Additional Information

Fluid analysis 9/1/21

New Mexico Office of the State Engineer

Active & Inactive Points of Diversion

(with Ownership Information)

(R=POD has been replaced and no longer serves this file, C=the file is closed)

(quarters are 1=NW 2=NE 3=SW 4=SE)

(quarters are smallest to largest)

(NAD83 UTM in meters)

(acre ft per annum)

WR File Nbr	Sub basin	Use	Diversion	Owner	County	POD Number	Well Tag	Code	Grant	Source	q 64	q 16	q 4	Sec	Twn	Rng	X	Y
RA 12312	RA	STK	3	KEY LIVESTOCK LLC	ED	RA 12312 POD1					4	1	3	26	18S	27E	569851	3620036

Record Count: 1

POD Search:

POD Number: RA 12312

Sorted by: File Number

J&L LABORATORIES
7509 W Industrial Ave
Suite A-1
Midland, TX 79706
info@jl-laboratories.com

Complete Water Analysis

Customer	Supreme Technologies	**Account Rep**	John Davis
Operator	Redwood Energy	**Date Sampled**	7/2/2021 2:23:00 PM
Well Name	RA 12312	**Date Submitted**	7/8/2021 2:25:00 PM
Sample Point	Key Livestock Well	**Sample ID**	WA210708-001
Region		**Notes/Time Sampled**	

Analytical Lab Data

Cations by ICP-OES		Anions by HPIC	
Analyte	**ppm**	**Analyte**	**ppm**
Calcium (Ca)	559	Chloride (Cl)	152
Magnesium (Mg)	216	Sulfate (SO_4)	44
Barium (Ba)	0.0		
Strontium (Sr)	10.0	Specific Gravity	
Potassium (K)	0	1.001	g/mL
Iron (Fe)	0.0		
Manganese (Mn)	0.0		
Boron (B)	0		
Zinc (Zn)	0		
Aluminum (Al)	0		
Phosphorus (P)	0.000	Calc. Phosphate	0.00
Silicon (Si)	16		
Sodium (Na) (calc.)	(875)		

Sample Conditions

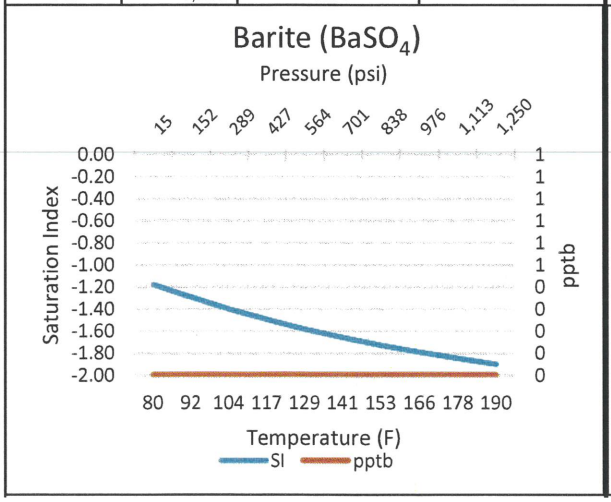
Analyte	Result
pH	7.32
Diss. H_2S (ppm)	0.0
Diss. CO_2 (ppm)	9
Bicarbonate (ppm HCO_3)	160.0
Carbonate (ppm CO_3)	N/A
Diss. O_2 (ppm)	N/A
Initial Temperature (°F)	190
Final Temperature (°F)	80
Initial Pressure (psi)	1250
Final Pressure (psi)	15
Calc. Resistivity (ohms/cm)	340.72
Conductivity (uS/cm)	2935
Calc. Total Hardness (as $CaCO_3$)	2287
Calc. TDS (ppm)	121

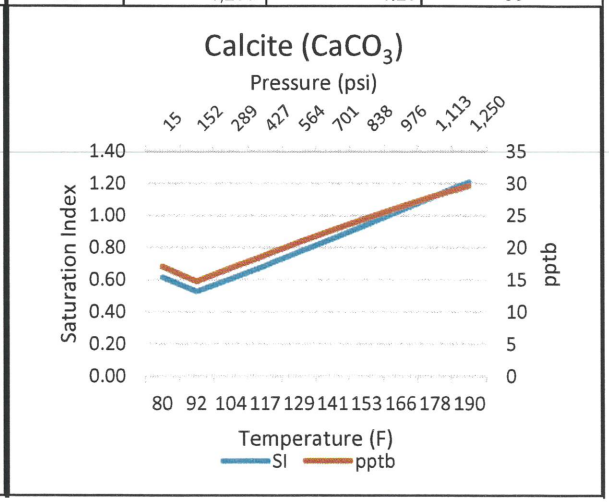
Barite ($BaSO_4$)

Temp. (°F)	PSI	SI	pptb
80	15	-1.18	0
92	152	-1.30	0
104	289	-1.40	0
117	427	-1.50	0
129	564	-1.58	0
141	701	-1.66	0
153	838	-1.73	0
166	976	-1.80	0
178	1,113	-1.85	0
190	1,250	-1.90	0

Calcite ($CaCO_3$)

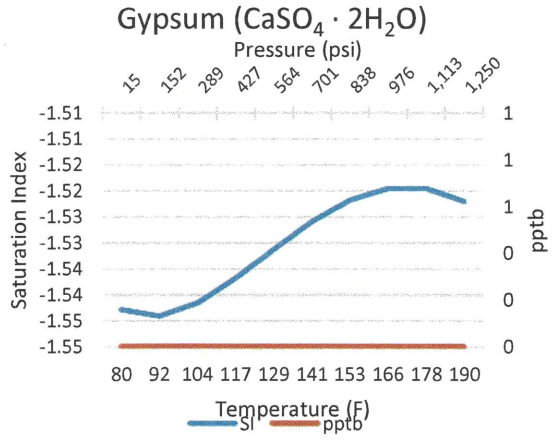
Temp. (°F)	PSI	SI	pptb
80	15	0.61	17
92	152	0.52	15
104	289	0.60	17
117	427	0.68	19
129	564	0.77	21
141	701	0.85	23
153	838	0.94	24
166	976	1.03	26
178	1,113	1.12	28
190	1,250	1.20	30

