



JACAM LABORATORIES

DownHole R_x

WATER CHEMISTRY

BERRY PETROLEUM
ROB SIMEONE

O-29 LATHAM 29-18D
SEPARATOR

Report Date: 10-05-2012 Sampled: 09-04-2012
Sample #: 23926 at 0000

Sample ID: 2580

CATIONS

Calcium (as Ca)	243.40
Magnesium (as Mg)	18.18
Barium (as Ba)	31.32
Strontium (as Sr)	22.24
Sodium (as Na)	5758
Potassium (as K)	138.00
Lithium (as Li)	9.22
Ammonia (as NH ₃)	0.00
Aluminum (as Al)	0.00
Iron (as Fe)	15.61
Manganese (as Mn)	0.0120
Zinc (as Zn)	0.0940
Lead (as Pb)	0.00

ANIONS

Chloride (as Cl)	9500
Sulfate (as SO ₄)	0.00
Bromine (as Br)	0.00
Dissolved CO ₂ (as CO ₂)	854.00
Bicarbonate (as HCO ₃)	325.00
Carbonate (as CO ₃)	0.00
Oxalic acid (as C ₂ O ₄)	0.00
Silica (as Si)	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)	8.71

PARAMETERS

Calculated T.D.S.	16103
Molar Conductivity	22652
Resistivity	44.15
Density(g/mL)	1.01
Pressure(atm)	1.00
pCO ₂ (atm)	0.0564
pH ₂ S(atm)	0.00
Temperature (°F)	190.00
pH	6.50

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

**JACAM LABORATORIES****DownHole R_x****DEPOSITION POTENTIAL INDICATORS**BERRY PETROLEUM
ROB SIMEONEO-29 LATHAM 29-18D
SEPARATOR

Report Date: 10-05-2012 Sampled: 09-04-2012
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SATURATION LEVEL

Calcite (CaCO ₃)	0.985
Aragonite (CaCO ₃)	0.802
Witherite (BaCO ₃)	0.0275
Strontianite (SrCO ₃)	0.207
Calcium oxalate (CaC ₂ O ₄)	0.00
Magnesite (MgCO ₃)	0.146
Anhydrite (CaSO ₄)	0.00
Gypsum (CaSO ₄ *2H ₂ O)	0.00
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)	329.98
Strengite (FePO ₄ *2H ₂ O)	0.00
Siderite (FeCO ₃)	202.86
Halite (NaCl)	< 0.001
Thenardite (Na ₂ SO ₄)	0.00
Iron sulfide (FeS)	0.00

MOMENTARY EXCESS (Lbs/1000 Barrels)

Calcite (CaCO ₃)	-0.00247
Aragonite (CaCO ₃)	-0.0396
Witherite (BaCO ₃)	-7.47
Strontianite (SrCO ₃)	-0.836
Calcium oxalate (CaC ₂ O ₄)	-0.212
Magnesite (MgCO ₃)	-0.760
Anhydrite (CaSO ₄)	-670.57
Gypsum (CaSO ₄ *2H ₂ O)	-908.08
Barite (BaSO ₄)	-2.96
Celestite (SrSO ₄)	-94.55
Fluorite (CaF ₂)	-19.09
Calcium phosphate	>-0.001
Hydroxyapatite	-484.14
Silica (SiO ₂)	-151.08
Brucite (Mg(OH) ₂)	0.0303
Magnesium silicate	-166.23
Iron hydroxide (Fe(OH) ₃)	< 0.001
Strengite (FePO ₄ *2H ₂ O)	>-0.001
Siderite (FeCO ₃)	0.185
Halite (NaCl)	-206533
Thenardite (Na ₂ SO ₄)	-56031
Iron sulfide (FeS)	-0.0972

SIMPLE INDICES

Langelier	0.0566
Ryznar	6.39
Puckorius	4.80
Larson-Skold Index	50.12
Stiff Davis Index	0.819
Oddo-Tomson	0.141

BOUND IONS

Calcium	243.40
Barium	31.32
Carbonate	5.67
Phosphate	0.00
Sulfate	0.00

TOTAL**FREE**

237.12
31.32
0.276
0.00
0.00

OPERATING CONDITIONS

Temperature (°F)	190.00
Time(secs)	0.00

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DownHole SAT™ Water Analysis Report

SYSTEM IDENTIFICATION

BERRY PETROLEUM
O-29 LATHAM 29-18D
ROB SIMEONE
SEPARATOR

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ID: 2580
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Boron(as B)	8.71

PARAMETERS

Temperature(°F)	190.00
T.D.S.	16103
Resistivity:	44.15
Sample pH	6.50
Conductivity:	22652

