

Additional Information

Updated WBD and Fluid
Analysis 6/15/20

June 15, 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: SHOLES DEEP SWD NO. 3 AUTHORIZATION TO INJECT
SUPPLEMENTAL INFORMATION**

Mr. Lamkin:

In response to your email on May 11, 2020 we are submitting the following documents to address your concerns:

- Revised Wellbore diagram to correct total depth of the well and the depth for the DV tool.
- Produced water analysis for the Kimberly SWD #1

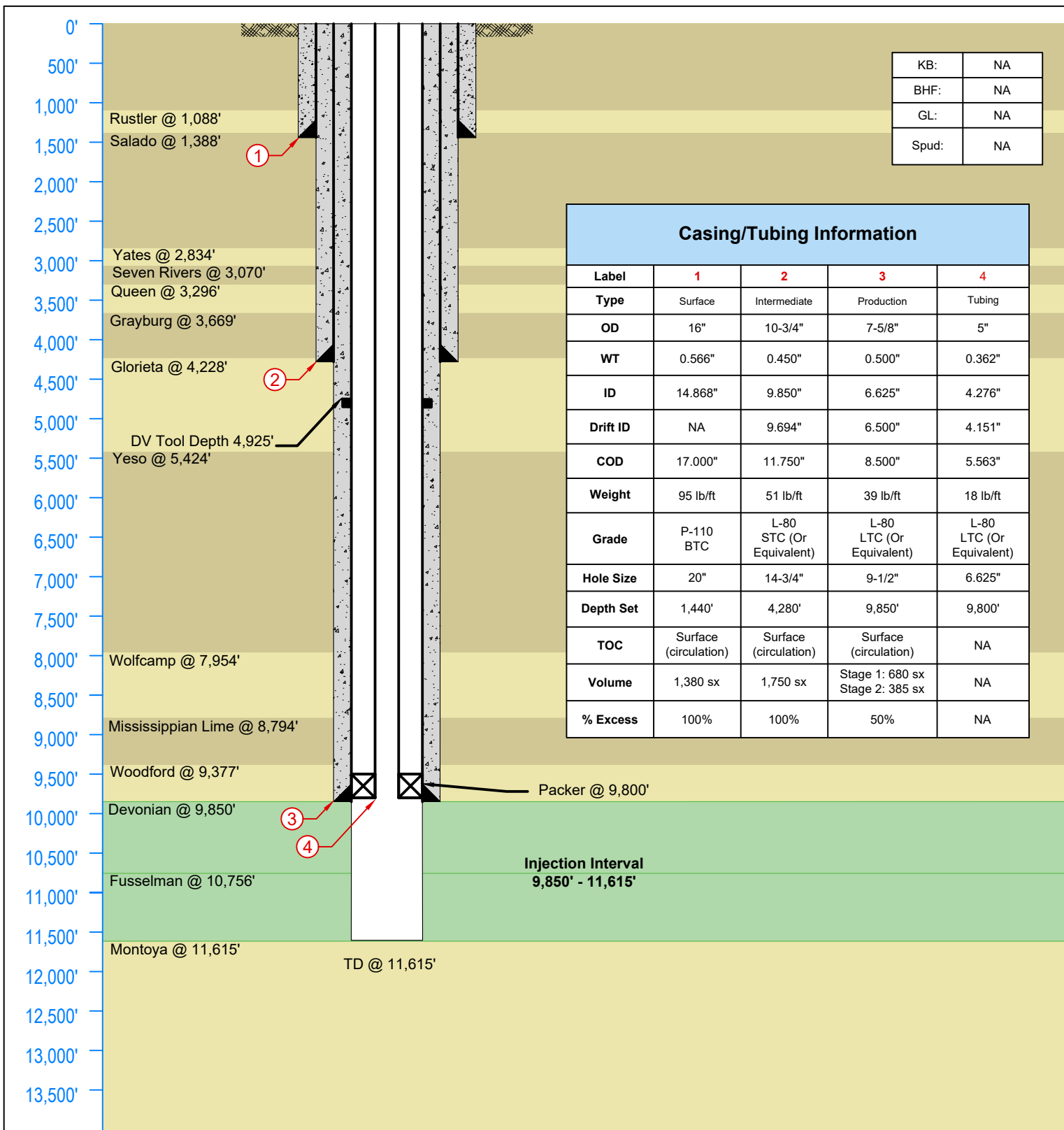
The water that is currently being injected into the Kimberly SWD #1 is representative of the anticipated injectate for the Sholes Deep SWD #3 well. This injectate is primarily produced from nearby Bone Springs and Wolfcamp wells with a small percentage from Delaware wells.