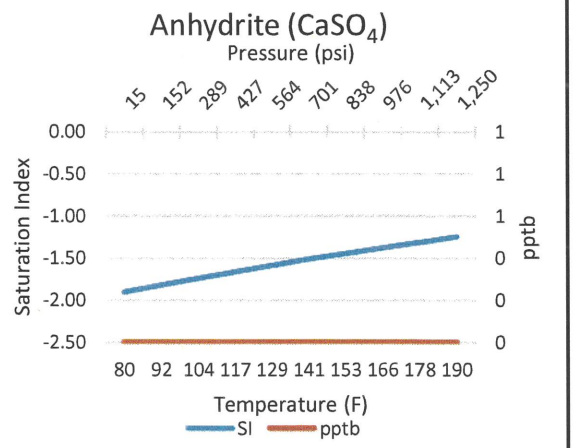




Gypsum ($CaSO_4 \cdot 2H_2O$)			
Temp. (°F)	PSI	SI	pptb
80	15	-1.54	0
92	152	-1.54	0
104	289	-1.54	0
117	427	-1.54	0
129	564	-1.53	0
141	701	-1.53	0
153	838	-1.52	0
166	976	-1.52	0
178	1,113	-1.52	0
190	1,250	-1.52	0

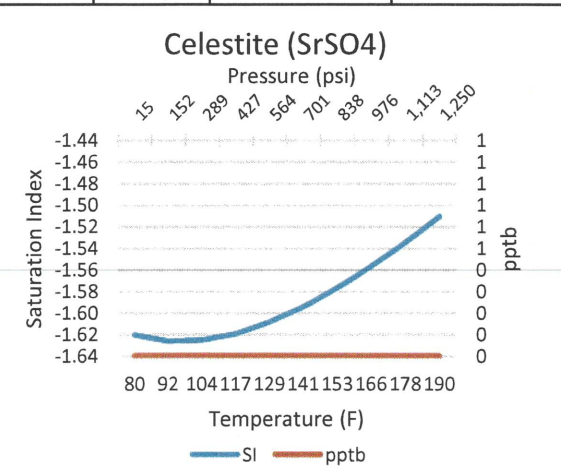
Anhydrite ($CaSO_4$)			
Temp. (°F)	PSI	SI	pptb
80	15	-1.91	0
92	152	-1.82	0
104	289	-1.74	0
117	427	-1.66	0
129	564	-1.59	0
141	701	-1.52	0
153	838	-1.45	0
166	976	-1.38	0
178	1,113	-1.32	0
190	1,250	-1.25	0

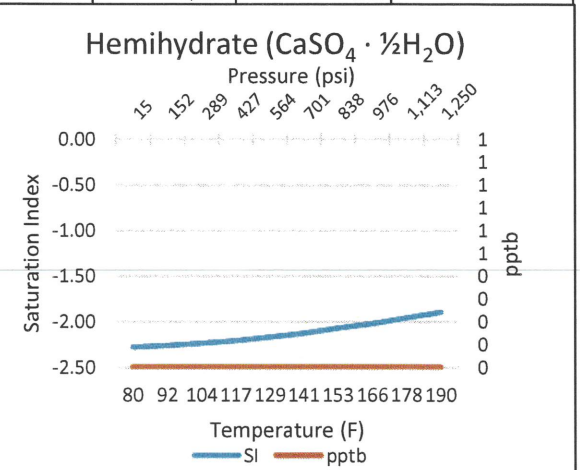




Celestite ($SrSO_4$)			
Temp. (°F)	PSI	SI	pptb
80	15	-1.62	0
92	152	-1.63	0
104	289	-1.63	0
117	427	-1.62	0
129	564	-1.61	0
141	701	-1.59	0
153	838	-1.58	0
166	976	-1.56	0
178	1,113	-1.53	0
190	1,250	-1.51	0

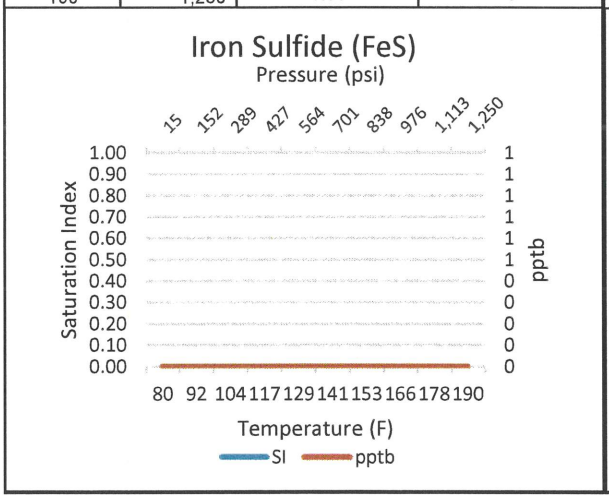
Hemihydrate ($CaSO_4 \cdot \frac{1}{2}H_2O$)			
Temp. (°F)	PSI	SI	pptb
80	15	-2.28	0
92	152	-2.27	0
104	289	-2.24	0
117	427	-2.21	0
129	564	-2.17	0
141	701	-2.13	0
153	838	-2.08	0
166	976	-2.02	0
178	1,113	-1.96	0
190	1,250	-1.90	0

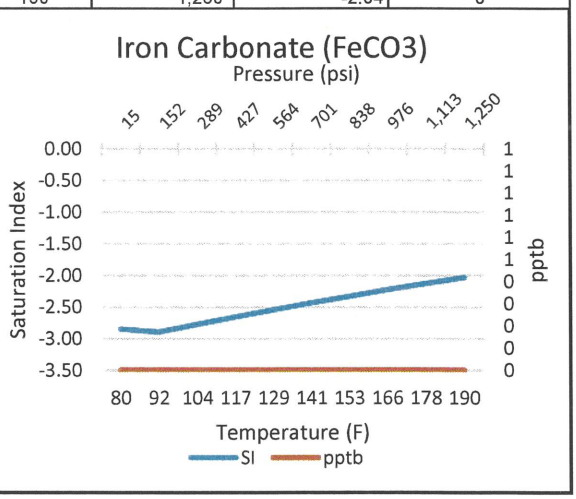




Iron Sulfide (FeS)			
Temp. (°F)	PSI	SI	pptb
80	15	0.00	0
92	152	0.00	0
104	289	0.00	0
117	427	0.00	0
129	564	0.00	0
141	701	0.00	0
153	838	0.00	0
166	976	0.00	0
178	1,113	0.00	0
190	1,250	0.00	0

Iron Carbonate (FeCO3)			
Temp. (°F)	PSI	SI	pptb
80	15	-2.85	0
92	152	-2.90	0
104	289	-2.78	0
117	427	-2.66	0
129	564	-2.55	0
141	701	-2.44	0
153	838	-2.33	0
166	976	-2.23	0
178	1,113	-2.14	0
190	1,250	-2.04	0





New Mexico Office of the State Engineer
Point of Diversion Summary

Well Tag	POD Number	(quarters are 1=NW 2=NE 3=SW 4=SE) (quarters are smallest to largest) Q64	Q16	Q4	Sec	Tws	Rng	(NAD83 UTM in meters) X	Y
	RA 04048	1	4	4	14	18S	27E	570841	3623030*

