JACAM CATALYST

DownHole R_x

WATER CHEMISTRY

FULCRUM ENERGY
NATE HYLE
JACKSON CO

MUTUAL 0780 2-8H
SEPARATOR

Report Date: 06-05-2023
Sample #: 6661

Sampled: 05-16-2023 at 0000
Sample ID: 332787

CATIONS		ANIONS	
Calcium (as Ca)	445.10	Chloride (as Cl)	27900
Magnesium (as Mg)	48.46	Sulfate (as SO_4)	0.00
Barium (as Ba)	57.96	Bromine (as Br)	0.00
Strontium (as Sr)	79.44	Dissolved CO_2 (as CO_2)	240.00
Sodium (as Na)	17444	Bicarbonate (as HCO_3)	195.20
Potassium (as K)	42.93	Carbonate (as CO_3)	0.00
Lithium (as Li)	3.28	Oxalic acid (as C_2O_4)	0.00
Ammonia (as NH_3)	0.00	Silica (as SiO_2)	0.00
Aluminum (as Al)	0.00	Phosphate(as PO_4)	0.00
Iron (as Fe)	25.49	H_2S (as H_2S)	0.00
Manganese (as Mn)	0.310	Fluoride (as F)	0.00
Zinc (as Zn)	0.0820	Nitrate (as NO_3)	0.00
Lead (as Pb)	0.00	Boron (as B)	17.21

PARAMETERS		BOUND IONS	TOTAL	FREE
Calculated T.D.S.	47415	Calcium	458.01	454.48
Molar Conductivity	55847	Barium	59.64	59.64
Resistivity	17.91	Carbonate	0.193	0.0266
Sp.Gr.(g/mL)	1.029	Phosphate	0.00	0.00
Pressure(atm)	1.00	Sulfate	0.00	0.00
pCO_2(atm)	0.0566			
pH_2S(atm)	0.00			
Temperature (^oF)	70.00	**CORROSION RATE PREDICTION**		
pH	6.06	CO_2 - H_2S Rate(mpy)		0.161

COMMENTS

JACKSON CO

JACAM LABORATORIES
205 S. Broadway · P.O. Box 96 · Sterling, KS 67579-0096

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DEPOSITION POTENTIAL INDICATORS

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SATURATION RATIO as IAP/Ksp		FREE ION MOMENTARY EXCESS (Lbs/1000 Barrels)	
Calcite ($CaCO_3$)	0.06	Calcite ($CaCO_3$)	-0.263
Aragonite ($CaCO_3$)	0.05	Aragonite ($CaCO_3$)	-0.281
Witherite ($BaCO_3$)	0.00	Witherite ($BaCO_3$)	-8.89
Strontianite ($SrCO_3$)	0.03	Strontianite ($SrCO_3$)	-0.742
Calcium oxalate (CaC_2O_4)	0.00	Calcium oxalate (CaC_2O_4)	-0.133
Magnesite ($MgCO_3$)	0.01	Magnesite ($MgCO_3$)	-2.49
Anhydrite ($CaSO_4$)	0.00	Anhydrite ($CaSO_4$)	-1285
Gypsum ($CaSO_4*2H_2O$)	0.00	Gypsum ($CaSO_4*2H_2O$)	-1091
Barite ($BaSO_4$)	0.00	Barite ($BaSO_4$)	-0.543
Celestite ($SrSO_4$)	0.00	Celestite ($SrSO_4$)	-145.17
Fluorite (CaF_2)	0.00	Fluorite (CaF_2)	-12.08
Calcium phosphate	0.00	Calcium phosphate	>-0.001
Hydroxyapatite	0.00	Hydroxyapatite	-330.25
Silica (SiO_2)	0.00	Silica (SiO_2)	-35.29
Brucite ($Mg(OH)_2$)	< 0.001	Brucite ($Mg(OH)_2$)	-1.66
Magnesium silicate	0.00	Magnesium silicate	-100.94
Iron hydroxide ($Fe(OH)_3$)	4.47	Iron hydroxide ($Fe(OH)_3$)	< 0.001
Strengite ($FePO_4*2H_2O$)	0.00	Strengite ($FePO_4*2H_2O$)	>-0.001
Siderite ($FeCO_3$)	4.49	Siderite ($FeCO_3$)	0.0139
Halite (NaCl)	0.01	Halite (NaCl)	-169018
Thenardite ($Na2SO_4$)	0.00	Thenardite ($Na2SO_4$)	-67418
Iron sulfide (FeS)	0.00	Iron sulfide (FeS)	-0.224

