



## SYSTEM IDENTIFICATION

Vaquero Energy  
Field: Blue Gravel  
Water Disposal Well: 1-35; S35; T9N; R91W  
Moffat, Co  
Sample Point: Wellhead  
Analyst: James Hampton

Sample ID#: 0  
ID:  
Sample Date: 07-10-2014 at 0710  
Report Date: 07-15-2014

## WATER CHEMISTRY

## CATIONS

Calcium(as Ca) 320.60  
Magnesium(as Mg) 48.60  
Barium(as Ba) 65.40  
Sodium(as Na) 6482  
Iron(as Fe) 4.40

## ANIONS

Chloride(as Cl) 10000  
Sulfate(as SO<sub>4</sub>) 3.00  
Dissolved CO<sub>2</sub>(as CO<sub>2</sub>) 150.00  
Bicarbonate(as HCO<sub>3</sub>) 1281  
Carbonate(as CO<sub>3</sub>) 0.00  
H<sub>2</sub>S (as H<sub>2</sub>S) 1.00

## PARAMETERS

Temperature(°F) 78.00  
Sample pH 7.20  
Conductivity 25250  
Density(lbs/gal) 8.58

Analysis of Composite  
Produced Water from  
central tank battery  
adjacent to Federal 1-35  
and 5-35 wells.

LennTech Calculator:  
TDS = 18140 ppm

Koehler, COGCC

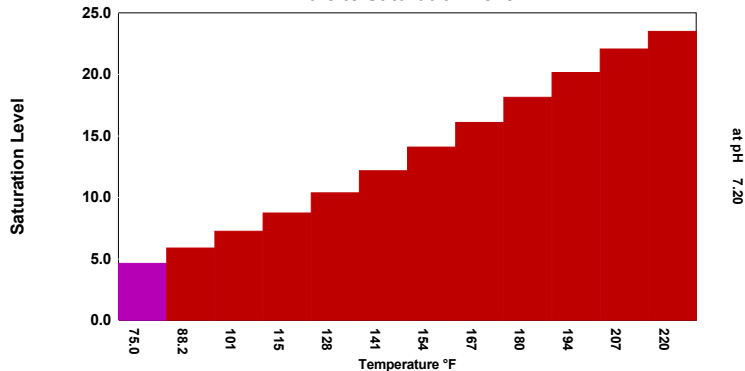
What meathead doesn't  
put the units for the  
analyses? BK-COGCC