Driller License: **Driller Company:**

Driller Name: STANLEY JONES

Drill Start Date:	11/05/1947	**Drill Finish Date:**	01/03/1948	**Plug Date:**	
Log File Date:	06/02/1959	**PCW Rcv Date:**		**Source:**	Artesian
Pump Type:		**Pipe Discharge Size:**		**Estimated Yield:**	
Casing Size:		**Depth Well:**	2096 feet	**Depth Water:**	

***UTM location was derived from PLSS - see Help**

5/21/21 11:04 AM POINT OF DIVERSION SUMMARY

DownHole SAT™ Water Analysis Report

French Creek Software

SYSTEM IDENTIFICATION

Supreme Technologies
Redwood
Leavitt 13 #2H WH
Glorieta-Yeso

Sample ID#: 0
ID 2021-06-04-39

Sample Date: 06-02-2021 at 2216
Report Date: 06-09-2021

WATER CHEMISTRY

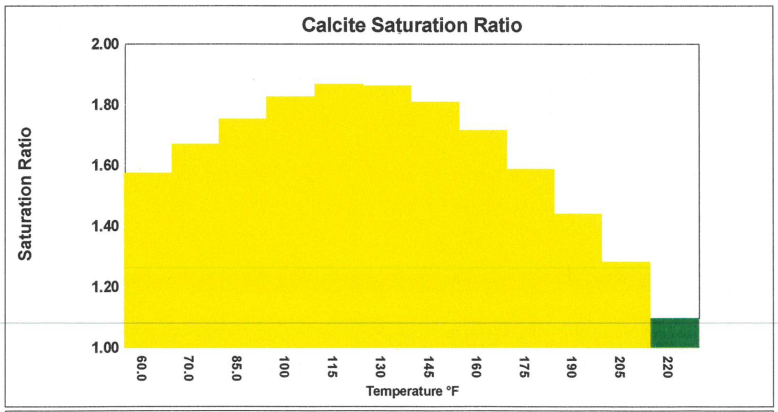
CATIONS		ANIONS	
Calcium(as Ca)	4593	Chloride(as Cl)	121021
Magnesium(as Mg)	984.00	Sulfate(as SO_4)	2179
Barium(as Ba)	0.00	Dissolved CO_2(as CO_2)	225.06
Strontium(as Sr)	88.00	Bicarbonate(as HCO_3)	427.00
Sodium(as Na)	71855	H_2S (as H_2S)	30.00
Potassium(as K)	978.00	Boron(as B)	12.00
Lithium(as Li)	24.00		
Iron(as Fe)	0.00		
Manganese(as Mn)	0.100		
Zinc(as Zn)	0.00		

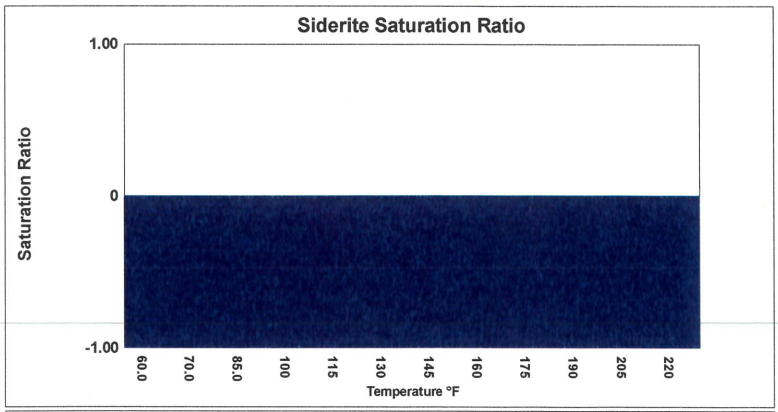
PARAMETERS			
Temperature(°F)	77.00	Sample pH	6.00
Conductivity	233708	Sp.Gr.(g/mL)	1.130
Resistivity	4.28	T.D.S.	217105

