January 7, 2020

New Mexico Energy, Minerals, and Natural Resources Department
Oil Conservation Division District IV
1220 South St. Francis Drive
Santa Fe, New Mexico 87505
(505) 476-3440

RE: SPACKLER SWD NO. 1 AUTHORIZATION TO INJECT SUPPLEMENTAL INFORMATION

Mr. McClure:

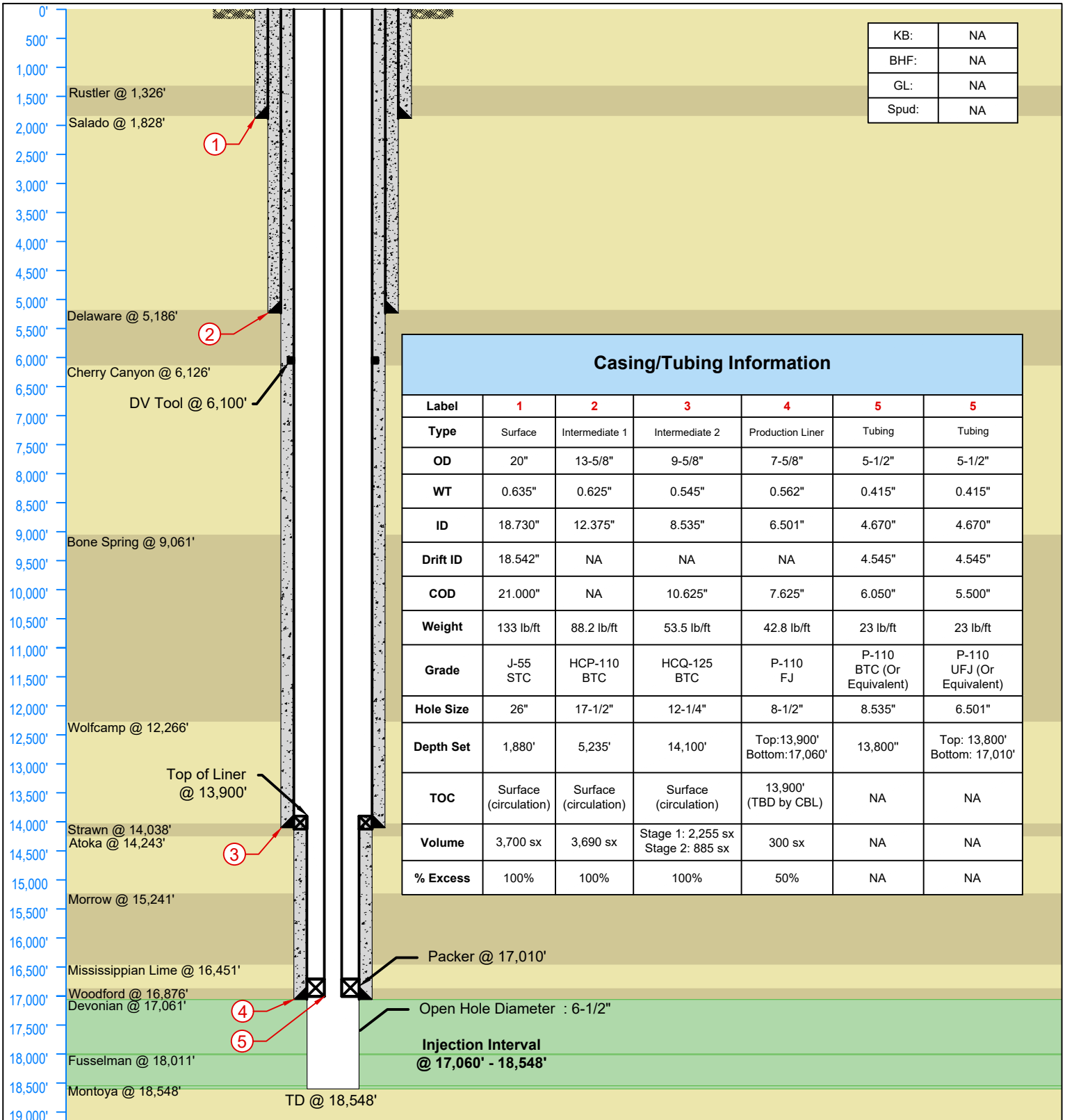
In response to your email on January 6, 2020 we are submitting the following documents to address your concerns:

- Revised Wellbore Schematic
  - Reduced interval to exclude the Montoya in the injection interval
  - Show diameter of open hole to be 6-1/2”
  - Show that a Cement Bond log will be run on the liner to determine TOC
- Revised C-108 Support Document to match changes to wellbore schematic
- Confining layer discussion and confirmation
- Signed statement fulfilling requirement XII
- Fresh water analysis performed on two wells within 1 mile of the proposed SWD

This well will be used for commercial purposes. Please do not hesitate to contact me with any further questions.