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



LONGQUIST & CO. LLC PETROLEUM ENGINEERS ENERGY ADVISORS AUSTIN • HOUSTON • CALGARY • WICHITA DENVER • COLLEGE STATION • BATON ROUGE • EDMONTON	OWL		Sholes Deep SWD No. 3	
	Country: USA		State/Province: New Mexico	County/Parish: Lea
	Location:		Site:	Survey:
	API No: NA		Field:	Well Type/Status: SWD / New Drill
	RRC District No:		Project No: 1809	Date: 5/6/2020
Texas License F-9147 12912 Hill Country Blvd. Ste F-200 Austin, Texas 78738 Tel: 512.732.9812 Fax: 512.732.9816	Drawn: JAM		Reviewed:	Approved:
	Rev No: 0		Notes:	

DownHole SAT™ Water Analysis Report



SYSTEM IDENTIFICATION

OWL
Kimberly 001 Inlet

Sample ID#: 0
ID:

Sample Date: 03-18-2020 at 1553
Report Date: 03-23-2020

WATER CHEMISTRY

CATIONS

Calcium(as Ca)	4824
Magnesium(as Mg)	638.00
Barium(as Ba)	1.00
Strontium(as Sr)	326.00
Sodium(as Na)	44812
Potassium(as K)	784.00
Lithium(as Li)	22.00
Iron(as Fe)	6.20
Manganese(as Mn)	0.900

ANIONS

Chloride(as Cl)	79498
Sulfate(as SO ₄)	597.00
Dissolved CO ₂ (as CO ₂)	170.00
Bicarbonate(as HCO ₃)	390.00
H ₂ S (as H ₂ S)	2.00
Boron(as B)	71.00

PARAMETERS

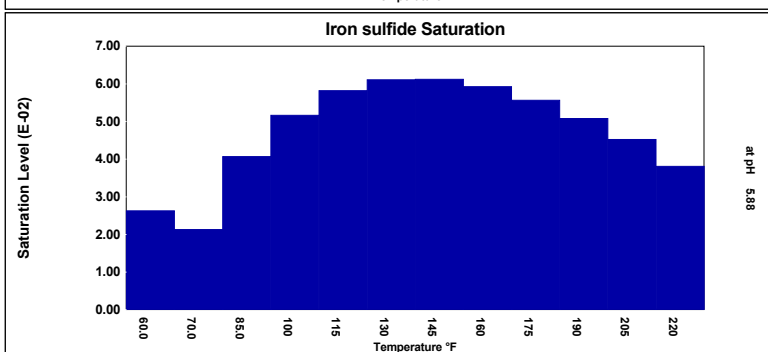
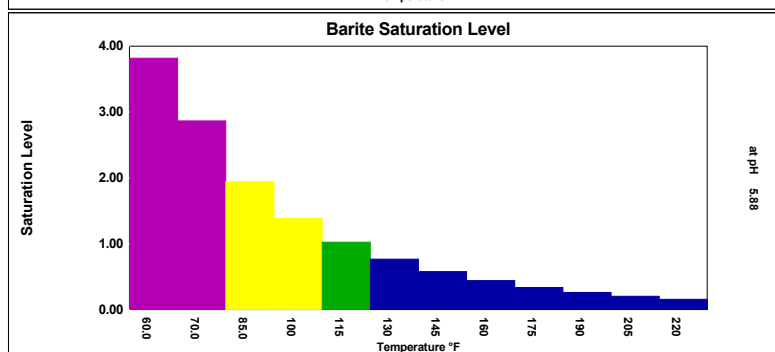
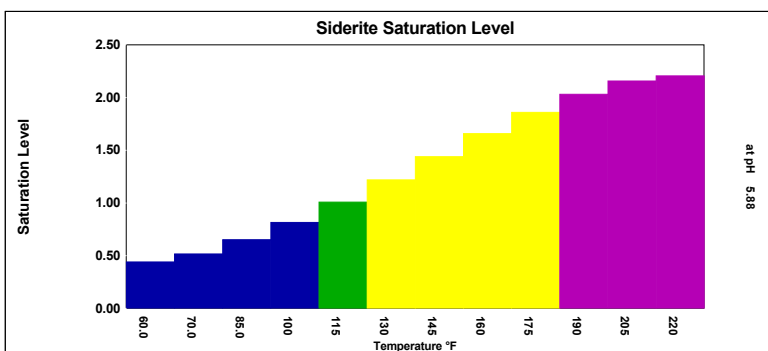
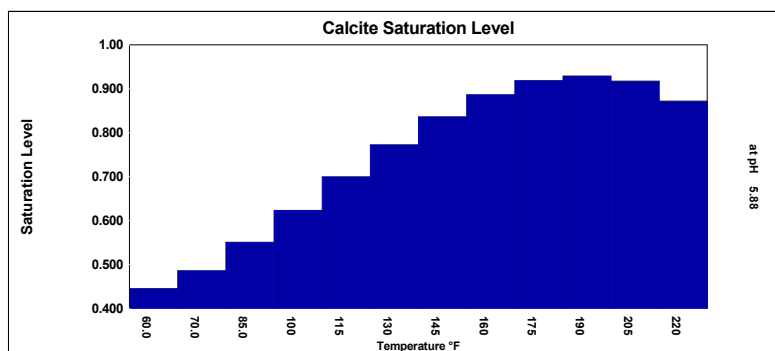
Temperature(°F)	77.00
Sample pH	5.80
Conductivity	190031
T.D.S.	129460
Resistivity	5.26
Sp.Gr.(g/mL)	1.08

