

Water Analysis Report

Production Company: **LARAMIE ENERGY LLC-EBUS**
Well Name: **CASCADE CREEK 604-12-13,GARFIELD**
Sample Point: **Tubing**
Sample Date: **4/7/2018**
Sample ID: **WA-367290**

Sales Rep: **UWE Wollerman**
Lab Tech: **Bryce Bess**

Scaling potential predicted using ScaleSoftPitzer from
Brine Chemistry Consortium (Rice University)

Sample Specifics		Analysis @ Properties in Sample Specifics			
		Cations	mg/L	Anions	mg/L
Test Date:	4/23/2018	Sodium (Na):	4704.63	Chloride (Cl):	9000.00
System Temperature 1 (°F):	330	Potassium (K):	78.06	Sulfate (SO4):	70.00
System Pressure 1 (psig):	2500	Magnesium (Mg):	17.81	Bicarbonate (HCO3):	580.00
System Temperature 2 (°F):	64	Calcium (Ca):	761.76	Carbonate (CO3):	
System Pressure 2 (psig):	50	Strontium (Sr):	29.10	Hydroxide(HO):	
Calculated Density (g/ml):	1.0087	Barium (Ba):	3.32	Acetic Acid (CH3COO)	
pH:	6.30	Iron (Fe):	355.11	Propionic Acid (C2H5COO)	
Calculated TDS (mg/L):	15841.26	Zinc (Zn):	159.31	Butanoic Acid (C3H7COO)	
CO2 in Gas (%):		Lead (Pb):	1.56	Isobutyric Acid ((CH3)2CHCOO)	
Dissolved CO2 (mg/L):	371.00	Ammonia NH3:		Fluoride (F):	
H2S in Gas (%):		Manganese (Mn):	10.60	Bromine (Br):	
H2S in Water (mg/L):	0.50	Aluminum (Al):	8.64	Silica (SiO2):	70.00
Tot. SuspendedSolids(mg/L):		Lithium (Li):	2.40	Calcium Carbonate (CaCO3):	
Corrosivity(LanglierSat.Indx)	0.00	Boron (B):	3.19	Phosphates (PO4):	10.73
Alkalinity:		Silicon (Si):	32.72	Oxygen (O2):	

Notes:

(PTB = Pounds per Thousand Barrels)

		Calcium Carbonate		Barium Sulfate		Iron Sulfide		Iron Carbonate		Gypsum CaSO4·2H2O		Celestite SrSO4		Halite NaCl		Zinc Sulfide	
Temp (°F)	PSI	SI	PTB	SI	PTB	SI	PTB	SI	PTB	SI	PTB	SI	PTB	SI	PTB	SI	PTB
64.00	50.00	0.00	0.00	0.89	1.71	1.52	0.46	1.29	121.45	0.00	0.00	0.00	0.00	0.00	0.00	9.56	0.53
94.00	322.00	0.00	0.00	0.59	1.46	1.42	0.46	1.49	132.90	0.00	0.00	0.00	0.00	0.00	0.00	9.11	0.53
123.00	594.00	0.13	17.00	0.37	1.11	1.41	0.46	1.71	143.21	0.00	0.00	0.00	0.00	0.00	0.00	8.76	0.53
153.00	867.00	0.30	36.77	0.21	0.74	1.46	0.46	1.92	151.89	0.00	0.00	0.00	0.00	0.00	0.00	8.50	0.53
182.00	1139.00	0.49	57.35	0.10	0.39	1.56	0.47	2.12	159.10	0.00	0.00	0.00	0.00	0.00	0.00	8.29	0.53
212.00	1411.00	0.71	77.37	0.03	0.12	1.70	0.47	2.32	164.99	0.00	0.00	0.00	0.00	0.00	0.00	8.14	0.53
241.00	1683.00	0.94	95.75	0.00	0.00	1.88	0.47	2.52	169.78	0.00	0.00	0.00	0.00	0.00	0.00	8.03	0.53
271.00	1956.00	1.20	111.75	0.00	0.00	2.08	0.47	2.70	173.63	0.00	0.00	0.00	0.00	0.00	0.00	7.96	0.53
300.00	2228.00	1.47	125.04	0.00	0.00	2.30	0.48	2.87	176.70	0.00	0.00	0.00	0.00	0.00	0.00	7.93	0.53
330.00	2500.00	1.75	135.63	0.00	0.00	2.55	0.48	3.03	179.13	0.00	0.00	0.00	0.00	0.00	0.00	7.92	0.53