Regards,

Ramona K. Hovey
Sr. Petroleum Engineer
Lonquist & Co., LLC
(512) 600-1777
ramona@lonquist.com



KB:	NA
BHF:	NA
GL:	NA
Spud:	NA

Casing/Tubing Information

Label	1	2	3	4	5	5
Type	Surface	Intermediate 1	Intermediate 2	Production Liner	Tubing	Tubing
OD	20"	13-5/8"	9-5/8"	7-5/8"	5-1/2"	5-1/2"
WT	0.635"	0.625"	0.545"	0.562"	0.415"	0.415"
ID	18.730"	12.375"	8.535"	6.501"	4.670"	4.670"
Drift ID	18.542"	NA	NA	NA	4.545"	4.545"
COD	21.000"	NA	10.625"	7.625"	6.050"	5.500"
Weight	133 lb/ft	88.2 lb/ft	53.5 lb/ft	42.8 lb/ft	23 lb/ft	23 lb/ft
Grade	J-55 STC	HCP-110 BTC	HCQ-125 BTC	P-110 FJ	P-110 BTC (Or Equivalent)	P-110 UFJ (Or Equivalent)
Hole Size	26"	17-1/2"	12-1/4"	8-1/2"	8.535"	6.501"
Depth Set	1,880'	5,235'	14,100'	Top:13,900' Bottom:17,060'	13,800"	Top: 13,800' Bottom: 17,010'
TOC	Surface (circulation)	Surface (circulation)	Surface (circulation)	13,900' (TBD by CBL)	NA	NA
Volume	3,700 sx	3,690 sx	Stage 1: 2,255 sx Stage 2: 885 sx	300 sx	NA	NA
% Excess	100%	100%	100%	50%	NA	NA

LONQUIST & CO. LLC
PETROLEUM ENGINEERS | ENERGY ADVISORS
HOUSTON | CALGARY
AUSTIN | WICHITA | DENVER

Texas License F-9147

12912 Hill Country Blvd. Ste F-200
Austin, Texas 78738
Tel: 512.732.9812
Fax: 512.732.9816

OWL SWD Operating, LLC

Spackler SWD No. 1

Country: USA	**State/Province:** New Mexico	**County/Parish:** Lea
Section: 21	**Township & Range:** 23S, 33E	**Survey:**
API No: TBD	**Field:**	**Well Type:** SWD
Well Status: New Drill	**Project No:** 1793	**Date:** 1/7/2020
Drawn: JAM	**Reviewed:** RH	**Approved:**
Rev No: 1	**Notes:**	

OWL SWD Operating, LLC.

Spackler SWD No. 1

FORM C-108 Supplemental Information

III. Well Data

A. Wellbore Information

1.

Well information	
Lease Name	Spackler SWD
Well No.	1
Location	Unit E S-21 T-23S R-33E
Footage Location	2,484' FNL & 1,181' FWL

2.

a. Wellbore Description

Casing Information				
Type	Surface	Intermediate 1	Intermediate 2	Production Liner
OD	20"	13-5/8"	9-5/8"	7-5/8"
WT	0.635"	0.625"	0.545"	0.562"
ID	18.730"	12.375"	8.535"	6.501"
Drift ID	18.542"		8.379"	6.376"
COD	21.000"		10.625"	7.625"
Weight	133 lb/ft	88.2 lb/ft	53.5 lb/ft	42.8 lb/ft
Grade	J-55 STC	HCP-110 STC (Or Equivalent)	HCQ-125 (Or Equivalent)	P-110 UFJ (Or Equivalent)
Hole Size	26"	17-1/2"	12-1/4"	8-1/2"
Depth Set	1,880'	5,235'	14,100'	13,900' – 17,060'

Open Hole Diameter : 6-1/2"

b. Cementing Program

Cement Information				
Casing String	Surface	Intermediate 1	Production	Production Liner
Lead Cement	HALCEM	HALCEM	Stage 1: NEOCEM Stage 2: NEOCEM	
Lead Cement Volume	2,680 sks	3,145 sks	Stage 1: 1630 sks Stage 2: 785 sks	
Tail Cement	HALCEM	HALCEM	Stage 1: NEOCEM Stage 2: HALCEM	VERSACEM
Tail Cement Volume	1,020 sks	545 sks	Stage 1: 625 sks Stage 2: 100 sks	300 sks
Cement Excess	100%	100%	100%	50%
TOC	Surface	Surface	Surface	13,900’
Method	Circulate to Surface	Circulate to Surface	Circulate to Surface	Cement Bond Log