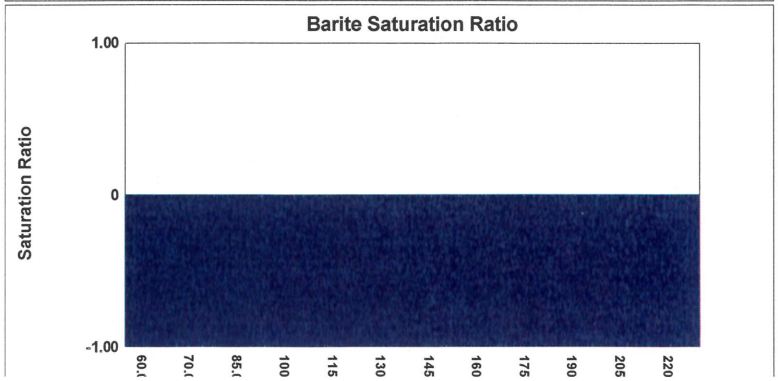
SCALE AND CORROSION POTENTIAL

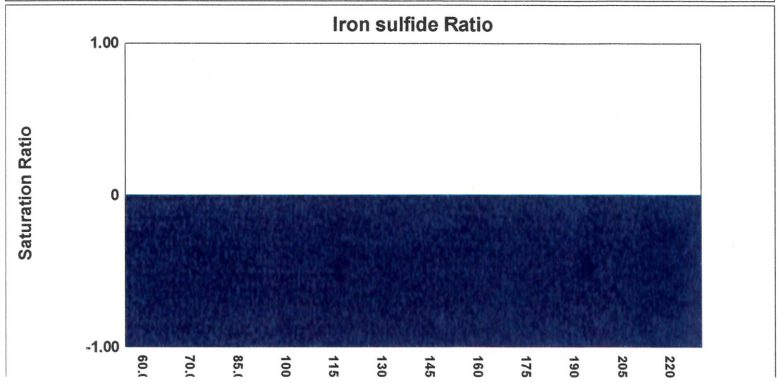
Temp. (°F)	Press. (psia)	Calcite $CaCO_3$			Anhydrite $CaSO_4$		Gypsum $CaSO_4*2H_2O$		Barite $BaSO_4$		Celestite $SrSO_4$		Siderite $FeCO_3$			Mackinawite FeS	
		xSAT	Lbs per 1000 Barrels	PP	xSAT	Lbs per 1000 Barrels	xSAT	Lbs per 1000 Barrels	xSAT	Lbs per 1000 Barrels	xSAT	Lbs per 1000 Barrels	xSAT	Lbs per 1000 Barrels	PP	xSAT	Lbs per 1000 Barrels
60.00	14.70	1.58	0.00963	178.84	1.05	17.58	1.38	108.98	0.00	-0.0736	0.411	-79.55	0.00	-0.395	0.00	0.00	-0.460
70.00	15.00	1.67	0.0104	184.07	1.01	3.67	1.28	83.70	0.00	-0.0991	0.388	-86.07	0.00	-0.366	0.00	0.00	-0.549
85.00	38.50	1.75	0.0106	174.23	0.989	-3.45	1.16	50.30	0.00	-0.148	0.367	-91.83	0.00	-0.329	0.00	0.00	-0.378
100.00	62.00	1.83	0.0106	170.85	1.01	4.28	1.07	23.34	0.00	-0.211	0.357	-94.32	0.00	-0.299	0.00	0.00	-0.336
115.00	85.50	1.87	0.0103	168.46	1.09	22.87	1.11	32.79	0.00	-0.289	0.350	-95.57	0.00	-0.274	0.00	0.00	-0.331
130.00	109.00	1.86	0.00952	167.78	1.21	47.80	1.18	47.41	0.00	-0.392	0.342	-97.40	0.00	-0.253	0.00	0.00	-0.349
145.00	132.50	1.81	0.00841	168.21	1.39	75.32	1.24	58.25	0.00	-0.526	0.333	-99.84	0.00	-0.236	0.00	0.00	-0.384
160.00	156.00	1.71	0.00706	169.31	1.65	102.76	1.29	66.46	0.00	-0.700	0.323	-102.76	0.00	-0.221	0.00	0.00	-0.437
175.00	179.50	1.59	0.00556	170.82	2.01	127.90	1.34	72.41	0.00	-0.923	0.312	-106.28	0.00	-0.209	0.00	0.00	-0.508
190.00	203.00	1.44	0.00403	169.62	2.51	149.92	1.38	76.85	0.00	-1.21	0.300	-110.31	0.00	-0.199	0.00	0.00	-0.601
205.00	226.50	1.28	0.00252	168.50	3.20	168.52	1.42	80.17	0.00	-1.57	0.289	-114.86	0.00	-0.190	0.00	0.00	-0.719
220.00	250.00	1.10	< 0.001	165.97	4.12	186.86	1.43	81.83	0.00	-2.05	0.273	-122.64	0.00	-0.186	0.00	0.00	-0.892

Saturation Ratios (xSAT) are the ratio of ion activity to solubility, e.g. $\{Ca\}\{CO_3\}/K_{sp}$. pCO_2 (atm) is the partial pressure of CO_2 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

Supreme Technologies
Leavitt 13 #2H WH
Glorieta-Yeso

Redwood

Report Date: 06-09-2021
Sample #: 0
Sampled: 06-02-2021 at 2216
Sample ID: 2021-06-04-39

CATIONS	
Calcium (as Ca)	4593
Magnesium (as Mg)	984.00
Barium (as Ba)	0.00
Strontium (as Sr)	88.00
Sodium (as Na)	71855
Potassium (as K)	978.00
Lithium (as Li)	24.00
Iron (as Fe)	0.00
Manganese (as Mn)	0.100
Zinc (as Zn)	0.00

ANIONS	
Chloride (as Cl)	121021
Sulfate (as SO_4)	2179
Dissolved CO_2 (as CO_2)	225.06
Bicarbonate (as HCO_3)	427.00
H_2S (as H_2S)	30.00
Boron (as B)	12.00

PARAMETERS	
Calculated T.D.S.	217105
Molar Conductivity	233708
Resistivity	4.28
Sp.Gr.(g/mL)	1.130
Pressure(psia)	15.00
Temperature (^{O}F)	77.00
pH	6.00

BOUND IONS	TOTAL	FREE
Calcium	5190	4753
Barium	0.00	0.00
Carbonate	20.07	0.0439
Phosphate	0.00	0.00
Sulfate	2462	696.30

CORROSION RATE PREDICTION

CO_2 - H_2S Rate(mpy)	0.327

FRENCH CREEK SOFTWARE, INC.
1220 VALLEY FORGE ROAD, SUITE 21, VALLEY FORGE, PA 19460

DownHole SAT(tm)

SURFACE WATER
DEPOSITION POTENTIAL INDICATORS

Supreme Technologies — Redwood
Leavitt 13 #2H WH
Glorieta-Yeso

Report Date: 06-09-2021 — Sampled: 06-02-2021 at 2216
Sample #: 0 — Sample ID: 2021-06-04-39

SATURATION RATIO as IAP/Ksp		FREE ION MOMENTARY EXCESS (Lbs/1000 Barrels)	
Calcite ($CaCO_3$)	1.73	Calcite ($CaCO_3$)	0.0108
Aragonite ($CaCO_3$)	1.60	Aragonite ($CaCO_3$)	0.00959
Witherite ($BaCO_3$)	0.00	Witherite ($BaCO_3$)	-27.73
Strontianite ($SrCO_3$)	0.03	Strontianite ($SrCO_3$)	-1.28
Calcium oxalate (CaC_2O_4)	0.00	Calcium oxalate (CaC_2O_4)	-0.00752
Magnesite ($MgCO_3$)	0.44	Magnesite ($MgCO_3$)	-0.0271
Anhydrite ($CaSO_4$)	1.00	Anhydrite ($CaSO_4$)	-1.15
Gypsum ($CaSO_4*2H_2O$)	1.22	Gypsum ($CaSO_4*2H_2O$)	67.84
Barite ($BaSO_4$)	0.00	Barite ($BaSO_4$)	-0.120
Celestite ($SrSO_4$)	0.38	Celestite ($SrSO_4$)	-89.07
Fluorite (CaF_2)	0.00	Fluorite (CaF_2)	-2.78
Calcium phosphate	0.00	Calcium phosphate	>-0.001
Hydroxyapatite	0.00	Hydroxyapatite	-263.20
Silica (SiO_2)	0.00	Silica (SiO_2)	-27.99
Brucite ($Mg(OH)_2$)	< 0.001	Brucite ($Mg(OH)_2$)	-0.233
Magnesium silicate	0.00	Magnesium silicate	-87.51
Iron hydroxide ($Fe(OH)_3$)	0.00	Iron hydroxide ($Fe(OH)_3$)	-0.211
Strengite ($FePO_4*2H_2O$)	0.00	Strengite ($FePO_4*2H_2O$)	>-0.001
Siderite ($FeCO_3$)	0.00	Siderite ($FeCO_3$)	-0.347
Halite (NaCl)	0.24	Halite (NaCl)	-73627
Thenardite ($Na2SO_4$)	0.00	Thenardite ($Na2SO_4$)	-84955
Iron sulfide (FeS)	0.00	Iron sulfide (FeS)	-0.570

