



DownHole SAT Rx

FORMATION WATER CHEMISTRY INPUT

Mid-Con Energy Operating
HRMU 9-12
Wellhead

Pro-Stim Chemicals
Paul Dwyer
Prepared by SGB Solutions

Report Date: 12-30-2015
Sample #: 577

Sampled: 12-18-2015
at 1711

CATIONS

Calcium (as Ca)	3280
Magnesium (as Mg)	316.00
Barium (as Ba)	0.00
Strontium (as Sr)	0.00
Sodium (as Na)	58137
Potassium (as K)	0.00
Lithium (as Li)	0.00
Ammonia (as NH ₃)	0.00
Aluminum (as Al)	0.00
Iron (as Fe)	18.50
Manganese (as Mn)	0.170
Zinc (as Zn)	0.00
Lead (as Pb)	0.00

ANIONS

Chloride (as Cl)	95000
Sulfate (as SO ₄)	2450
Bromine (as Br)	0.00
Dissolved CO ₂ (as CO ₂)	7.03
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.	154528
Molar Conductivity	241105
Resistivity	4.15
Sp.Gr.(g/mL)	1.09
Pressure(psia)	14.70
pCO ₂ (psia)	0.0563
pH ₂ S(atm)	0.00
Temperature (°F)	68.00
pH	6.53

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

FRENCH CREEK SOFTWARE, INC.
1220 VALLEY FORGE ROAD, BUILDING 21, VALLEY FORGE, PA 19460



DownHole SAT Rx

FORMATION WATER DEPOSITION POTENTIAL INDICATORS

Mid-Con Energy Operating
HRMU 9-12
Wellhead

Pro-Stim Chemicals
Paul Dwyer
Prepared by SGB Solutions

Report Date: 12-30-2015
Sample #: 577

Sampled: 12-18-2015
at 1711

SATURATION LEVEL

Calcite (CaCO_3)	1.45
Aragonite (CaCO_3)	1.27
Witherite (BaCO_3)	0.00
Strontianite (SrCO_3)	0.00
Calcium oxalate (CaC_2O_4)	0.00
Magnesite (MgCO_3)	0.139
Anhydrite (CaSO_4)	0.758
Gypsum ($\text{CaSO}_4 \cdot 2\text{H}_2\text{O}$)	1.07
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 ($\text{Fe}(\text{OH})_3$)	1.84
Strengite ($\text{FePO}_4 \cdot 2\text{H}_2\text{O}$)	0.00
Siderite (FeCO_3)	5.93
Halite (NaCl)	0.0994
Thenardite (Na_2SO_4)	< 0.001
Iron sulfide (FeS)	0.00

FREE ION MOMENTARY EXCESS (ppm)

Calcite (CaCO_3)	0.0473
Aragonite (CaCO_3)	0.0324
Witherite (BaCO_3)	-72.64
Strontianite (SrCO_3)	-23.65
Calcium oxalate (CaC_2O_4)	-0.0491
Magnesite (MgCO_3)	-0.799
Anhydrite (CaSO_4)	-414.94
Gypsum ($\text{CaSO}_4 \cdot 2\text{H}_2\text{O}$)	101.36
Barite (BaSO_4)	-0.136
Celestite (SrSO_4)	-243.82
Fluorite (CaF_2)	-12.02
Calcium phosphate	> -0.001
Hydroxyapatite	-856.49
Silica (SiO_2)	-80.75
Brucite ($\text{Mg}(\text{OH})_2$)	0.00206
Magnesium silicate	-265.12
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)	0.147
Halite (NaCl)	-318834
Thenardite (Na_2SO_4)	-235094
Iron sulfide (FeS)	-0.578

SIMPLE INDICES

Langelier	0.575
Ryznar	5.38
Puckorius	3.83
Larson-Skold Index	482.37
Stiff Davis Index	0.0840
Oddo-Tomson	-0.580

BOUND IONS

Calcium	3280
Barium	0.00
Carbonate	8.77
Phosphate	0.00
Sulfate	2450

TOTAL

FREE

OPERATING CONDITIONS

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