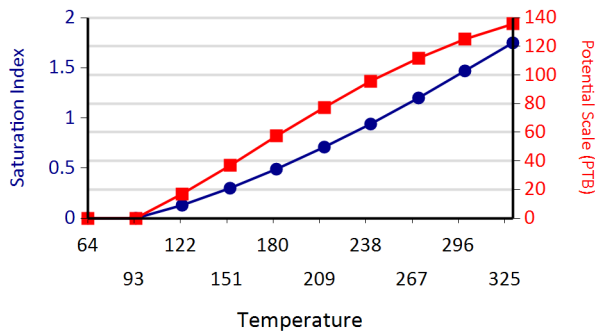
Water Analysis Report

Temp (°F)	PSI	Hemihydrate CaSO ₄ •0.5H ₂ O		Anhydrate CaSO ₄		Calcium Fluoride		Zinc Carbonate		Lead Sulfide		Mg Silicate		Ca Mg Silicate		Fe Silicate	
		SI	PTB	SI	PTB	SI	PTB	SI	PTB	SI	PTB	SI	PTB	SI	PTB	SI	PTB
64.00	50.00	0.00	0.00	0.00	0.00	0.00	0.00	0.14	13.76	10.04	0.63	0.00	0.00	0.00	0.00	1.32	34.14
94.00	322.00	0.00	0.00	0.00	0.00	0.00	0.00	0.61	52.80	9.20	0.63	0.00	0.00	0.00	0.00	2.24	56.29
123.00	594.00	0.00	0.00	0.00	0.00	0.00	0.00	1.05	77.28	8.54	0.63	0.00	0.00	0.00	0.00	3.33	80.28
153.00	867.00	0.00	0.00	0.00	0.00	0.00	0.00	1.44	91.37	7.99	0.63	0.00	0.00	0.00	0.00	4.51	102.78
182.00	1139.00	0.00	0.00	0.00	0.00	0.00	0.00	1.79	98.92	7.55	0.63	0.00	0.00	0.00	0.00	5.74	122.41
212.00	1411.00	0.00	0.00	0.00	0.00	0.00	0.00	2.10	102.77	7.19	0.63	0.00	0.00	0.00	0.00	7.02	138.33
241.00	1683.00	0.00	0.00	0.00	0.00	0.00	0.00	2.37	104.70	6.90	0.63	0.00	0.00	0.00	0.00	8.31	150.12
271.00	1956.00	0.00	0.00	0.00	0.00	0.00	0.00	2.61	105.69	6.67	0.63	0.00	0.00	0.65	16.22	9.62	157.51
300.00	2228.00	0.00	0.00	0.00	0.00	0.00	0.00	2.81	106.22	6.49	0.63	1.56	19.13	1.64	36.30	10.92	160.94
330.00	2500.00	0.00	0.00	0.00	0.00	0.00	0.00	2.98	106.50	6.35	0.63	3.11	29.31	2.62	49.27	12.21	162.04

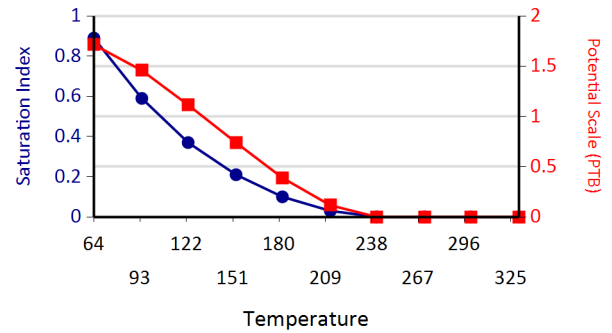
These scales have positive scaling potential under initial temperature and pressure: Barium Sulfate Iron Sulfide Iron Carbonate Zinc Sulfide Zinc Carbonate Lead Sulfide Fe Silicate

These scales have positive scaling potential under final temperature and pressure: Calcium Carbonate Iron Sulfide Iron Carbonate Zinc Sulfide Zinc Carbonate Lead Sulfide Mg Silicate Ca Mg Silicate Fe Silicate