SIMPLE INDICES		CARBONATE PRECIPITATION POTENTIAL (Lbs/1000 Barrels)	
Langelier	0.876	Calcite ($CaCO_3$)	187.56
Ryznar	4.25	Aragonite ($CaCO_3$)	185.27
Puckorius	1.66	Witherite ($BaCO_3$)	0.00
Larson-Skold Index	301.16	Strontianite ($SrCO_3$)	-18.23
Stiff Davis Index	0.732	Magnesite ($MgCO_3$)	135.47
Oddo-Tomson	-0.237	Siderite ($FeCO_3$)	0.00

OPERATING CONDITIONS

Temperature (^oF)	77.00
Time(mins)	3.00

FRENCH CREEK SOFTWARE, INC.
1220 VALLEY FORGE ROAD, SUITE 21, VALLEY FORGE, PA 19460

DownHole SAT™ Water Analysis Report

French Creek Software

SYSTEM IDENTIFICATION

Supreme Technologies
Redwood
Leavitt 14 A #2 WH
Glorieta-Yeso

Sample ID#: 0
ID: 2021-06-03-28

Sample Date: 05-31-2021 at 1553
Report Date: 06-06-2021

WATER CHEMISTRY

CATIONS

Calcium(as Ca)	4646
Magnesium(as Mg)	964.00
Barium(as Ba)	0.00
Strontium(as Sr)	87.00
Sodium(as Na)	66750
Potassium(as K)	863.00
Lithium(as Li)	23.00
Iron(as Fe)	0.100
Manganese(as Mn)	0.00
Zinc(as Zn)	0.00

ANIONS

Chloride(as Cl)	111832
Sulfate(as SO_4)	1796
Dissolved CO_2(as CO_2)	180.00
Bicarbonate(as HCO_3)	329.00
H_2S (as H_2S)	136.00
Boron(as B)	13.00

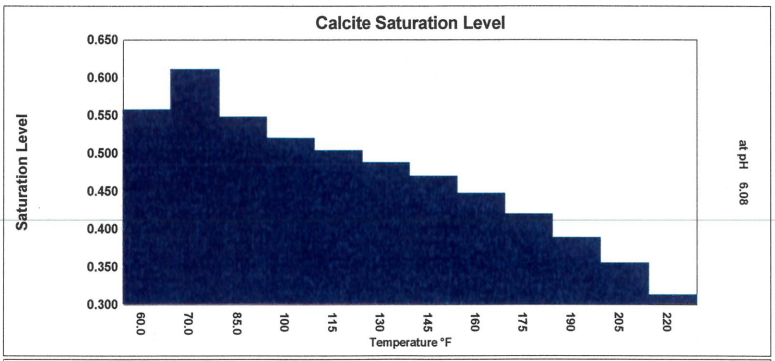
PARAMETERS

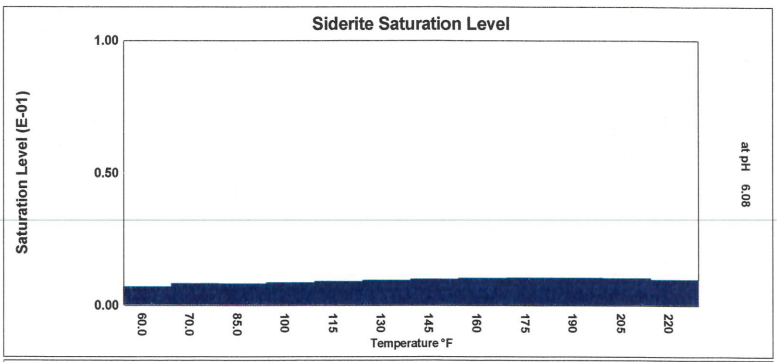
Temperature(°F)	77.00
Sample pH	6.00
Conductivity	286589
T.D.S.	180517
Resistivity	3.49
Sp.Gr.(g/mL)	1.13

