



DownHole SAT Rx

FORMATION WATER CHEMISTRY INPUT

Mid-Con Energy Operating
Harker Ranch #5
Wellhead

Pro-Stim Chemicals
Paul Dwyer
Prepared by SGB Solutions

Report Date: 12-30-2015
Sample #: 574

Sampled: 12-18-2015
at 1711

CATIONS

Calcium (as Ca)	2360
Magnesium (as Mg)	267.00
Barium (as Ba)	0.00
Strontium (as Sr)	0.00
Sodium (as Na)	61513
Potassium (as K)	0.00
Lithium (as Li)	0.00
Ammonia (as NH ₃)	0.00
Aluminum (as Al)	0.00
Iron (as Fe)	16.00
Manganese (as Mn)	0.200
Zinc (as Zn)	0.00
Lead (as Pb)	0.00

ANIONS

Chloride (as Cl)	98000
Sulfate (as SO ₄)	3000
Bromine (as Br)	0.00
Dissolved CO ₂ (as CO ₂)	10.22
Bicarbonate (as HCO ₃)	380.00
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.	159918
Molar Conductivity	254741
Resistivity	3.93
Sp.Gr.(g/mL)	1.09
Pressure(psia)	14.70
pCO ₂ (psia)	0.0824
pH ₂ S(atm)	0.00
Temperature (°F)	68.00
pH	6.27

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

FRENCH CREEK SOFTWARE, INC.
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DEPOSITION POTENTIAL INDICATORS

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SATURATION LEVEL

Calcite (CaCO_3)	0.613
Aragonite (CaCO_3)	0.538
Witherite (BaCO_3)	0.00
Strontianite (SrCO_3)	0.00
Calcium oxalate (CaC_2O_4)	0.00
Magnesite (MgCO_3)	0.0693
Anhydrite (CaSO_4)	0.715
Gypsum ($\text{CaSO}_4 \cdot 2\text{H}_2\text{O}$)	0.999
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 ($\text{Fe}(\text{OH})_3$)	0.472
Strengite ($\text{FePO}_4 \cdot 2\text{H}_2\text{O}$)	0.00
Siderite (FeCO_3)	2.96
Halite (NaCl)	0.112
Thenardite (Na_2SO_4)	< 0.001
Iron sulfide (FeS)	0.00

FREE ION MOMENTARY EXCESS (ppm)

Calcite (CaCO_3)	-0.0557
Aragonite (CaCO_3)	-0.0759
Witherite (BaCO_3)	-72.51
Strontianite (SrCO_3)	-23.63
Calcium oxalate (CaC_2O_4)	-0.0669
Magnesite (MgCO_3)	-0.997
Anhydrite (CaSO_4)	-589.39
Gypsum ($\text{CaSO}_4 \cdot 2\text{H}_2\text{O}$)	-2.48
Barite (BaSO_4)	-0.106
Celestite (SrSO_4)	-196.39
Fluorite (CaF_2)	-13.93
Calcium phosphate	>-0.001
Hydroxyapatite	-837.93
Silica (SiO_2)	-78.95
Brucite ($\text{Mg}(\text{OH})_2$)	0.00112
Magnesium silicate	-260.98
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)	0.0676
Halite (NaCl)	-303963
Thenardite (Na_2SO_4)	-233874
Iron sulfide (FeS)	-1.08

SIMPLE INDICES

Langelier	0.196
Ryznar	5.88
Puckorius	4.06
Larson-Skold Index	495.72
Stiff Davis Index	-0.270
Oddo-Tomson	-0.962

BOUND IONS

	TOTAL	FREE
Calcium	2360	2103
Barium	0.00	0.00
Carbonate	5.86	0.0529
Phosphate	0.00	0.00
Sulfate	3000	1421

OPERATING CONDITIONS

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