Zinc(as Zn) 0.00

SCALE AND CORROSION POTENTIAL

Temp. (°F)	Press. (psig)	Calcite CaCO ₃		Anhydrite CaSO ₄		Gypsum CaSO ₄ *2H ₂ O		Barite BaSO ₄		Celestite SrSO ₄		Siderite FeCO ₃		Mackawenite FeS		CO ₂ (mpy)	pCO ₂ (atm)
60.00	0.00	0.445	-0.0156	0.251	-336.66	0.378	-215.34	3.82	0.437	0.634	-50.03	0.439	-0.0183	0.0262	-0.958	0.346	0.125
70.00	0.30	0.485	-0.0134	0.243	-341.41	0.354	-231.51	2.86	0.385	0.604	-55.24	0.516	-0.0136	0.0213	-1.04	0.585	0.128
85.00	23.80	0.550	-0.0106	0.241	-332.40	0.325	-252.18	1.94	0.287	0.580	-58.91	0.650	-0.00800	0.0407	-1.11	1.42	0.328
100.00	47.30	0.623	-0.00810	0.250	-305.85	0.304	-267.27	1.39	0.164	0.571	-59.31	0.815	-0.00351	0.0516	-1.17	2.42	0.529
115.00	70.80	0.699	-0.00596	0.271	-266.96	0.319	-242.20	1.02	0.0140	0.569	-58.60	1.01	< 0.001	0.0582	-1.23	3.00	0.729
130.00	94.30	0.772	-0.00421	0.304	-221.20	0.341	-212.70	0.766	-0.181	0.564	-58.56	1.22	0.00294	0.0611	-1.30	2.84	0.930
145.00	117.80	0.836	-0.00286	0.353	-173.25	0.362	-188.94	0.578	-0.430	0.556	-59.12	1.44	0.00511	0.0612	-1.38	2.53	1.13
160.00	141.30	0.886	-0.00189	0.423	-126.86	0.382	-169.83	0.440	-0.749	0.546	-60.26	1.66	0.00671	0.0592	-1.47	2.19	1.33
175.00	164.80	0.918	-0.00130	0.520	-84.56	0.399	-154.51	0.337	-1.15	0.534	-61.96	1.86	0.00778	0.0556	-1.59	1.81	1.53
190.00	188.30	0.929	-0.00109	0.654	-47.74	0.415	-142.34	0.261	-1.66	0.520	-64.22	2.03	0.00837	0.0508	-1.73	0.619	1.73
205.00	211.80	0.917	-0.00125	0.841	-16.89	0.428	-132.84	0.203	-2.29	0.505	-67.05	2.16	0.00853	0.0452	-1.89	0.126	1.93
220.00	235.30	0.872	-0.00196	1.09	7.20	0.433	-131.10	0.156	-3.12	0.482	-72.97	2.20	0.00840	0.0381	-2.10	0.00	2.13
		xSAT		xSAT		xSAT		xSAT		xSAT		xSAT		xSAT			
		Lbs per 1000 Barrels		Lbs per 1000 Barrels		Lbs per 1000 Barrels		Lbs per 1000 Barrels		Lbs per 1000 Barrels		Lbs per 1000 Barrels		Lbs per 1000 Barrels			

Saturation Levels (xSAT) are the ratio of ion activity to solubility, e.g. {Ca}{CO₃}/K_{sp}. pCO₂ (atm) is the partial pressure of CO₂ in the gas phase.
Lbs/1000 Barrels scale is the quantity of precipitation (or dissolution) required to instantaneously bring the water to equilibrium.