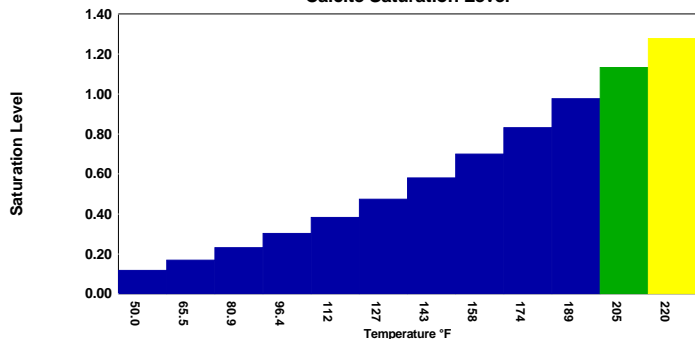
SCALE AND CORROSION POTENTIAL

Temp. (°F)	Press. (atm)	Calcite CaCO ₃		Anhydrite CaSO ₄		Gypsum CaSO ₄ *2H ₂ O		Barite BaSO ₄		Celestite SrSO ₄		Siderite FeCO ₃		Mackawenite FeS		CO ₂ (mpy)	pCO ₂ (atm)
50.00	0.00	0.117	-0.335	0.00	-1002	0.00	-818.50	0.00	-0.275	0.00	-105.69	10.63	0.0468	0.00	-0.0655	0.0714	0.0564
65.45	0.00	0.168	-0.276	0.00	-1012	0.00	-844.10	0.00	-0.414	0.00	-108.72	17.14	0.0611	0.00	-0.0675	0.134	0.0564
80.91	0.00	0.231	-0.226	0.00	-991.98	0.00	-860.42	0.00	-0.586	0.00	-108.33	26.16	0.0755	0.00	-0.0698	0.102	0.0564
96.36	0.00	0.302	-0.183	0.00	-945.29	0.00	-868.20	0.00	-0.785	0.00	-106.12	37.98	0.0895	0.00	-0.0723	0.134	0.0564
111.82	0.00	0.382	-0.147	0.00	-882.70	0.00	-869.81	0.00	-1.01	0.00	-103.23	52.83	0.103	0.00	-0.0752	0.140	0.0564
127.27	0.00	0.474	-0.114	0.00	-826.80	0.00	-872.79	0.00	-1.27	0.00	-100.71	71.76	0.117	0.00	-0.0784	0.118	0.0564
142.73	0.00	0.579	-0.0837	0.00	-778.84	0.00	-878.02	0.00	-1.59	0.00	-98.62	95.57	0.132	0.00	-0.0821	0.0953	0.0564
158.18	0.00	0.699	-0.0556	0.00	-737.68	0.00	-885.49	0.00	-1.96	0.00	-96.93	124.77	0.148	0.00	-0.0863	0.0992	0.0564
173.64	0.00	0.831	-0.0292	0.00	-702.40	0.00	-895.26	0.00	-2.41	0.00	-95.60	159.63	0.165	0.00	-0.0912	0.103	0.0564
189.09	0.00	0.976	-0.00395	0.00	-672.28	0.00	-907.40	0.00	-2.93	0.00	-94.61	200.27	0.184	0.00	-0.0969	0.0518	0.0564
204.55	0.00	1.13	0.0204	0.00	-646.74	0.00	-922.03	0.00	-3.54	0.00	-93.96	246.30	0.203	0.00	-0.104	0.0434	0.0564
220.00	0.171	1.28	0.0422	0.00	-634.33	0.00	-952.41	0.00	-4.32	0.00	-94.85	293.80	0.225	0.00	-0.114	0.0591	0.0660
		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		

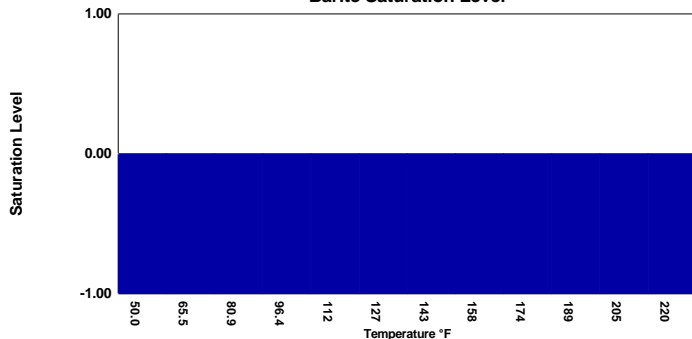
Saturation Levels (xSAT) are the ratio of ion activity to solubility, e.g. {Ca}{CO₃}/K_{sp}. pCO₂ (atm) is the partial pressure of CO₂ in the gas phase.

Lbs/1000 Barrels scale is the quantity of precipitation (or dissolution) required to instantaneously bring the water to equilibrium.

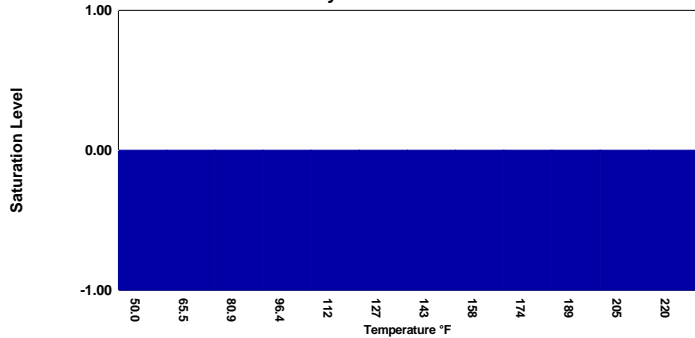
Calcite Saturation Level



Barite Saturation Level



Anhydrite Saturation Level



Gypsum Saturation Level

