KOLAR Document ID: 1398360

KANSAS CORPORATION COMMISSION
OIL & GAS CONSERVATION DIVISION

Form U3C
June 2015
Form must be Typed
Form must be completed on a per well basis

ANNUAL REPORT OF PRESSURE MONITORING, FLUID INJECTION AND ENHANCED RECOVERY

Complete all blanks - add pages if needed. Copy to be retained for five (5) years after filing date.

OPERATOR: License # 32811
Name: OSAGE Resources, LLC
Address 1: PO BOX 1185
Address 2:
City: MCPHERSON State: KS Zip: 67460 + 1185
Contact Person: JD Dubwig
Phone: (620) 930-8056
Lease Name: OSAGE
Well Number: 115 SWD

API No.: 15-007-23182-00-00
Permit No: D30000.0
Reporting Year: 2017
(January 1 to December 31)

(Q/Q/Q/Q) - SW - SE - NE Sec. 25 Twp. 33 S. R. 15 ☐ E ☑ W
3178 feet from ☐ N / ☑ S Line of Section
1100 feet from ☑ E / ☐ W Line of Section
County: Barber

I. Injection Fluid:

Type *(Pick one)*: ☐ Fresh Water ☐ Treated Brine ☑ Untreated Brine ☐ Water/Brine
Source: ☑ Produced Water ☐ Other *(Attach list)*
Quality: Total Dissolved Solids: 198721 mg/l Specific Gravity: 1.14 Additives:
(Attach water analysis, if available)

II. Well Data:

Maximum Authorized Injection Pressure: 400 psi Injection Zone: ARBUCKLE,SIMPSON
Maximum Authorized Injection Rate: 20000 barrels per day
Total Number of Enhanced Recovery Injection Wells Covered by this Permit: _____ *(Include TA's)*

III.

Month:	Total Fluid Injected BBL	Maximum Fluid Pressure	Total Gas Injected MCF	Maximum Gas Pressure	# Days of Injection
January	22745	0	0		31
February	18836	0	0		28
March	18894	0	0		31
April	13646	0	0		30
May	12199	0	0		31
June	11242	0	0		30
July	12798	0	0		31
August	7970	0	0		31
September	5885	0	0		30
October	5849	0	0		31
November	5614	0	0		30
December	5828	0	0		31
TOTAL	141506		0		

Submitted Electronically

JACAM LABORATORIES

DownHole R_X

WATER CHEMISTRY

OSAGE RESOURCES
RYAN KLAUSMEYER
BARBER KS

OSAGE 115
DISCHARGE

Report Date: 09-22-2016
Sample #: 2046

Sampled: 09-02-2016
at 0000

Sample ID: 136625

CATIONS		ANIONS	
Calcium (as Ca)	14260	Chloride (as Cl)	132200
Magnesium (as Mg)	2794	Sulfate (as SO_4)	125.00
Barium (as Ba)	0.204	Bromine (as Br)	0.00
Strontium (as Sr)	748.40	Dissolved CO_2 (as CO_2)	200.00
Sodium (as Na)	55319	Bicarbonate (as HCO_3)	48.00
Potassium (as K)	787.80	Carbonate (as CO_3)	0.00
Lithium (as Li)	10.11	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)	16.93	H_2S (as H_2S)	0.00
Manganese (as Mn)	0.0120	Fluoride (as F)	0.00
Zinc (as Zn)	0.669	Nitrate (as NO_3)	0.00
Lead (as Pb)	0.00	Boron (as B)	10.28

PARAMETERS

Calculated T.D.S.	198721
Molar Conductivity	330618
Resistivity	3.02
Sp.Gr.(g/mL)	1.14
Pressure(atm)	1.00
pCO_2(atm)	0.00844
pH_2S(atm)	0.00
Temperature (^oF)	79.00
pH	6.40