DownHole SAT(tm)

SURFACE WATER CHEMISTRY INPUT

OWL

Kimberly 001 Inlet

Report Date: 03-23-2020 Sampled: 03-18-2020 at 1553
Sample ID:

CATIONS

Calcium (as Ca)	4824
Magnesium (as Mg)	638.00
Barium (as Ba)	1.00
Strontium (as Sr)	326.00
Sodium (as Na)	44812
Potassium (as K)	784.00
Lithium (as Li)	22.00
Iron (as Fe)	6.20
Manganese (as Mn)	0.900
Zinc (as Zn)	0.00

ANIONS

Chloride (as Cl)	79498
Sulfate (as SO ₄)	597.00
Dissolved CO ₂ (as CO ₂)	170.00
Bicarbonate (as HCO ₃)	390.00
H ₂ S (as H ₂ S)	2.00
Boron (as B)	71.00

PARAMETERS

Calculated T.D.S.	129460
Molar Conductivity	190031
Resistivity	5.26
Sp.Gr.(g/mL)	1.08
Pressure(psia)	15.00
Temperature (°F)	77.00
pH	5.80

CORROSION RATE PREDICTION

CO ₂ - H ₂ S Rate(mpy)	0.712
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FRENCH CREEK SOFTWARE, INC.
1220 VALLEY FORGE ROAD, SUITE 21, VALLEY FORGE, PA 19460



DownHole SAT(tm)

SURFACE WATER DEPOSITION POTENTIAL INDICATORS

OWL

Kimberly 001 Inlet

Report Date: 03-23-2020 Sampled: 03-18-2020 at 1553
Sample ID:

SATURATION LEVEL

Calcite (CaCO ₃)	0.477
Aragonite (CaCO ₃)	0.442
Witherite (BaCO ₃)	< 0.001
Strontianite (SrCO ₃)	0.0498
Calcium oxalate (CaC ₂ O ₄)	0.00
Magnesite (MgCO ₃)	0.0662
Anhydrite (CaSO ₄)	0.241
Gypsum (CaSO ₄ *2H ₂ O)	0.340
Barite (BaSO ₄)	2.37
Celestite (SrSO ₄)	0.590
Fluorite (CaF ₂)	0.00
Calcium phosphate	0.00
Hydroxyapatite	0.00
Silica (SiO ₂)	0.00
Brucite (Mg(OH) ₂)	< 0.001
Magnesium silicate	0.00
Iron hydroxide (Fe(OH) ₃)	< 0.001
Strengite (FePO ₄ *2H ₂ O)	0.00
Siderite (FeCO ₃)	0.533
Halite (NaCl)	0.0575
Thenardite (Na ₂ SO ₄)	< 0.001
Iron sulfide (FeS)	0.0200

MOMENTARY EXCESS (Lbs/1000 Barrels)

Calcite (CaCO ₃)	-0.0129
Aragonite (CaCO ₃)	-0.0149
Witherite (BaCO ₃)	-25.19
Strontianite (SrCO ₃)	-0.331
Calcium oxalate (CaC ₂ O ₄)	-0.0126
Magnesite (MgCO ₃)	-0.140
Anhydrite (CaSO ₄)	-338.69
Gypsum (CaSO ₄ *2H ₂ O)	-241.09
Barite (BaSO ₄)	0.342
Celestite (SrSO ₄)	-57.35
Fluorite (CaF ₂)	-3.71
Calcium phosphate	>-0.001
Hydroxyapatite	-332.17
Silica (SiO ₂)	-33.86
Brucite (Mg(OH) ₂)	< 0.001
Magnesium silicate	-100.83
Iron hydroxide (Fe(OH) ₃)	< 0.001
Strengite (FePO ₄ *2H ₂ O)	>-0.001
Siderite (FeCO ₃)	-0.0119
Halite (NaCl)	-131353
Thenardite (Na ₂ SO ₄)	-80750
Iron sulfide (FeS)	-1.10

SIMPLE INDICES

Langelier	0.0442
Ryznar	5.71
Puckorius	3.40
Larson-Skold Index	380.65
Stiff Davis Index	-0.526
Oddo-Tomson	-1.08

BOUND IONS

Calcium	4824
Barium	1.00
Carbonate	1.36
Phosphate	0.00
Sulfate	597.00

TOTAL**FREE**

4690
1.00
0.0203
0.00
235.63

OPERATING CONDITIONS

Temperature (°F)	77.00
Time(mins)	3.00