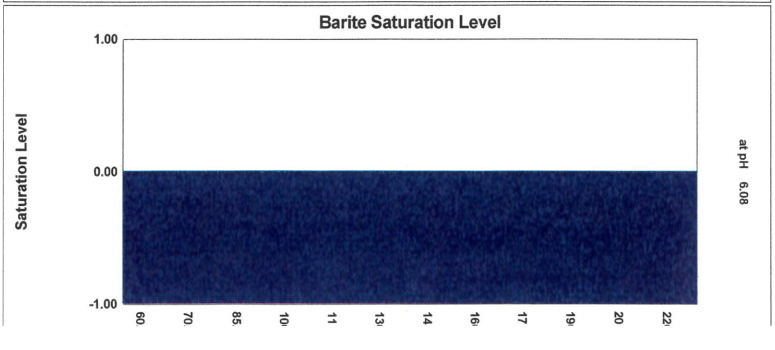
SCALE AND CORROSION POTENTIAL

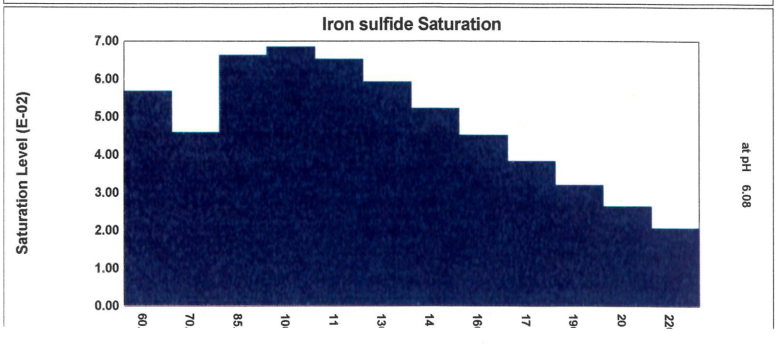
Temp. (°F)	Press. (psig)	Calcite $CaCO_3$		Anhydrite $CaSO_4$		Gypsum $CaSO_4*2H_2O$		Barite $BaSO_4$		Celestite $SrSO_4$		Siderite $FeCO_3$		Mackawenite FeS		CO_2 (mpy)	pCO_2 (atm)
60.00	0.00	0.557	-0.0110	0.677	-140.34	0.950	-18.16	0.00	-0.0765	0.345	-89.18	0.00676	-0.368	0.0566	-0.139	0.239	0.0870
70.00	0.30	0.610	-0.00898	0.652	-151.80	0.885	-42.84	0.00	-0.103	0.326	-95.07	0.00796	-0.338	0.0456	-0.171	0.367	0.0888
85.00	23.80	0.547	-0.00941	0.641	-151.98	0.806	-75.10	0.00	-0.153	0.310	-100.05	0.00794	-0.303	0.0660	-0.115	0.966	0.228
100.00	47.30	0.519	-0.00912	0.661	-133.98	0.748	-100.40	0.00	-0.216	0.303	-101.79	0.00832	-0.273	0.0683	-0.109	1.75	0.367
115.00	70.80	0.503	-0.00871	0.710	-102.98	0.777	-82.25	0.00	-0.295	0.299	-102.38	0.00886	-0.247	0.0651	-0.113	2.25	0.506
130.00	94.30	0.487	-0.00837	0.791	-64.36	0.826	-58.49	0.00	-0.398	0.293	-103.55	0.00940	-0.226	0.0591	-0.122	2.52	0.645
145.00	117.80	0.469	-0.00816	0.912	-22.83	0.870	-40.00	0.00	-0.533	0.287	-105.29	0.00986	-0.208	0.0521	-0.135	2.74	0.784
160.00	141.30	0.447	-0.00809	1.08	17.91	0.911	-25.62	0.00	-0.706	0.279	-107.59	0.0102	-0.193	0.0450	-0.154	2.99	0.923
175.00	164.80	0.419	-0.00814	1.32	55.27	0.946	-14.54	0.00	-0.927	0.271	-110.46	0.0104	-0.180	0.0382	-0.177	3.19	1.06
190.00	188.30	0.388	-0.00831	1.66	87.92	0.976	-6.06	0.00	-1.21	0.261	-113.86	0.0103	-0.169	0.0319	-0.206	1.48	1.20
205.00	211.80	0.355	-0.00857	2.12	115.46	1.00	0.432	0.00	-1.56	0.252	-117.80	0.0102	-0.160	0.0262	-0.244	0.706	1.34
220.00	235.30	0.313	-0.00929	2.72	139.62	1.01	2.06	0.00	-2.04	0.239	-124.90	0.00961	-0.156	0.0205	-0.298	0.273	1.48
		xSAT	Lbs per 1000 Barrels	xSAT	Lbs per 1000 Barrels	xSAT	Lbs per 1000 Barrels	xSAT	Lbs per 1000 Barrels	xSAT	Lbs per 1000 Barrels	xSAT	Lbs per 1000 Barrels	xSAT	Lbs per 1000 Barrels		

Saturation Levels (xSAT) are the ratio of ion activity to solubility, e.g. $\{Ca\}\{CO_3\}/K_{sp}$. pCO_2 (atm) is the partial pressure of CO_2 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

Supreme Technologies — Redwood
Leavitt 14 A #2 WH
Glorieta-Yeso

Report Date: 06-06-2021 Sampled: 05-31-2021 at 1553
Sample ID: 2021-06-03-28 Sample ID: 2021-06-03-28

CATIONS		ANIONS	
Calcium (as Ca)	4646	Chloride (as Cl)	111832
Magnesium (as Mg)	964.00	Sulfate (as SO_4)	1796
Barium (as Ba)	0.00	Dissolved CO_2 (as CO_2)	180.00
Strontium (as Sr)	87.00	Bicarbonate (as HCO_3)	329.00
Sodium (as Na)	66750	H_2S (as H_2S)	136.00
Potassium (as K)	863.00	Boron (as B)	13.00
Lithium (as Li)	23.00		
Iron (as Fe)	0.100		
Manganese (as Mn)	0.00		
Zinc (as Zn)	0.00		

PARAMETERS

Calculated T.D.S.	180517
Molar Conductivity	286589
Resistivity	3.49
Sp.Gr.(g/mL)	1.13
Pressure(psia)	15.00
Temperature (^oF)	77.00
pH	6.00

CORROSION RATE PREDICTION

CO_2 - H_2S Rate(mpy)	0.452

FRENCH CREEK SOFTWARE, INC.
1220 VALLEY FORGE ROAD, SUITE 21, VALLEY FORGE, PA 19460

DownHole SAT(tm)

SURFACE WATER
DEPOSITION POTENTIAL INDICATORS

Supreme Technologies — Redwood
Leavitt 14 A #2 WH
Glorieta-Yeso

Report Date: 06-06-2021 Sampled: 05-31-2021 at 1553
Sample ID: 2021-06-03-28 Sample ID: 2021-06-03-28

SATURATION LEVEL		MOMENTARY EXCESS (Lbs/1000 Barrels)	
Calcite ($CaCO_3$)	0.561	Calcite ($CaCO_3$)	-0.00958
Aragonite ($CaCO_3$)	0.519	Aragonite ($CaCO_3$)	-0.0114
Witherite ($BaCO_3$)	0.00	Witherite ($BaCO_3$)	-27.60
Strontianite ($SrCO_3$)	0.0118	Strontianite ($SrCO_3$)	-1.47
Calcium oxalate (CaC_2O_4)	0.00	Calcium oxalate (CaC_2O_4)	-0.0111
Magnesite ($MgCO_3$)	0.132	Magnesite ($MgCO_3$)	-0.0681
Anhydrite ($CaSO_4$)	0.644	Anhydrite ($CaSO_4$)	-153.56
Gypsum ($CaSO_4*2H_2O$)	0.847	Gypsum ($CaSO_4*2H_2O$)	-58.02
Barite ($BaSO_4$)	0.00	Barite ($BaSO_4$)	-0.124
Celestite ($SrSO_4$)	0.318	Celestite ($SrSO_4$)	-97.77
Fluorite (CaF_2)	0.00	Fluorite (CaF_2)	-3.47
Calcium phosphate	0.00	Calcium phosphate	>-0.001
Hydroxyapatite	0.00	Hydroxyapatite	-304.59
Silica (SiO_2)	0.00	Silica (SiO_2)	-31.47
Brucite ($Mg(OH)_2$)	< 0.001	Brucite ($Mg(OH)_2$)	< 0.001
Magnesium silicate	0.00	Magnesium silicate	-96.47
Iron hydroxide ($Fe(OH)_3$)	< 0.001	Iron hydroxide ($Fe(OH)_3$)	< 0.001
Strengite ($FePO_4*2H_2O$)	0.00	Strengite ($FePO_4*2H_2O$)	>-0.001
Siderite ($FeCO_3$)	0.00769	Siderite ($FeCO_3$)	-0.321
Halite (NaCl)	0.133	Halite (NaCl)	-102986
Thenardite ($Na2SO_4$)	< 0.001	Thenardite ($Na2SO_4$)	-85717
Iron sulfide (FeS)	0.0429	Iron sulfide (FeS)	-0.181