3. Tubing Description

Tubing		
OD	5-1/2”	5-1/2”
WT	0.415”	0.415”
ID	4.670”	4.670”
Drift ID	4.545”	4.545”
COD	6.050”	5.500”
Weight	23 lb/ft	23 lb/ft
Grade	P-110 BTC (Or Equivalent	P-110 UFJ (Or Equivalent
Depth Set	13,800’	13,800’-17,010’

Tubing will be lined with Duoline.

4. Packer Description

D&L Oil Tools 7-5/8” x 5-1/2” Permapack Packer – Single Bore

B. Completion Information

1. Injection Formation: Silurian - Devonian

2. Gross Injection Interval: 17,060’ – 18,548’

   Completion Type: Open Hole

3. Drilled for injection.

4. See the attached wellbore schematic.

5. Oil and Gas Bearing Zones within area of well:

Formation	Depth
Delaware	5,186’
Cherry Canyon	6,126’
Bone Spring	9,061’
Wolfcamp	12,266’
Strawn	14,038’
Atoka	14,243’
Morrow	15,241’
Devonian	17,061’

VI. Area of Review

No wells within the one-mile AOR penetrated the proposed injection zone.

VII. Proposed Operation Data

1. Proposed Daily Rate of Fluids to be Injection:

   Average Volume: 20,000 BPD
   Maximum Volume: 30,000 BPD

2. Closed System

3. Anticipated Injection Pressure:

   Average Injection Pressure: 2,559 PSI (surface pressure)
   Maximum Injection Pressure: 3,412 PSI (surface pressure)

4. The injection fluid is to be locally produced water. Attached are produced water sample analyses taken from the closest wells that feature samples from the Bone Springs and Delaware formations.

5. The Devonian Formation is productive of oil and gas in this area.

VIII. Geological Data

The Devonian formation is a dolomitic ramp carbonate that occurs below the Woodford shale and above the Fusselman formation. Strata found in the Devonian formation near Jal are two major groups, the Wristen Buildups and the Thirtyone Deepwater Chert, with the Wristen being more abundant. The Wristen Groups is composed of mixed limestone and dolomites with mudstone to grainstone and boundstone textures. Porosity in the Wristen group is a result of both primary and secondary development. Present are moldic, vugular, karstic (including collapse breccia) features that allow for higher porosities and permeabilities. The Thirtyone Formation contains two end-member reservoir facies, skeletal packstones/grainstones and spiculitic chert, with most of the porosity and permeability found in the coarsely crystalline cherty dolomite. These particular characteristics allow for this formation to be a successful Salt Water Disposal horizon.

A. Injection Zone: Devonian-Silurian Formation

Formation	**Depth**
Rustler	1,326’
Salado	1,828’
Delaware	5,186’
Cherry Canyon	6,126’
Bone Spring	9,061’
Wolfcamp	12,266’
Strawn	14,038’
Atoka	14,243’
Morrow	15,241’
Mississippian Lime	16,451’
Woodford	16,876’
Devonian	17,061’
Fusselman	18,011’
Montoya	18,548’

B. Underground Sources of Drinking Water

Water wells in the one-mile surrounding area for the proposed Spackler SWD No.1 well are at depths ranging from 550 ft to 650 ft. The Rustler may also be another USDW and will be protected through the top of the Salado Formation at 1,828’ by setting surface casing at 1,880’.

IX. Proposed Stimulation Program

No proposed stimulation program.

X. Logging and Test Data on the Well

There are no existing logs or test data on the well. During the process of drilling and completion resistivity, gamma ray, and density logs will be run.

XI. Chemical Analysis of Fresh Water Wells

There are three (3) fresh water wells within one mile of the well location, per the New Mexico Office of the State Engineer. A list of all the water wells, a map of these wells and their associated Water Right Summaries are attached. Fresh water samples will be obtained from two of the wells and analysis of these samples will be submitted as soon as possible.

XII. Affirmative Statement of Examination of Geologic and Engineering Data

Based on the available engineering and geologic data we find no evidence of open faults or any other hydrologic connection between the disposal zone and any underground sources of drinking water.