SIMPLE INDICES		CARBONATE PRECIPITATION POTENTIAL (Lbs/1000 Barrels)	
Langelier	-1.16	Calcite ($CaCO_3$)	-39.28
Ryznar	8.37	Aragonite ($CaCO_3$)	-40.54
Puckorius	6.67	Witherite ($BaCO_3$)	-64.71
Larson-Skold Index	246.54	Strontianite ($SrCO_3$)	-38.48
Stiff Davis Index	-1.79	Magnesite ($MgCO_3$)	-68.42
Oddo-Tomson	-1.91	Siderite ($FeCO_3$)	14.00

OPERATING CONDITIONS

Temperature (^oF)	70.00
Time(secs)	0.00

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SYSTEM IDENTIFICATION

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MUTUAL 0780 2-8H
NATE HYLE
SEPARATOR
JACKSON CO

Sample ID#: 6661
ID 332787

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Iron(as Fe)	25.49	Phosphate(as PO_4)	0.00
Ammonia(as NH_3)	0.00	H_2S (as H_2S)	0.00
Aluminum(as Al)	0.00	Fluoride(as F)	0.00
Manganese(as Mn)	0.310	Nitrate(as NO_3)	0.00
Zinc(as Zn)	0.0820	Boron(as B)	17.21
Lead(as Pb)	0.00		
PARAMETERS			
Temperature(°F)	70.00	Sample pH	6.06
Conductivity	55847	Sp.Gr.(g/mL)	1.029
Resistivity	17.91	T.D.S.	47415

SCALE AND CORROSION POTENTIAL

Temp. (°F)	Press. (atm)	Calcite $CaCO_3$		Anhydrite $CaSO_4$		Gypsum $CaSO_4*2H_2O$		Barite $BaSO_4$		Celestite $SrSO_4$		Siderite $FeCO_3$		Mackinawite FeS		CO_2 (mpy)	pCO_2 (atm)
50.00	1.000	0.0162	-0.323	0.00	-1267	0.00	-1042	0.00	-0.319	0.00	-139.76	1.12	< 0.001	0.00	-0.214	0.145	0.0566
65.45	1.000	0.0253	-0.281	0.00	-1287	0.00	-1081	0.00	-0.486	0.00	-144.74	1.97	0.00419	0.00	-0.222	0.184	0.0566
80.91	1.000	0.0369	-0.247	0.00	-1265	0.00	-1108	0.00	-0.695	0.00	-144.82	3.21	0.00756	0.00	-0.230	0.206	0.0566
96.36	1.000	0.0504	-0.219	0.00	-1209	0.00	-1124	0.00	-0.941	0.00	-142.27	4.86	0.0107	0.00	-0.240	0.270	0.0566
111.82	1.000	0.0655	-0.196	0.00	-1125	0.00	-1082	0.00	-1.22	0.00	-138.75	6.95	0.0137	0.00	-0.251	0.286	0.0566
127.27	1.000	0.0833	-0.177	0.00	-1024	0.00	-1007	0.00	-1.56	0.00	-135.79	9.69	0.0167	0.00	-0.263	0.249	0.0566
142.73	1.000	0.104	-0.160	0.00	-911.31	0.00	-943.77	0.00	-1.98	0.00	-133.50	13.23	0.0200	0.00	-0.276	0.208	0.0566
158.18	1.000	0.128	-0.146	0.00	-795.07	0.00	-890.24	0.00	-2.50	0.00	-131.83	17.71	0.0236	0.00	-0.291	0.195	0.0566
173.64	1.000	0.156	-0.134	0.00	-680.37	0.00	-845.02	0.00	-3.11	0.00	-130.72	23.26	0.0275	0.00	-0.308	0.182	0.0566
189.09	1.000	0.187	-0.123	0.00	-571.45	0.00	-807.15	0.00	-3.85	0.00	-130.18	30.06	0.0318	0.00	-0.327	0.0815	0.0566
204.55	1.000	0.221	-0.114	0.00	-471.26	0.00	-775.79	0.00	-4.74	0.00	-130.18	38.14	0.0366	0.00	-0.348	0.0624	0.0566
220.00	18.207	0.248	-0.114	0.00	-398.26	0.00	-777.86	0.00	-6.09	0.00	-135.43	46.55	0.0427	0.00	-0.382	0.375	1.03
		xSAT	Lbs per 1000 Barrels	xSAT	Lbs per 1000 Barrels	xSAT	Lbs per 1000 Barrels	xSAT	Lbs per 1000 Barrels	xSAT	Lbs per 1000 Barrels	xSAT	Lbs per 1000 Barrels	xSAT	Lbs per 1000 Barrels		

Saturation Ratios (xSAT) are the ratio of ion activity to solubility, e.g. $\{Ca\}\{CO_3\}/K_{sp}$. pCO_2 (atm) is the partial pressure of CO_2 in the gas phase.
Lbs/1000 Barrels scale is the quantity of precipitation (or dissolution) required to instantaneously bring the water to equilibrium.