SIMPLE INDICES		BOUND IONS	TOTAL	FREE
Langelier	0.246	Calcium	4646	4389
Ryznar	5.51	Barium	0.00	0.00
Puckorius	3.56	Carbonate	4.12	0.0211
Larson-Skold Index	660.02	Phosphate	0.00	0.00
Stiff Davis Index	-0.0648	Sulfate	1796	612.62
Oddo-Tomson	-0.901			

OPERATING CONDITIONS

Temperature (^oF)	77.00
Time(mins)	3.00

FRENCH CREEK SOFTWARE, INC.
1220 VALLEY FORGE ROAD, SUITE 21, VALLEY FORGE, PA 19460

DownHole SAT™ Water Analysis Report

French Creek Software

SYSTEM IDENTIFICATION

Supreme Technologies
Redwood
Kaiser B #1 WH
Queen-Grayburg-
San Andres

Sample ID#: 0
ID: 2021-06-03-9

Sample Date: 05-31-2021 at 1553
Report Date: 06-06-2021

WATER CHEMISTRY

CATIONS

Calcium(as Ca)	3262
Magnesium(as Mg)	556.00
Barium(as Ba)	0.00
Strontium(as Sr)	59.00
Sodium(as Na)	88835
Potassium(as K)	50.00
Lithium(as Li)	22.00
Iron(as Fe)	0.00
Manganese(as Mn)	0.00
Zinc(as Zn)	0.00

ANIONS

Chloride(as Cl)	139429
Sulfate(as SO_4)	3973
Dissolved CO_2(as CO_2)	250.00
Bicarbonate(as HCO_3)	390.00
H_2S (as H_2S)	17.00
Boron(as B)	8.90

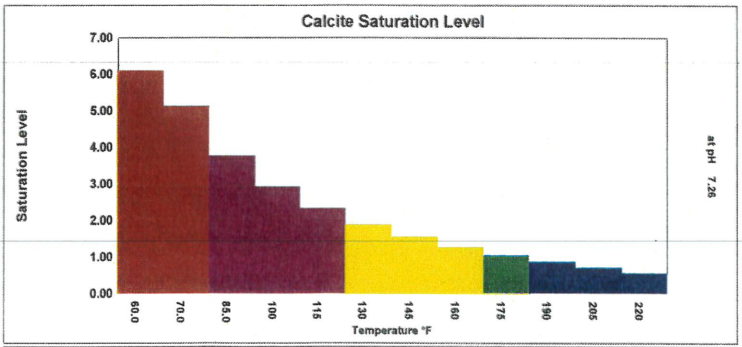
PARAMETERS

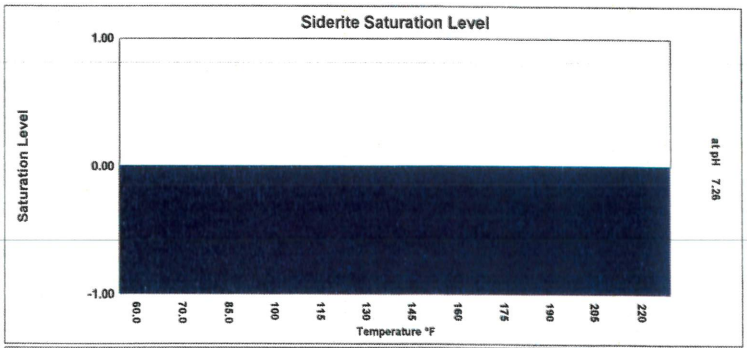
Temperature(°F)	77.00
Sample pH	7.00
Conductivity	396368
T.D.S.	223486
Resistivity	2.52
Sp.Gr.(g/mL)	1.15

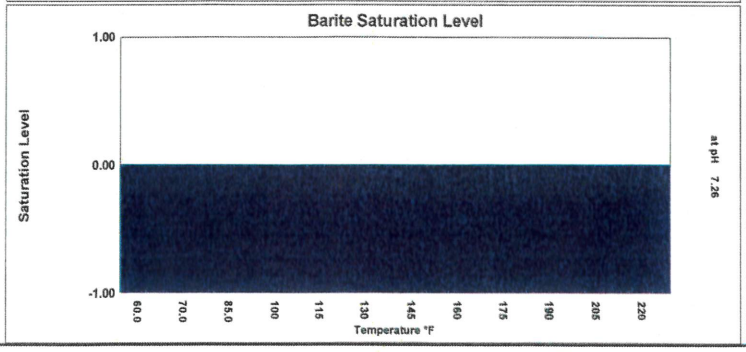
SCALE AND CORROSION POTENTIAL

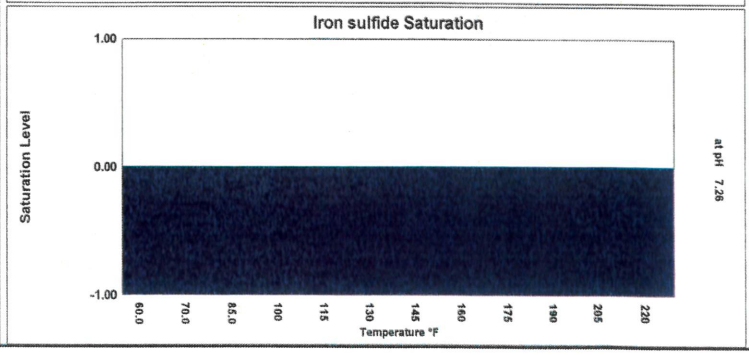
Temp. (°F)	Press. (psig)	Calcite $CaCO_3$		Anhydrite $CaSO_4$		Gypsum $CaSO_4*2H_2O$		Barite $BaSO_4$		Celestite $SrSO_4$		Siderite $FeCO_3$		Mackawenite FeS		CO_2 (mpy)	pCO_2 (atm)
60.00	0.00	6.08	0.146	1.21	103.63	1.57	257.16	0.00	-0.0385	0.467	-45.14	0.00	-0.326	0.00	-0.0184	0.0458	0.0225
70.00	0.30	5.12	0.110	1.17	84.09	1.47	218.84	0.00	-0.0514	0.443	-49.29	0.00	-0.315	0.00	-0.0323	0.0447	0.0230
85.00	23.80	3.77	0.0667	1.15	75.36	1.34	167.95	0.00	-0.0761	0.424	-52.94	0.00	-0.299	0.00	-0.0303	0.102	0.0590
100.00	47.30	2.92	0.0423	1.19	89.72	1.25	127.15	0.00	-0.107	0.416	-54.40	0.00	-0.282	0.00	-0.0391	0.167	0.0951
115.00	70.80	2.33	0.0271	1.29	121.66	1.31	145.21	0.00	-0.146	0.412	-55.00	0.00	-0.264	0.00	-0.0535	0.0641	0.131
130.00	94.30	1.89	0.0168	1.45	164.10	1.40	171.41	0.00	-0.196	0.406	-56.09	0.00	-0.248	0.00	-0.0744	0.179	0.167
145.00	117.80	1.54	0.00963	1.68	212.03	1.49	191.96	0.00	-0.261	0.399	-57.55	0.00	-0.234	0.00	-0.103	0.307	0.203
160.00	141.30	1.26	0.00440	2.01	260.44	1.57	207.82	0.00	-0.344	0.390	-59.43	0.00	-0.222	0.00	-0.143	0.489	0.239
175.00	164.80	1.03	< 0.001	2.47	306.07	1.64	220.17	0.00	-0.451	0.380	-61.72	0.00	-0.211	0.00	-0.195	0.677	0.275
190.00	188.30	0.842	-0.00248	3.11	346.75	1.70	229.68	0.00	-0.586	0.368	-64.45	0.00	-0.202	0.00	-0.264	0.339	0.311
205.00	211.80	0.686	-0.00480	4.00	381.83	1.76	237.18	0.00	-0.757	0.356	-67.60	0.00	-0.194	0.00	-0.353	0.307	0.347
220.00	235.30	0.541	-0.00713	5.17	416.73	1.78	242.20	0.00	-0.988	0.337	-73.08	0.00	-0.190	0.00	-0.484	0.414	0.383
		xSAT	Lbs per 1000 Barrels	xSAT	Lbs per 1000 Barrels	xSAT	Lbs per 1000 Barrels	xSAT	Lbs per 1000 Barrels	xSAT	Lbs per 1000 Barrels	xSAT	Lbs per 1000 Barrels	xSAT	Lbs per 1000 Barrels		