INJECTION INTERVAL CONFINING LAYERS – SPACKLER SWD NO. 1

The Devonian-Silurian injection interval for the proposed Spackler SWD No. 1 is contained by upper and lower confining layers. The upper confining layer is the Woodford Shale, which is approximately 185 feet thick on top of the Devonian Formation. The lower confining layer is the Sylvan Shale equivalent, which serves as a boundary between the Montoya and Fusselman. This shale layer provides a basal region for the injection interval of the Devonian and Fusselman formations. The low permeability nature of both the Woodford and Sylvan Shale equivalent would provide the Devonian and Fusselman formations appropriate confinement for saltwater disposal during the life of the well.

Parker Jessee
Geologist
Lonquist & Co., LLC
January 7, 2020

Project: OWL SWD Operating, LLC
Spackler SWD No. 1

GEOLOGIC AFFIRMATION

I have examined available geologic and engineering data and have found no evidence of open faults or other hydrologic connection between the disposal interval and underground sources of drinking water.

Parker Jessee
Geologist

Project: OWL SWD Operating, LLC
Spackler SWD No. 1

CARDINAL Laboratories

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

November 18, 2018

RAMONA HOVEY

Lonquist Field Services, LLC

3345 Bee Cave Road, Suite 201

Austin, TX 78746

RE: SPACKLER SWD #1

Enclosed are the results of analyses for samples received by the laboratory on 11/09/18 15:50.

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

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

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

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

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

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

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

Sincerely,

Celey D. Keene

Celey D. Keene

Lab Director/Quality Manager

CARDINAL Laboratories

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

Analytical Results For:

Lonquist Field Services, LLC 3345 Bee Cave Road, Suite 201 Austin TX, 78746	Project: SPACKLER SWD #1 Project Number: 32.290657/ -103.58221 Project Manager: RAMONA HOVEY Fax To: (512) 732-9816	Reported: 18-Nov-18 15:38

Sample ID	Laboratory ID	Matrix	Date Sampled	Date Received
C-03562 - POD1	H803269-01	Water	09-Nov-18 13:41	09-Nov-18 15:50
C-04159 - POD1	H803269-02	Water	09-Nov-18 14:09	09-Nov-18 15:50

Cardinal Laboratories

*=Accredited Analyte

Celey D. Keene, Lab Director/Quality Manager

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Lonquist Field Services, LLC 3345 Bee Cave Road, Suite 201 Austin TX, 78746	Project: SPACKLER SWD #1 Project Number: 32.290657/ -103.58221 Project Manager: RAMONA HOVEY Fax To: (512) 732-9816	Reported: 18-Nov-18 15:38

C-03562 - POD1

H803269-01 (Water)

Analyte	Result	MDL	Reporting Limit	Units	Dilution	Batch	Analyst	Analyzed	Method	Notes
Cardinal Laboratories										
Inorganic Compounds										
Alkalinity, Bicarbonate	**371**		5.00	mg/L	1	8111201	AC	12-Nov-18	310.1	
Alkalinity, Carbonate	<1.00		1.00	mg/L	1	8111201	AC	12-Nov-18	310.1	
Chloride*	**16.0**		4.00	mg/L	1	8111208	AC	13-Nov-18	4500-Cl-B	
Conductivity*	**622**		1.00	uS/cm	1	8111101	AC	12-Nov-18	120.1	
pH*	**7.87**		0.100	pH Units	1	8111101	AC	11-Nov-18	150.1	
Resistivity	**16.1**			Ohms/m	1	8111101	AC	12-Nov-18	120.1	
Specific Gravity @ 60° F	**0.9930**		0.000	[blank]	1	8111202	AC	12-Nov-18	SM 2710F	
Sulfate*	**73.2**		10.0	mg/L	1	8111306	AC	13-Nov-18	375.4	
TDS*	**377**		5.00	mg/L	1	8111001	AC	13-Nov-18	160.1	
Alkalinity, Total*	**304**		4.00	mg/L	1	8111201	AC	12-Nov-18	310.1	
Sulfide, total	<0.0100		0.0100	mg/L	1	8111205	AC	12-Nov-18	376.2	
Green Analytical Laboratories										
Total Recoverable Metals by ICP (E200.7)										
Barium*	<0.050		0.050	mg/L	1	B811129	AES	16-Nov-18	EPA200.7	
Calcium*	**19.2**		0.100	mg/L	1	B811129	AES	16-Nov-18	EPA200.7	
Iron*	**0.443**		0.050	mg/L	1	B811129	AES	16-Nov-18	EPA200.7	
Magnesium*	**27.4**		0.100	mg/L	1	B811129	AES	16-Nov-18	EPA200.7	
Potassium*	**2.95**		1.00	mg/L	1	B811129	AES	16-Nov-18	EPA200.7	
Sodium*	**74.9**		1.00	mg/L	1	B811129	AES	16-Nov-18	EPA200.7	

