



DownHole SAT Rx

FORMATION WATER CHEMISTRY INPUT

Mid-Con Energy Operating
HRMU #6
Wellhead

Pro-Stim Chemicals
Paul Dwyer
Prepared by SGB Solutions

Report Date: 12-30-2015
Sample #: 576

Sampled: 12-18-2015
at 1711

CATIONS

Calcium (as Ca)	3800
Magnesium (as Mg)	486.00
Barium (as Ba)	0.00
Strontium (as Sr)	0.00
Sodium (as Na)	54846
Potassium (as K)	0.00
Lithium (as Li)	0.00
Ammonia (as NH ₃)	0.00
Aluminum (as Al)	0.00
Iron (as Fe)	159.50
Manganese (as Mn)	1.36
Zinc (as Zn)	0.00
Lead (as Pb)	0.00

ANIONS

Chloride (as Cl)	92000
Sulfate (as SO ₄)	1700
Bromine (as Br)	0.00
Dissolved CO ₂ (as CO ₂)	9.67
Bicarbonate (as HCO ₃)	440.00
Carbonate (as CO ₃)	0.00
Oxalic acid (as C ₂ O ₄)	0.00
Silica (as SiO ₂)	0.00
Phosphate(as PO ₄)	0.00
H ₂ S (as H ₂ S)	0.00
Fluoride (as F)	0.00
Nitrate (as NO ₃)	0.00
Boron (as B)	0.00

PARAMETERS

Calculated T.D.S.	148875
Molar Conductivity	229350
Resistivity	4.36
Sp.Gr.(g/mL)	1.09
Pressure(psia)	14.70
pCO ₂ (psia)	0.0770
pH ₂ S(atm)	0.00
Temperature (°F)	68.00
pH	6.42

All anions & cations are in mg/l (CO₂ in MEq/L)

FRENCH CREEK SOFTWARE, INC.
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FORMATION WATER DEPOSITION POTENTIAL INDICATORS

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SATURATION LEVEL

Calcite (CaCO_3)	1.50
Aragonite (CaCO_3)	1.31
Witherite (BaCO_3)	0.00
Strontianite (SrCO_3)	0.00
Calcium oxalate (CaC_2O_4)	0.00
Magnesite (MgCO_3)	0.189
Anhydrite (CaSO_4)	0.582
Gypsum ($\text{CaSO}_4 \cdot 2\text{H}_2\text{O}$)	0.830
Barite (BaSO_4)	0.00
Celestite (SrSO_4)	0.00
Fluorite (CaF_2)	0.00
Calcium phosphate	0.00
Hydroxyapatite	0.00
Silica (SiO_2)	0.00
Brucite ($\text{Mg}(\text{OH})_2$)	< 0.001
Magnesium silicate	0.00
Iron hydroxide ($\text{Fe}(\text{OH})_3$)	34.77
Strengite ($\text{FePO}_4 \cdot 2\text{H}_2\text{O}$)	0.00
Siderite (FeCO_3)	46.32
Halite (NaCl)	0.0890
Thenardite (Na_2SO_4)	< 0.001
Iron sulfide (FeS)	0.00

FREE ION MOMENTARY EXCESS (ppm)

Calcite (CaCO_3)	0.0454
Aragonite (CaCO_3)	0.0325
Witherite (BaCO_3)	-72.55
Strontianite (SrCO_3)	-23.63
Calcium oxalate (CaC_2O_4)	-0.0426
Magnesite (MgCO_3)	-0.495
Anhydrite (CaSO_4)	-646.39
Gypsum ($\text{CaSO}_4 \cdot 2\text{H}_2\text{O}$)	-216.46
Barite (BaSO_4)	-0.204
Celestite (SrSO_4)	-329.24
Fluorite (CaF_2)	-11.23
Calcium phosphate	> -0.001
Hydroxyapatite	-869.43
Silica (SiO_2)	-82.05
Brucite ($\text{Mg}(\text{OH})_2$)	0.00161
Magnesium silicate	-267.71
Iron hydroxide ($\text{Fe}(\text{OH})_3$)	< 0.001
Strengite ($\text{FePO}_4 \cdot 2\text{H}_2\text{O}$)	> -0.001
Siderite (FeCO_3)	0.155
Halite (NaCl)	-330843
Thenardite (Na_2SO_4)	-235205
Iron sulfide (FeS)	-0.0959

SIMPLE INDICES

Langelier	0.577
Ryznar	5.27
Puckorius	3.51
Larson-Skold Index	400.01
Stiff Davis Index	0.0644
Oddo-Tomson	-0.575

BOUND IONS

	TOTAL	FREE
Calcium	3800	3563
Barium	0.00	0.00
Carbonate	6.89	0.0821
Phosphate	0.00	0.00
Sulfate	1700	721.81

OPERATING CONDITIONS

Temperature ($^{\circ}\text{F}$)	68.00
Time(mins)	3.00