



DownHole SAT Rx

FORMATION WATER CHEMISTRY INPUT

Mid-Con Energy Operating
Harker Ranch #3
Wellhead

Pro-Stim Chemicals
Paul Dwyer
Prepared by SGB Solutions

Report Date: 12-30-2015
Sample #: 573

Sampled: 12-18-2015
at 1711

CATIONS

Calcium (as Ca)	2480
Magnesium (as Mg)	170.00
Barium (as Ba)	0.00
Strontium (as Sr)	0.00
Sodium (as Na)	65293
Potassium (as K)	0.00
Lithium (as Li)	0.00
Ammonia (as NH ₃)	0.00
Aluminum (as Al)	0.00
Iron (as Fe)	12.50
Manganese (as Mn)	0.300
Zinc (as Zn)	0.00
Lead (as Pb)	0.00

ANIONS

Chloride (as Cl)	104000
Sulfate (as SO ₄)	2950
Bromine (as Br)	0.00
Dissolved CO ₂ (as CO ₂)	10.63
Bicarbonate (as HCO ₃)	460.00
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)	2.00
Fluoride (as F)	0.00
Nitrate (as NO ₃)	0.00
Boron (as B)	0.00

PARAMETERS

Calculated T.D.S.	168963
Molar Conductivity	270751
Resistivity	3.69
Sp.Gr.(g/mL)	1.10
Pressure(psia)	14.70
pCO ₂ (psia)	0.0864
pH ₂ S(atm)	< 0.001
Temperature (°F)	68.00
pH	6.37

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)	0.951
Aragonite (CaCO_3)	0.834
Witherite (BaCO_3)	0.00
Strontianite (SrCO_3)	0.00
Calcium oxalate (CaC_2O_4)	0.00
Magnesite (MgCO_3)	0.0658
Anhydrite (CaSO_4)	0.732
Gypsum ($\text{CaSO}_4 \cdot 2\text{H}_2\text{O}$)	1.01
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 ($\text{Fe}(\text{OH})_3$)	< 0.001
Strengite ($\text{FePO}_4 \cdot 2\text{H}_2\text{O}$)	0.00
Siderite (FeCO_3)	3.25
Halite (NaCl)	0.127
Thenardite (Na_2SO_4)	< 0.001
Iron sulfide (FeS)	0.343

FREE ION MOMENTARY EXCESS (ppm)

Calcite (CaCO_3)	-0.00656
Aragonite (CaCO_3)	-0.0254
Witherite (BaCO_3)	-73.77
Strontianite (SrCO_3)	-24.01
Calcium oxalate (CaC_2O_4)	-0.0624
Magnesite (MgCO_3)	-1.52
Anhydrite (CaSO_4)	-537.18
Gypsum ($\text{CaSO}_4 \cdot 2\text{H}_2\text{O}$)	18.56
Barite (BaSO_4)	-0.115
Celestite (SrSO_4)	-211.31
Fluorite (CaF_2)	-13.49
Calcium phosphate	>-0.001
Hydroxyapatite	-830.71
Silica (SiO_2)	-78.46
Brucite ($\text{Mg}(\text{OH})_2$)	0.00141
Magnesium silicate	-260.64
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)	0.102
Halite (NaCl)	-292890
Thenardite (Na_2SO_4)	-237265
Iron sulfide (FeS)	-0.682

SIMPLE INDICES

Langelier	0.406
Ryznar	5.56
Puckorius	3.74
Larson-Skold Index	441.83
Stiff Davis Index	-0.0263
Oddo-Tomson	-0.754

BOUND IONS

BOUND IONS	TOTAL	FREE
Calcium	2480	2210
Barium	0.00	0.00
Carbonate	9.99	0.0765
Phosphate	0.00	0.00
Sulfate	2950	1378

OPERATING CONDITIONS

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