Cardinal Laboratories

*=Accredited Analyte

Celey D. Keene, Lab Director/Quality Manager

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Analytical Results For:

Lonquist Field Services, LLC 3345 Bee Cave Road, Suite 201 Austin TX, 78746	Project: SPACKLER SWD #1 Project Number: 32.290657/ -103.58221 Project Manager: RAMONA HOVEY Fax To: (512) 732-9816	Reported: 18-Nov-18 15:38

C-04159 - POD1

H803269-02 (Water)

Analyte	Result	MDL	Reporting Limit	Units	Dilution	Batch	Analyst	Analyzed	Method	Notes
Cardinal Laboratories										
Inorganic Compounds										
Alkalinity, Bicarbonate	**390**		5.00	mg/L	1	8111201	AC	12-Nov-18	310.1	
Alkalinity, Carbonate	<1.00		1.00	mg/L	1	8111201	AC	12-Nov-18	310.1	
Chloride*	**24.0**		4.00	mg/L	1	8111208	AC	13-Nov-18	4500-Cl-B	
Conductivity*	**622**		1.00	uS/cm	1	8111101	AC	12-Nov-18	120.1	
pH*	**8.70**		0.100	pH Units	1	8111101	AC	11-Nov-18	150.1	
Resistivity	**16.1**			Ohms/m	1	8111101	AC	12-Nov-18	120.1	
Specific Gravity @ 60° F	**1.002**		0.000	[blank]	1	8111202	AC	12-Nov-18	SM 2710F	
Sulfate*	**73.6**		10.0	mg/L	1	8111306	AC	13-Nov-18	375.4	
TDS*	**402**		5.00	mg/L	1	8111001	AC	13-Nov-18	160.1	
Alkalinity, Total*	**320**		4.00	mg/L	1	8111201	AC	12-Nov-18	310.1	
Sulfide, total	<0.0100		0.0100	mg/L	1	8111205	AC	12-Nov-18	376.2	
Green Analytical Laboratories										
Total Recoverable Metals by ICP (E200.7)										
Barium*	**0.101**		0.050	mg/L	1	B811129	AES	16-Nov-18	EPA200.7	
Calcium*	**20.8**		0.100	mg/L	1	B811129	AES	16-Nov-18	EPA200.7	
Iron*	<0.050		0.050	mg/L	1	B811129	AES	16-Nov-18	EPA200.7	
Magnesium*	**25.6**		0.100	mg/L	1	B811129	AES	16-Nov-18	EPA200.7	
Potassium*	**2.65**		1.00	mg/L	1	B811129	AES	16-Nov-18	EPA200.7	
Sodium*	**86.9**		1.00	mg/L	1	B811129	AES	16-Nov-18	EPA200.7	

Cardinal Laboratories

*=Accredited Analyte

Celey D. Keene, Lab Director/Quality Manager

CARDINAL Laboratories

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

Analytical Results For:

Lonquist Field Services, LLC 3345 Bee Cave Road, Suite 201 Austin TX, 78746	Project: SPACKLER SWD #1 Project Number: 32.290657/ -103.58221 Project Manager: RAMONA HOVEY Fax To: (512) 732-9816	Reported: 18-Nov-18 15:38

Inorganic Compounds - Quality Control

Cardinal Laboratories

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch 8111001 - Filtration										
Blank (8111001-BLK1)				Prepared: 10-Nov-18 Analyzed: 13-Nov-18						
TDS	ND	5.00	mg/L							
LCS (8111001-BS1)				Prepared: 10-Nov-18 Analyzed: 13-Nov-18						
TDS	556		mg/L	527		106	80-120			
Duplicate (8111001-DUP1)		**Source: H803267-01**		Prepared: 10-Nov-18 Analyzed: 13-Nov-18						
TDS	3040	5.00	mg/L		3200			5.07	20	
Batch 8111101 - General Prep - Wet Chem										
LCS (8111101-BS1)				Prepared: 11-Nov-18 Analyzed: 12-Nov-18						
Conductivity	506		uS/cm	500		101	80-120			
pH	7.08		pH Units	7.00		101	90-110			
Duplicate (8111101-DUP1)		**Source: H803255-01**		Prepared: 11-Nov-18 Analyzed: 12-Nov-18						
Conductivity	1930	1.00	uS/cm		1930			0.155	20	
pH	7.51	0.100	pH Units		7.45			0.802	20	
Resistivity	5.18		Ohms/m		5.18			0.155	20	
Batch 8111201 - General Prep - Wet Chem										
Blank (8111201-BLK1)				Prepared & Analyzed: 12-Nov-18						
Alkalinity, Carbonate	ND	1.00	mg/L							
Alkalinity, Bicarbonate	5.00	5.00	mg/L							
Alkalinity, Total	4.00	4.00	mg/L							

