JACAM CATALYST

DownHole R_x

WATER CHEMISTRY

FULCRUM ENERGY
NATE HYLE
JACKSON CO

PRU 0880 6-29H17
SEPARATOR

Report Date: 06-05-2023
Sample #: 6661
Sampled: 05-16-2023 at 0000
Sample ID: 332785

CATIONS		ANIONS	
Calcium (as Ca)	317.48	Chloride (as Cl)	27300
Magnesium (as Mg)	35.36	Sulfate (as SO_4)	0.00
Barium (as Ba)	52.34	Bromine (as Br)	0.00
Strontium (as Sr)	51.77	Dissolved CO_2 (as CO_2)	470.00
Sodium (as Na)	17264	Bicarbonate (as HCO_3)	244.00
Potassium (as K)	47.50	Carbonate (as CO_3)	0.00
Lithium (as Li)	3.20	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)	19.03	H_2S (as H_2S)	0.00
Manganese (as Mn)	0.200	Fluoride (as F)	0.00
Zinc (as Zn)	0.0820	Nitrate (as NO_3)	0.00
Lead (as Pb)	0.00	Boron (as B)	19.83

PARAMETERS		BOUND IONS	TOTAL	FREE
Calculated T.D.S.	46416	Calcium	326.05	322.87
Molar Conductivity	55011	Barium	53.75	53.75
Resistivity	18.18	Carbonate	0.389	0.0567
Sp.Gr.(g/mL)	1.027	Phosphate	0.00	0.00
Pressure(atm)	1.00	Sulfate	0.00	0.00
pCO_2(atm)	0.0552			
pH_2S(atm)	0.00			
Temperature (^oF)	70.00	**CORROSION RATE PREDICTION**		
pH	6.29	CO_2 - H_2S Rate(mpy)		0.115

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 ($CaCO_3$)	0.08	Calcite ($CaCO_3$)	-0.355
Aragonite ($CaCO_3$)	0.08	Aragonite ($CaCO_3$)	-0.380
Witherite ($BaCO_3$)	0.01	Witherite ($BaCO_3$)	-9.30
Strontianite ($SrCO_3$)	0.04	Strontianite ($SrCO_3$)	-1.08
Calcium oxalate (CaC_2O_4)	0.00	Calcium oxalate (CaC_2O_4)	-0.185
Magnesite ($MgCO_3$)	0.01	Magnesite ($MgCO_3$)	-3.28
Anhydrite ($CaSO_4$)	0.00	Anhydrite ($CaSO_4$)	-1341
Gypsum ($CaSO_4*2H_2O$)	0.00	Gypsum ($CaSO_4*2H_2O$)	-1153
Barite ($BaSO_4$)	0.00	Barite ($BaSO_4$)	-0.587
Celestite ($SrSO_4$)	0.00	Celestite ($SrSO_4$)	-152.27
Fluorite (CaF_2)	0.00	Fluorite (CaF_2)	-14.09
Calcium phosphate	0.00	Calcium phosphate	>-0.001
Hydroxyapatite	0.00	Hydroxyapatite	-328.74
Silica (SiO_2)	0.00	Silica (SiO_2)	-35.29
Brucite ($Mg(OH)_2$)	< 0.001	Brucite ($Mg(OH)_2$)	-1.92
Magnesium silicate	0.00	Magnesium silicate	-100.68
Iron hydroxide ($Fe(OH)_3$)	9.72	Iron hydroxide ($Fe(OH)_3$)	< 0.001
Strengite ($FePO_4*2H_2O$)	0.00	Strengite ($FePO_4*2H_2O$)	>-0.001
Siderite ($FeCO_3$)	7.24	Siderite ($FeCO_3$)	0.0329
Halite (NaCl)	0.01	Halite (NaCl)	-168956
Thenardite ($Na2SO_4$)	0.00	Thenardite ($Na2SO_4$)	-66971
Iron sulfide (FeS)	0.00	Iron sulfide (FeS)	-0.173