Saturation Levels (xSAT) are the ratio of ion activity to solubility, e.g. $\{Ca\}\{CO_3\}/K_{sp}$. pCO_2 (atm) is the partial pressure of CO_2 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

Supreme Technologies — Redwood
Kaiser B #1 WH
Queen-Grayburg- San Andres

Report Date: 06-06-2021 Sampled: 05-31-2021 at 1553
Sample ID: 2021-06-03-9 Sample ID: 2021-06-03-9

CATIONS		ANIONS	
Calcium (as Ca)	3262	Chloride (as Cl)	139429
Magnesium (as Mg)	556.00	Sulfate (as SO_4)	3973
Barium (as Ba)	0.00	Dissolved CO_2 (as CO_2)	250.00
Strontium (as Sr)	59.00	Bicarbonate (as HCO_3)	390.00
Sodium (as Na)	88835	H_2S (as H_2S)	17.00
Potassium (as K)	50.00	Boron (as B)	8.90
Lithium (as Li)	22.00		
Iron (as Fe)	0.00		
Manganese (as Mn)	0.00		
Zinc (as Zn)	0.00		

PARAMETERS

Calculated T.D.S.	223486
Molar Conductivity	396368
Resistivity	2.52
Sp.Gr.(g/mL)	1.15
Pressure(psia)	15.00
Temperature (^oF)	77.00
pH	7.00

CORROSION RATE PREDICTION

CO_2 - H_2S Rate(mpy)	0.0528

FRENCH CREEK SOFTWARE, INC.
1220 VALLEY FORGE ROAD, SUITE 21, VALLEY FORGE, PA 19460

DownHole SAT(tm)

SURFACE WATER
DEPOSITION POTENTIAL INDICATORS

Supreme Technologies — Redwood
Kaiser B #1 WH
Queen-Grayburg-San Andres

Report Date: 06-06-2021 Sampled: 05-31-2021 at 1553
Sample ID: 2021-06-03-9 Sample ID: 2021-06-03-9

SATURATION LEVEL		MOMENTARY EXCESS (Lbs/1000 Barrels)	
Calcite ($CaCO_3$)	3.94	Calcite ($CaCO_3$)	0.0745
Aragonite ($CaCO_3$)	3.65	Aragonite ($CaCO_3$)	0.0724
Witherite ($BaCO_3$)	0.00	Witherite ($BaCO_3$)	-28.05
Strontianite ($SrCO_3$)	0.0629	Strontianite ($SrCO_3$)	-2.06
Calcium oxalate (CaC_2O_4)	0.00	Calcium oxalate (CaC_2O_4)	-0.0129
Magnesite ($MgCO_3$)	0.793	Magnesite ($MgCO_3$)	-0.0219
Anhydrite ($CaSO_4$)	1.16	Anhydrite ($CaSO_4$)	78.07
Gypsum ($CaSO_4*2H_2O$)	1.41	Gypsum ($CaSO_4*2H_2O$)	194.92
Barite ($BaSO_4$)	0.00	Barite ($BaSO_4$)	-0.0621
Celestite ($SrSO_4$)	0.433	Celestite ($SrSO_4$)	-51.26
Fluorite (CaF_2)	0.00	Fluorite (CaF_2)	-3.67
Calcium phosphate	0.00	Calcium phosphate	>-0.001
Hydroxyapatite	0.00	Hydroxyapatite	-267.07
Silica (SiO_2)	0.00	Silica (SiO_2)	-28.17
Brucite ($Mg(OH)_2$)	< 0.001	Brucite ($Mg(OH)_2$)	0.00303
Magnesium silicate	0.00	Magnesium silicate	-89.14
Iron hydroxide ($Fe(OH)_3$)	0.00	Iron hydroxide ($Fe(OH)_3$)	-0.214
Strengite ($FePO_4*2H_2O$)	0.00	Strengite ($FePO_4*2H_2O$)	>-0.001
Siderite ($FeCO_3$)	0.00	Siderite ($FeCO_3$)	-0.314
Halite (NaCl)	0.259	Halite (NaCl)	-72069
Thenardite ($Na2SO_4$)	< 0.001	Thenardite ($Na2SO_4$)	-86536
Iron sulfide (FeS)	0.00	Iron sulfide (FeS)	-0.0416

SIMPLE INDICES		BOUND IONS	TOTAL	FREE
Langelier	1.39	Calcium	3262	2858
Ryznar	4.21	Barium	0.00	0.00
Puckorius	3.03	Carbonate	88.17	0.172
Larson-Skold Index	570.61	Phosphate	0.00	0.00
Stiff Davis Index	1.25	Sulfate	3973	1385
Oddo-Tomson	0.281			

OPERATING CONDITIONS

Temperature (^oF)	77.00
Time(mins)	3.00

FRENCH CREEK SOFTWARE, INC.
1220 VALLEY FORGE ROAD, SUITE 21, VALLEY FORGE, PA 19460