Cardinal Laboratories

*=Accredited Analyte

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Inorganic Compounds - Quality Control

Cardinal Laboratories

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch 8111201 - General Prep - Wet Chem										
LCS (8111201-BS1)				Prepared & Analyzed: 12-Nov-18						
Alkalinity, Carbonate	ND	2.50	mg/L				80-120			
Alkalinity, Bicarbonate	318	12.5	mg/L				80-120			
Alkalinity, Total	260	10.0	mg/L	250		104	80-120			
LCS Dup (8111201-BSD1)				Prepared & Analyzed: 12-Nov-18						
Alkalinity, Carbonate	ND	2.50	mg/L				80-120		20	
Alkalinity, Bicarbonate	318	12.5	mg/L				80-120	0.00	20	
Alkalinity, Total	260	10.0	mg/L	250		104	80-120	0.00	20	
Batch 8111202 - General Prep - Wet Chem										
Duplicate (8111202-DUP1)		**Source: H803269-02**		Prepared & Analyzed: 12-Nov-18						
Specific Gravity @ 60° F	1.001	0.000	[blank]		1.002			0.175	20	
Batch 8111205 - General Prep - Wet Chem										
Blank (8111205-BLK1)				Prepared & Analyzed: 12-Nov-18						
Sulfide, total	ND	0.0100	mg/L							
Duplicate (8111205-DUP1)		**Source: H803267-01**		Prepared & Analyzed: 12-Nov-18						
Sulfide, total	0.0129	0.0100	mg/L		0.0157			19.6	20	
Batch 8111208 - General Prep - Wet Chem										
Blank (8111208-BLK1)				Prepared: 12-Nov-18 Analyzed: 13-Nov-18						
Chloride	ND	4.00	mg/L							

Cardinal Laboratories

*=Accredited Analyte

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Inorganic Compounds - Quality Control

Cardinal Laboratories

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch 8111208 - General Prep - Wet Chem										
LCS (8111208-BS1)				Prepared: 12-Nov-18 Analyzed: 13-Nov-18						
Chloride	104	4.00	mg/L	100		104	80-120			
LCS Dup (8111208-BSD1)				Prepared: 12-Nov-18 Analyzed: 13-Nov-18						
Chloride	104	4.00	mg/L	100		104	80-120	0.00	20	
Batch 8111306 - General Prep - Wet Chem										
Blank (8111306-BLK1)				Prepared & Analyzed: 13-Nov-18						
Sulfate	ND	10.0	mg/L							
LCS (8111306-BS1)				Prepared & Analyzed: 13-Nov-18						
Sulfate	22.7	10.0	mg/L	20.0		114	80-120			
LCS Dup (8111306-BSD1)				Prepared & Analyzed: 13-Nov-18						
Sulfate	20.2	10.0	mg/L	20.0		101	80-120	11.5	20	

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Celey D. Keene, Lab Director/Quality Manager

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

Green Analytical Laboratories

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch B811129 - Total Rec. 200.7/200.8/200.2										
Blank (B811129-BLK1)				Prepared: 15-Nov-18 Analyzed: 16-Nov-18						
Potassium	ND	1.00	mg/L							
Magnesium	ND	0.100	mg/L							
Iron	ND	0.050	mg/L							
Calcium	ND	0.100	mg/L							
Sodium	ND	1.00	mg/L							
Barium	ND	0.050	mg/L							
LCS (B811129-BS1)				Prepared: 15-Nov-18 Analyzed: 16-Nov-18						
Iron	3.91	0.050	mg/L	4.00		97.9	85-115			
Magnesium	19.9	0.100	mg/L	20.0		99.7	85-115			
Potassium	8.04	1.00	mg/L	8.00		100	85-115			
Sodium	3.22	1.00	mg/L	3.24		99.3	85-115			
Calcium	4.08	0.100	mg/L	4.00		102	85-115			
Barium	1.94	0.050	mg/L	2.00		97.1	85-115			
LCS Dup (B811129-BSD1)				Prepared: 15-Nov-18 Analyzed: 16-Nov-18						
Calcium	4.00	0.100	mg/L	4.00		100	85-115	2.03	20	
Iron	3.86	0.050	mg/L	4.00		96.5	85-115	1.37	20	
Potassium	7.92	1.00	mg/L	8.00		99.0	85-115	1.49	20	
Sodium	3.17	1.00	mg/L	3.24		97.9	85-115	1.44	20	
Barium	1.91	0.050	mg/L	2.00		95.3	85-115	1.87	20	
Magnesium	19.8	0.100	mg/L	20.0		98.9	85-115	0.800	20	