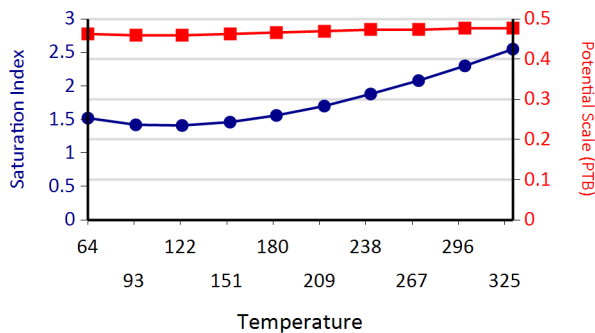
Calcium Carbonate



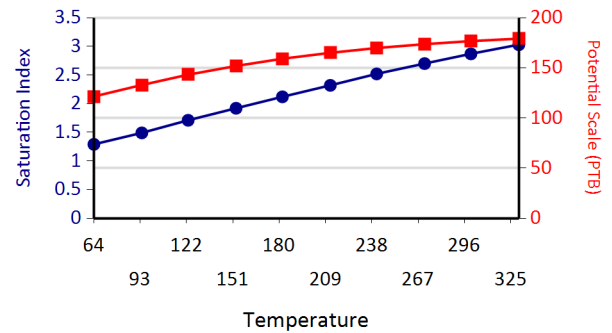
Barium Sulfate



Iron Sulfide

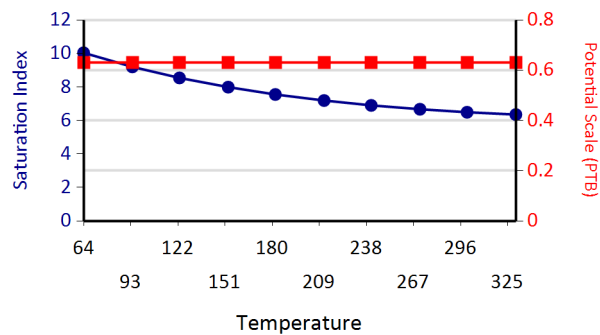


Iron Carbonate

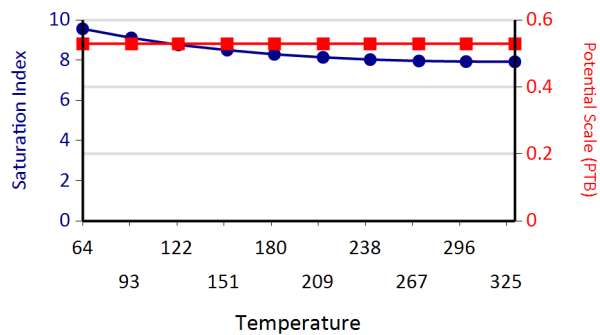


Water Analysis Report

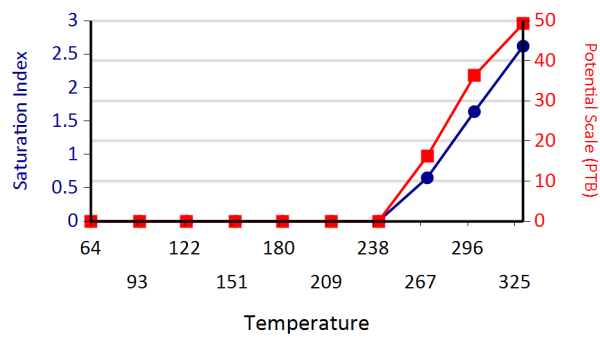
Lead Sulfide



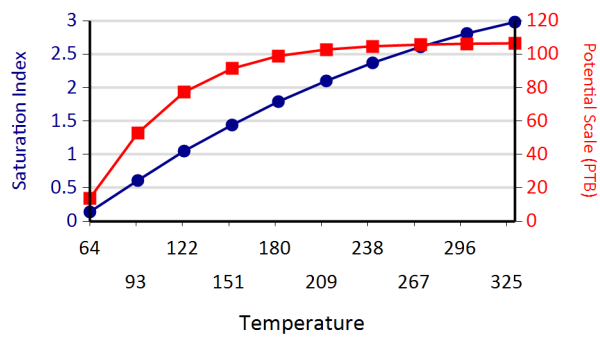
Zinc Sulfide



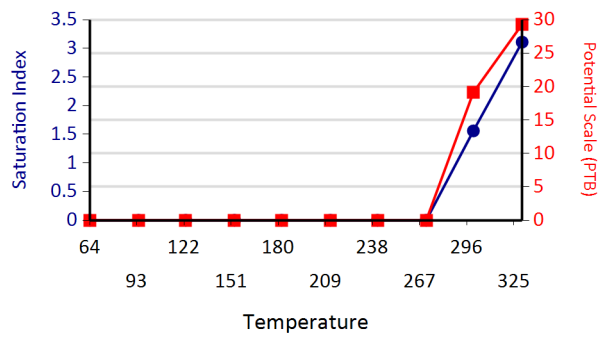
Ca Mg Silicate



Zinc Carbonate



Mg Silicate



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