



DownHole SAT Rx

FORMATION WATER CHEMISTRY INPUT

Mull Drilling
Quiver Unit #1

Pro-Stim Chemicals
Ryan Uhland & Paul Dwyer

Report Date: 09-16-2017 Sampled: 09-01-2017
Sample #: 2327 at 1644

CATIONS

Calcium (as Ca)	1440
Magnesium (as Mg)	122.00
Barium (as Ba)	0.00
Strontium (as Sr)	0.00
Sodium (as Na)	9077
Potassium (as K)	0.00
Lithium (as Li)	0.00
Ammonia (as NH ₃)	0.00
Aluminum (as Al)	0.00
Iron (as Fe)	6.50
Manganese (as Mn)	0.230
Zinc (as Zn)	0.00
Lead (as Pb)	0.00

ANIONS

Chloride (as Cl)	14950
Sulfate (as SO ₄)	2650
Bromine (as Br)	0.00
Dissolved CO ₂ (as CO ₂)	80.00
Bicarbonate (as HCO ₃)	340.00
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)	30.00
Fluoride (as F)	0.00
Nitrate (as NO ₃)	0.00
Boron (as B)	0.00

PARAMETERS

Calculated T.D.S.	28492
Molar Conductivity	36600
Resistivity	27.32
Sp.Gr.(g/mL)	1.01
Pressure(psia)	14.70
pCO ₂ (psia)	0.0201
pH ₂ S(atm)	0.00508
Temperature (°F)	70.00
pH	7.08

COMMENTS All anions & cations are in mg/l

FRENCH CREEK SOFTWARE, INC.
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FORMATION WATER DEPOSITION POTENTIAL INDICATORS

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SATURATION LEVEL

Calcite (CaCO ₃)	2.80
Aragonite (CaCO ₃)	2.45
Witherite (BaCO ₃)	0.00
Strontianite (SrCO ₃)	0.00
Calcium oxalate (CaC ₂ O ₄)	0.00
Magnesite (MgCO ₃)	0.192
Anhydrite (CaSO ₄)	0.666
Gypsum (CaSO ₄ *2H ₂ O)	1.11
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 (Mg(OH) ₂)	< 0.001
Magnesium silicate	0.00
Iron hydroxide (Fe(OH) ₃)	< 0.001
Strengite (FePO ₄ *2H ₂ O)	0.00
Siderite (FeCO ₃)	20.33
Halite (NaCl)	0.00206
Thenardite (Na ₂ SO ₄)	< 0.001
Iron sulfide (FeS)	88.03

FREE ION MOMENTARY EXCESS (ppm)

Calcite (CaCO ₃)	0.456
Aragonite (CaCO ₃)	0.420
Witherite (BaCO ₃)	-45.10
Strontianite (SrCO ₃)	-14.58
Calcium oxalate (CaC ₂ O ₄)	-0.121
Magnesite (MgCO ₃)	-2.50
Anhydrite (CaSO ₄)	-705.81
Gypsum (CaSO ₄ *2H ₂ O)	172.70
Barite (BaSO ₄)	-0.0261
Celestite (SrSO ₄)	-50.31
Fluorite (CaF ₂)	-20.18
Calcium phosphate	>-0.001
Hydroxyapatite	-882.14
Silica (SiO ₂)	-104.47
Brucite (Mg(OH) ₂)	0.00744
Magnesium silicate	-279.64
Iron hydroxide (Fe(OH) ₃)	< 0.001
Strengite (FePO ₄ *2H ₂ O)	>-0.001
Siderite (FeCO ₃)	0.779
Halite (NaCl)	-497701
Thenardite (Na ₂ SO ₄)	-176364
Iron sulfide (FeS)	2.18

SIMPLE INDICES

Langelier	0.621
Ryznar	5.84
Puckorius	4.81
Larson-Skold Index	86.16
Stiff Davis Index	0.162
Oddo-Tomson	0.0390

BOUND IONS

BOUND IONS	TOTAL	FREE
Calcium	1440	1190
Barium	0.00	0.00
Carbonate	2.59	0.426
Phosphate	0.00	0.00
Sulfate	2650	1783

OPERATING CONDITIONS

Temperature (°F)	70.00
Time(mins)	3.00