Cardinal Laboratories

*=Accredited Analyte

Celey D. Keene, Lab Director/Quality Manager

CARDINAL Laboratories

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

Notes and Definitions

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

Cardinal Laboratories

*=Accredited Analyte

Celey D. Keene, Lab Director/Quality Manager

CARDINAL Laboratories

CHAIN-OF-CUSTODY AND ANALYSIS REQUEST

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

Company Name: OWL	**BILL TO**
Project Manager:	P.O. #:
Address:	Company:
City: State: Zip:	Attn:
Phone #: Fax #:	Address:
Project #: Project Owner:	City:
Project Name: SPACKLER SWD #1	State: Zip:
Project Location: 32.250657 / -103.58221	Phone #:
Sampler Name: Rolando Hernandez	Fax #:

FOR LAB USE ONLY				MATRIX						PRESERV.			SAMPLING		ANALYSIS REQUEST												
Lab I.D.	Sample I.D.	(G)RAB OR (C)OMP.	# CONTAINERS	GROUNDWATER	WASTEWATER	SOIL	OIL	SLUDGE	OTHER :	ACID/BASE:	ICE / COOL	OTHER :	DATE	TIME	Scale	T. Sulfide											
H803269																											
1	C-03562 - POD 1	G	3	✓							✓		11-9-18	1:41	✓	✓											
2	C-04159 - POD 1	G	3	✓							✓		11-9-18	2:09	✓	✓											

Relinquished By: R Hernandez	Date: 11-9 Time: 3:50	Received By: Tamara Oldaker	Phone Result: ☐ Yes ☐ No Add'l Phone #: Fax Result: ☐ Yes ☐ No Add'l Fax #: REMARKS: Rush!
Relinquished By:	Date: Time:	Received By:	
Delivered By: (Circle One) Sampler - UPS - Bus - Other: T.O. 5.4° #97	Sample Condition Cool ☑ Yes ☐ No Intact ☑ Yes ☐ No	CHECKED BY: (Initials) TO.	

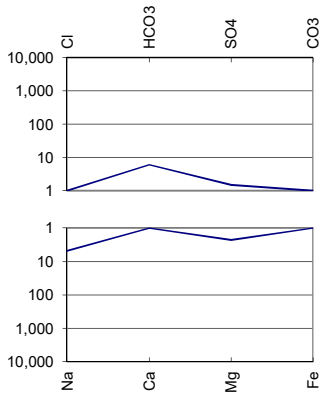
+ Cardinal cannot accept verbal changes. Please fax written changes to (575) 393-2326

CARDINAL LABORATORIES
SCALE INDEX WATER ANALYSIS REPORT

Company	:	LONQUIST FIELD SERVICES, LLC	Date Sampled	: 11/09/18
Lease Name	:	SPACKLER SWD #1	Company Rep.	: RAMONA HOVEY
Well Number	:	C-03562-POD1 (H803269-01)		
Location	:	32.290657 / -103.58221		

	ANALYSIS					
1.	pH	7.87				
2.	Specific Gravity @ 60/60 F.	0.9930				
3.	CaCO3 Saturation Index @ 80 F.	-0.595				
	@ 140 F.	+0.105	'Calcium Carbonate Scale Possible'			
	Dissolved Gasses					
4.	Hydrogen Sulfide	0.000	PPM			
5.	Carbon Dioxide	ND	PPM			
6.	Dissolved Oxygen	ND	PPM			
	Cations		/ Eq. Wt.	=	MEQ/L	
7.	Calcium (Ca++)	19.20	/ 20.1	=	0.96	
8.	Magnesium (Mg++)	27.40	/ 12.2	=	2.25	
9.	Sodium (Na+)	75	/ 23.0	=	4.82	
10.	Barium (Ba++)	0.000	/ 68.7	=	0.00	
	Anions					
11.	Hydroxyl (OH-)	0	/ 17.0	=	0.00	
12.	Carbonate (CO3=)	0	/ 30.0	=	0.00	
13.	Bicarbonate (HCO3-)	371	/ 61.1	=	6.07	
14.	Sulfate (SO4=)	73	/ 48.8	=	1.50	
15.	Chloride (Cl-)	16	/ 35.5	=	0.45	
	Other					
16.	Total Iron (Fe)	0.443	/ 18.2	=	0.02	
17.	Total Dissolved Solids	377				
18.	Total Hardness As CaCO3	161.0				
19.	Calcium Sulfate Solubility @ 90 F.	1,497				
20.	Resistivity (Measured)	16.100	Ohm/Meters	@ 77	Degrees (F)	