## SCALE AND CORROSION POTENTIAL

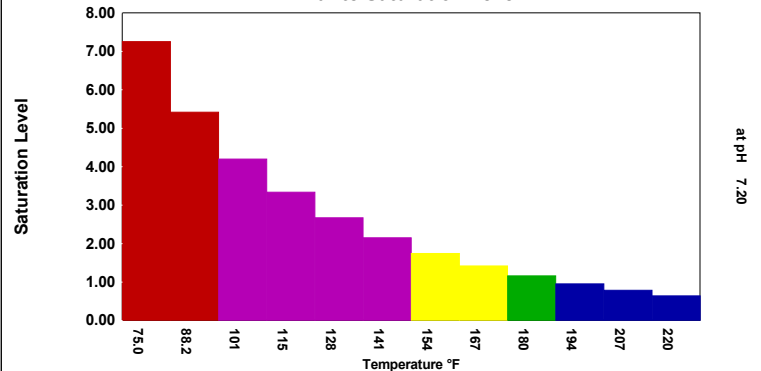
Temp. (°F)	Press. (psig)	Calcite CaCO <sub>3</sub>		Anhydrite CaSO <sub>4</sub>		Gypsum CaSO <sub>4</sub> *2H <sub>2</sub> O		Barite BaSO <sub>4</sub>		Celestite SrSO <sub>4</sub>		Siderite FeCO <sub>3</sub>		Mackawenite FeS		CO <sub>2</sub> (mpy)	pCO <sub>2</sub> (psia)
75.00	0.00	4.63	0.969	< 0.001	-1023	< 0.001	-866.60	7.25	1.74	0.00	-121.68	112.62	1.41	5.03	0.200	0.0563	0.865
88.18	0.00	5.88	1.19	< 0.001	-992.16	< 0.001	-877.90	5.41	1.62	0.00	-120.32	157.06	1.63	4.28	0.169	0.0732	0.865
101.36	0.00	7.25	1.39	< 0.001	-943.73	< 0.001	-882.94	4.20	1.49	0.00	-117.99	211.09	1.85	3.66	0.142	0.0901	0.865
114.55	0.00	8.73	1.58	< 0.001	-881.69	< 0.001	-834.48	3.34	1.35	0.00	-115.45	275.52	2.05	3.15	0.119	0.0856	0.865
127.73	0.00	10.37	1.78	< 0.001	-810.24	< 0.001	-783.69	2.67	1.18	0.00	-113.26	352.91	2.26	2.73	0.0998	0.0732	0.865
140.91	0.00	12.16	1.99	< 0.001	-733.21	< 0.001	-739.29	2.15	0.996	0.00	-111.39	443.35	2.48	2.38	0.0830	0.0171	0.865
154.09	0.00	14.08	2.19	< 0.001	-653.94	< 0.001	-700.45	1.74	0.779	0.00	-109.83	545.57	2.69	2.08	0.0679	0.0364	0.865
167.27	0.00	16.09	2.40	< 0.001	-575.21	< 0.001	-666.46	1.42	0.529	0.00	-108.54	656.49	2.85	1.81	0.0539	0.0545	0.865
180.45	0.00	18.13	2.60	< 0.001	-499.22	< 0.001	-636.73	1.16	0.242	0.00	-107.52	770.80	2.85	1.57	0.0405	0.0575	0.865
193.64	0.00	20.15	2.78	0.00110	-427.59	< 0.001	-610.75	0.952	-0.0882	0.00	-106.76	880.79	2.75	1.36	0.0270	0.0312	0.865
206.82	0.00	22.06	2.95	0.00141	-361.45	< 0.001	-588.13	0.786	-0.467	0.00	-106.24	976.86	2.62	1.16	0.0130	0.0424	0.865
220.00	2.51	23.49	3.12	0.00179	-306.48	< 0.001	-577.18	0.638	-0.956	0.00	-107.27	1038	2.46	1.11	0.0103	0.0575	1.01
		Lbs per xSAT 1000 Barrels		Lbs per xSAT 1000 Barrels		Lbs per xSAT 1000 Barrels		Lbs per xSAT 1000 Barrels		Lbs per xSAT 1000 Barrels		Lbs per xSAT 1000 Barrels		Lbs per xSAT 1000 Barrels			

Saturation Levels (xSAT) are the ratio of ion activity to solubility, e.g. {Ca}{CO<sub>3</sub>}/K<sub>sp</sub>. pCO<sub>2</sub> (psia) is the partial pressure of CO<sub>2</sub> in the gas phase.  
Lbs/1000 Barrels scale is the quantity of precipitation (or dissolution) required to instantaneously bring the water to equilibrium.

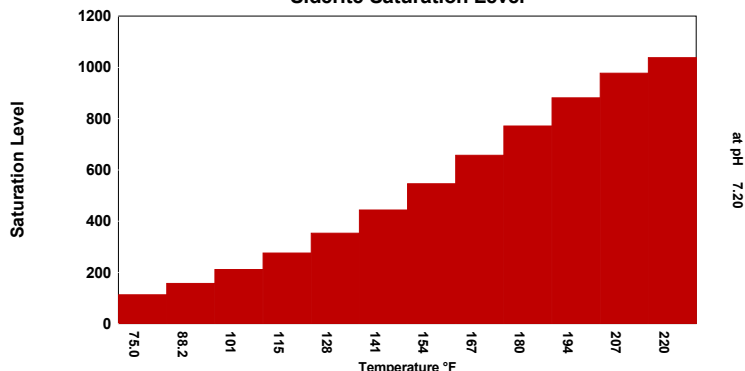
Calcite Saturation Level



Barite Saturation Level



Siderite Saturation Level



Iron sulfide Saturation

