8/16/2016	2.1	3.7
11/17/2016	1.9	2.8
2/23/2017	1.9	3.1
6/7/2017	1.9	3.8
8/24/2017	1.9	3.4
12/20/2017	2.2	
6/21/2018	1.9	
12/13/2018	2.58	

#### **Non-Parametric ANOVA**

Constituent: Boron Analysis Run 1/4/2019 3:22 PM

Sandy Creek Energy Station Client: Sandy Creek Data: Sandy Creek GWdata (Sanitas)\_1.4.2019

For observations made between 12/14/2015 and 12/13/2018, the non-parametric analysis of variance test indicates a DIFFERENCE between the medians of the groups tested at the 5% significance level. Because the calculated Kruskal-Wallis statistic is greater than the Chi-squared value, we conclude that at least one group has a significantly different median concentration of this constituent when compared to another group.

Calculated Kruskal-Wallis statistic = 7.667

Tabulated Chi-Squared value = 3.841 with 1 degree of freedom at the 5% significance level.

There were 2 groups of ties in the data, consequently the Kruskal-Wallis statistic (H) was adjusted. The adjusted statistic (H') was utilized to determine if the medians were equal. Kruskal-Wallis statistic (H) = 7.425 Adjusted Kruskal-Wallis statistic (H') = 7.667

The contrast test was performed to determine if any compliance group concentration was significantly higher than the background concentration. The contrast test indicates statistical significance in none of the compliance wells.

Contrast table:			
Well	Difference	Contrast	Significant?
MW-2	-7.125	4.299	No

The critical (contrast) value was computed with 1 degree of freedom and a 5% error level for each well comparison. (Note: In this case, with Anova indicating differences that are not reflected in the contrast test, it should be concluded that it is the median of the Background data which is significantly higher.)

Non-parametric test used in lieu of parametric anova because Levene's Equality of Variance test failed at the 0.05 alpha level.

# Non-Parametric ANOVA

Constituent: Boron (mg/L) Analysis Run 1/4/2019 3:22 PM

Sandy Creek Energy Station Client: Sandy Creek Data: Sandy Creek GWdata (Sanitas)\_1.4.2019

	BW-1 (bg)	MW-2
12/14/2015	1.8	1.9
2/25/2016	3.5	2.4
5/11/2016	4	2.2
8/16/2016	3.7	2.1
11/17/2016	2.8	1.9
2/23/2017	3.1	1.9
6/7/2017	3.8	1.9
8/24/2017	3.4	1.9
12/20/2017		2.2
6/21/2018		1.9
12/13/2018		2.58

Sanitas<sup>™</sup> v.9.5.32 Software licensed to SCS Engineers. EPA Hollow symbols indicate censored values.

Within Limit

# Prediction Limit



Background Data Summary (after Cohen's Adjustment): Mean=0.4018, Std. Dev.=0.3908, n=8, 37.5% NDs. Insufficient data to test for seasonality; not deseasonalized. Normality test: Shapiro Wilk @alpha = 0.05, calculated = 0.8478, critical = 0.818. Report alpha = 0.05. Most recent point compared to limit.

Constituent: Fluoride Analysis Run 1/4/2019 3:20 PM Sandy Creek Energy Station Client: Sandy Creek Data: Sandy Creek GWdata (Sanitas)\_1.4.2019

# **Prediction Limit**

Constituent: Fluoride (mg/L) Analysis Run 1/4/2019 3:20 PM

Sandy Creek Energy Station Client: Sandy Creek Data: Sandy Creek GWdata (Sanitas)\_1.4.2019

	MW-1	BW-1 (bg)
12/14/2015	<0.3	<0.3
2/25/2016	<0.3	0.67
5/11/2016	<0.3	0.32
8/16/2016	0.35	0.94
11/17/2016	<0.3	0.85
2/23/2017	<0.3	<0.3
6/7/2017	<0.3	<0.3
8/24/2017	0.4	0.37
12/20/2017	1.1	
6/21/2018	0.3	
12/13/2018	0.585	

### **Parametric ANOVA**

Constituent: Fluoride Analysis Run 1/4/2019 3:21 PM

Sandy Creek Energy Station Client: Sandy Creek Data: Sandy Creek GWdata (Sanitas)\_1.4.2019

For observations made between 12/14/2015 and 12/13/2018 the parametric analysis of variance test (after natural log transformation) indicates NO VARIATION at the 5% significance level. Because the calculated F statistic is less than or equal to the tabulated F statistic, the hypothesis of a single homogeneous population is accepted.

Calculated F statistic = 0.8061

Tabulated F statistic = 4.45 with 1 and 17 degrees of freedom at the 5% significance level.

#### ONE-WAY PARAMETRIC ANOVA TABLE

Source of Variation	Sum of Squares	Degrees of Freedom	Mean Squares	F
Between Groups	0.436	1	0.436	0.8061
Error Within Groups	9.195	17	0.5409	
Total	9.631	18		

The Bonferroni t-Test indicates that NO compliance well mean is significantly higher than the background (see Contrasts Table below). The critical t (contrast) value is 1.74 with 17 degrees of freedom, 1 compliance wells and a 5% error level for each well comparison.

Contrast table:			
Well	Difference	Di	Significant
MW-1	-0.3068	0.5945	No

Where the difference of a Well is greater than the critical (Di) value the hypothesis of a single population should be rejected.

The Shapiro Wilk normality test on the residuals passed after natural log transformation. Alpha = 0.05, calculated = 0.9036, critical = 0.901. Levene's Equality of Variance test passed. Calculated = 0.1807, tabulated = 4.45.

### **Parametric ANOVA**

Constituent: Fluoride (mg/L) Analysis Run 1/4/2019 3:21 PM

Sandy Creek Energy Station Client: Sandy Creek Data: Sandy Creek GWdata (Sanitas)\_1.4.2019

	MW-1	BW-1 (bg)
12/14/2015	<0.3	<0.3
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6/7/2017	<0.3	<0.3
8/24/2017	0.4	0.37
12/20/2017	1.1	
6/21/2018	0.3	
12/13/2018	0.585	

Texas-Specific Soil Background Concentrations milligrams per kilogram (mg/kg) <sup>1</sup>		
Metal	Median Background Concentration (mg/kg)	
Aluminum	30,000	
Antimony	1	
Arsenic	5.9	
Barium	300	
Beryllium	1.5	
Boron	30	
Total Chromium	30	
Cobalt	7	
Copper	15	
Fluoride	<mark>(190</mark> )	
Iron	15,000	
Lead	15	
Manganese	300	
Mercury	0.04	
Nickel	10	
Selenium	0.3	
Strontium	100	
Tin	0.9	
Titanium	2,000	
Thorium	9.3	
Vanadium	50	
Zinc	30	

<sup>1</sup> Source: "Background Geochemistry of Some Rocks, Soils, Plants, and Vegetables in the Conterminous United States", by Jon J. Connor, Hansford T. Shacklette, et al., Geological Survey Professional Paper 574-F, US Geological Survey.