Logarithmic Water Pattern



PROBABLE MINERAL COMPOSITION

COMPOUND	Eq. Wt.	X	MEQ/L	=	mg/L
Ca(HCO3)2	81.04	X	0.96	=	77
CaSO4	68.07	X	0.00	=	0
CaCl2	55.50	X	0.00	=	0
Mg(HCO3)2	73.17	X	2.25	=	164
MgSO4	60.19	X	0.00	=	0
MgCl2	47.62	X	0.00	=	0
NaHCO3	84.00	X	2.87	=	241
NaSO4	71.03	X	1.50	=	107
NaCl	58.46	X	0.45	=	26

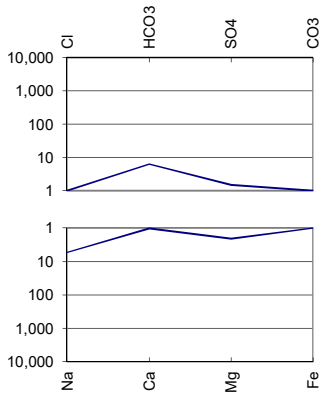
ND = Not Determined

CARDINAL LABORATORIES
SCALE INDEX WATER ANALYSIS REPORT

Company	:	LONQUIST FIELD SERVICES, LLC	Date Sampled	: 11/09/18
Lease Name	:	SPACKLER SWD #1	Company Rep.	: RAMONA HOVEY
Well Number	:	C-04159-POD1 (H803269-02)		
Location	:	32.290657 / -103.58221		

	ANALYSIS					
1.	pH	8.7				
2.	Specific Gravity @ 60/60 F.	1.0020				
3.	CaCO3 Saturation Index @ 80 F.	-0.538				
	@ 140 F.	+0.162	'Calcium Carbonate Scale Possible'			
	Dissolved Gasses					
4.	Hydrogen Sulfide	0.000	PPM			
5.	Carbon Dioxide	ND	PPM			
6.	Dissolved Oxygen	ND	PPM			
	Cations		/ Eq. Wt.	=	MEQ/L	
7.	Calcium (Ca++)	20.80	/ 20.1	=	1.03	
8.	Magnesium (Mg++)	25.60	/ 12.2	=	2.10	
9.	Sodium (Na+)	87	/ 23.0	=	5.43	
10.	Barium (Ba++)	0.101	/ 68.7	=	0.00	
	Anions					
11.	Hydroxyl (OH-)	0	/ 17.0	=	0.00	
12.	Carbonate (CO3=)	0	/ 30.0	=	0.00	
13.	Bicarbonate (HCO3-)	390	/ 61.1	=	6.38	
14.	Sulfate (SO4=)	74	/ 48.8	=	1.51	
15.	Chloride (Cl-)	24	/ 35.5	=	0.68	
	Other					
16.	Total Iron (Fe)	0.000	/ 18.2	=	0.00	
17.	Total Dissolved Solids	402				
18.	Total Hardness As CaCO3	157.0				
19.	Calcium Sulfate Solubility @ 90 F.	1,499				
20.	Resistivity (Measured)	16.100	Ohm/Meters	@ 77	Degrees (F)	

Logarithmic Water Pattern



PROBABLE MINERAL COMPOSITION

COMPOUND	Eq. Wt.	X	MEQ/L	=	mg/L
Ca(HCO3)2	81.04	X	1.03	=	84
CaSO4	68.07	X	0.00	=	0
CaCl2	55.50	X	0.00	=	0
Mg(HCO3)2	73.17	X	2.10	=	154
MgSO4	60.19	X	0.00	=	0
MgCl2	47.62	X	0.00	=	0
NaHCO3	84.00	X	3.25	=	273
NaSO4	71.03	X	1.51	=	107
NaCl	58.46	X	0.68	=	40

ND = Not Determined