SIMPLE INDICES		CARBONATE PRECIPITATION POTENTIAL (Lbs/1000 Barrels)	
Langelier	-0.976	Calcite ($CaCO_3$)	-38.54
Ryznar	8.24	Aragonite ($CaCO_3$)	-39.83
Puckorius	6.62	Witherite ($BaCO_3$)	-60.99
Larson-Skold Index	192.75	Strontianite ($SrCO_3$)	-35.68
Stiff Davis Index	-1.60	Magnesite ($MgCO_3$)	-66.35
Oddo-Tomson	-1.72	Siderite ($FeCO_3$)	11.21

OPERATING CONDITIONS

Temperature (^oF)	70.00
Time(secs)	0.00

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JACAM CATALYST Water Chemistry Report

SYSTEM IDENTIFICATION

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NATE HYLE
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ID 332785

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Potassium(as K)	47.50	Carbonate(as CO_3)	0.00
Lithium(as Li)	3.20	Silica(as SiO_2)	0.00
Iron(as Fe)	19.03	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)	0.200	Nitrate(as NO_3)	0.00
Zinc(as Zn)	0.0820	Boron(as B)	19.83
Lead(as Pb)	0.00		
PARAMETERS			
Temperature(°F)	70.00	Sample pH	6.29
Conductivity	55011	Sp.Gr.(g/mL)	1.027
Resistivity	18.18	T.D.S.	46416

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	0.0330	-0.441	0.00	-1323	0.00	-1104	0.00	-0.346	0.00	-146.89	2.42	0.0103	0.00	-0.166	0.0195	0.0552
65.45	1.000	0.0508	-0.380	0.00	-1343	0.00	-1143	0.00	-0.526	0.00	-151.85	4.18	0.0180	0.00	-0.171	0.192	0.0552
80.91	1.000	0.0729	-0.331	0.00	-1321	0.00	-1170	0.00	-0.751	0.00	-151.91	6.70	0.0257	0.00	-0.178	0.147	0.0552
96.36	1.000	0.0987	-0.289	0.00	-1264	0.00	-1186	0.00	-1.02	0.00	-149.36	10.05	0.0331	0.00	-0.186	0.192	0.0552
111.82	1.000	0.127	-0.255	0.00	-1181	0.00	-1143	0.00	-1.32	0.00	-145.83	14.27	0.0401	0.00	-0.194	0.203	0.0552
127.27	1.000	0.161	-0.225	0.00	-1079	0.00	-1068	0.00	-1.68	0.00	-142.86	19.75	0.0476	0.00	-0.203	0.172	0.0552
142.73	1.000	0.200	-0.199	0.00	-965.88	0.00	-1004	0.00	-2.13	0.00	-140.55	26.78	0.0557	0.00	-0.214	0.140	0.0552
158.18	1.000	0.244	-0.177	0.00	-848.72	0.00	-950.30	0.00	-2.67	0.00	-138.86	35.59	0.0645	0.00	-0.225	0.137	0.0552
173.64	1.000	0.295	-0.156	0.00	-732.72	0.00	-904.57	0.00	-3.32	0.00	-137.74	46.42	0.0742	0.00	-0.238	0.133	0.0552
189.09	1.000	0.352	-0.137	0.00	-622.06	0.00	-866.18	0.00	-4.10	0.00	-137.17	59.54	0.0849	0.00	-0.253	0.0639	0.0552
204.55	1.000	0.414	-0.119	0.00	-519.60	0.00	-834.35	0.00	-5.03	0.00	-137.16	74.94	0.0966	0.00	-0.270	0.0516	0.0552
220.00	18.207	0.460	-0.114	0.00	-444.31	0.00	-836.23	0.00	-6.43	0.00	-142.36	90.56	0.112	0.00	-0.297	0.313	1.00
		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.