COMMENTS

BARBER KS

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

JACAM LABORATORIES

DownHole R_X

DEPOSITION POTENTIAL INDICATORS

OSAGE RESOURCES
RYAN KLAUSMEYER
BARBER KS

OSAGE 115
DISCHARGE

Report Date: 09-22-2016
Sample #: 2046

Sampled: 09-02-2016
at 0000

Sample ID: 136625

SATURATION LEVEL		MOMENTARY EXCESS (Lbs/1000 Barrels)	
Calcite ($CaCO_3$)	0.419	Calcite ($CaCO_3$)	-0.00313
Aragonite ($CaCO_3$)	0.364	Aragonite ($CaCO_3$)	-0.00394
Witherite ($BaCO_3$)	< 0.001	Witherite ($BaCO_3$)	-28.79
Strontianite ($SrCO_3$)	0.0173	Strontianite ($SrCO_3$)	-0.189
Calcium oxalate (CaC_2O_4)	0.00	Calcium oxalate (CaC_2O_4)	-0.00280
Magnesite ($MgCO_3$)	0.103	Magnesite ($MgCO_3$)	-0.0165
Anhydrite ($CaSO_4$)	0.0795	Anhydrite ($CaSO_4$)	-115.10
Gypsum ($CaSO_4*2H_2O$)	0.102	Gypsum ($CaSO_4*2H_2O$)	-99.73
Barite ($BaSO_4$)	0.0264	Barite ($BaSO_4$)	-3.65
Celestite ($SrSO_4$)	0.0780	Celestite ($SrSO_4$)	-127.07
Fluorite (CaF_2)	0.00	Fluorite (CaF_2)	-1.74
Calcium phosphate	0.00	Calcium phosphate	>-0.001
Hydroxyapatite	0.00	Hydroxyapatite	-281.35
Silica (SiO_2)	0.00	Silica (SiO_2)	-31.44
Brucite ($Mg(OH)_2$)	< 0.001	Brucite ($Mg(OH)_2$)	< 0.001
Magnesium silicate	0.00	Magnesium silicate	-91.09
Iron hydroxide ($Fe(OH)_3$)	1.14	Iron hydroxide ($Fe(OH)_3$)	< 0.001
Strengite ($FePO_4*2H_2O$)	0.00	Strengite ($FePO_4*2H_2O$)	>-0.001
Siderite ($FeCO_3$)	0.234	Siderite ($FeCO_3$)	-0.00853
Halite (NaCl)	0.147	Halite (NaCl)	-92711
Thenardite ($Na2SO_4$)	< 0.001	Thenardite ($Na2SO_4$)	-88155
Iron sulfide (FeS)	0.00	Iron sulfide (FeS)	-0.330

SIMPLE INDICES		BOUND IONS	TOTAL	FREE
Langelier	0.409	Calcium	14260	14222
Ryznar	5.58	Barium	0.204	0.204
Puckorius	5.27	Carbonate	0.979	0.00388
Larson-Skold Index	5424	Phosphate	0.00	0.00
Stiff Davis Index	0.262	Sulfate	125.00	20.29
Oddo-Tomson	-0.707			

OPERATING CONDITIONS

Temperature (^oF)	79.00
Time(secs)	0.00

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

DownHole SAT™ Water Analysis Report

JACAM LABORATORIES

SYSTEM IDENTIFICATION

OSAGE RESOURCES
OSAGE 115
RYAN KLAUSMEYER
DISCHARGE
BARBER KS

Sample ID#: 2046
ID: 136625
Report Date: 09-22-2016
Sample Date: 09-02-2016
at 0000

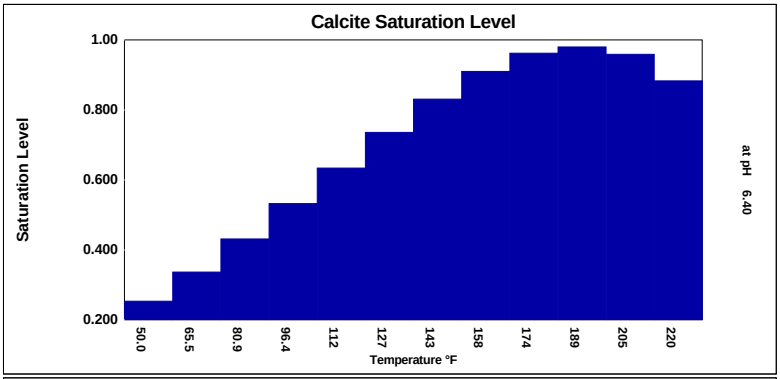
WATER CHEMISTRY

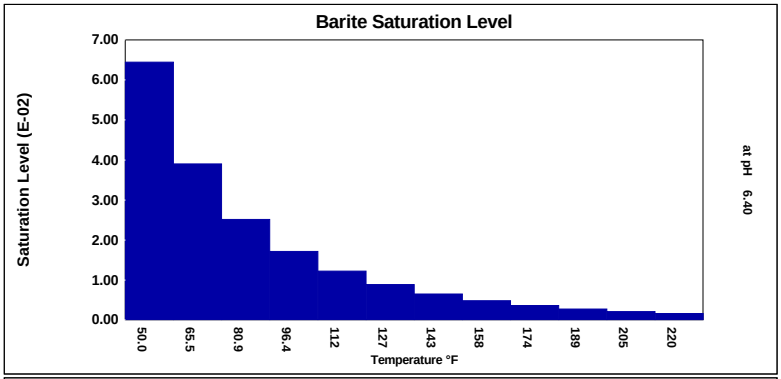
CATIONS		ANIONS	
Calcium(as Ca)	14260	Chloride(as Cl)	132200
Magnesium(as Mg)	2794	Sulfate(as SO_4)	125.00
Barium(as Ba)	0.204	Bromine(as Br)	0.00
Strontium(as Sr)	748.40	Dissolved CO_2(as CO_2)	200.00
Sodium(as Na)	55319	Bicarbonate(as HCO_3)	48.00
Potassium(as K)	787.80	Carbonate(as CO_3)	0.00
Lithium(as Li)	10.11	Silica(as SiO_2)	0.00
Iron(as Fe)	16.93	Phosphate(as PO_4)	0.00
Field Iron(as Fe)	0.00	H_2S (as H_2S)	0.00
Ammonia(as NH_3)	0.00	Fluoride(as F)	0.00
Aluminum(as Al)	0.00	Nitrate(as NO_3)	0.00
Manganese(as Mn)	0.0120	Boron(as B)	10.28
Zinc(as Zn)	0.669		
Lead(as Pb)	0.00	**PARAMETERS**	
		Temperature(^{O}F)	79.00
Sample pH	6.40	T.D.S.	198721
Conductivity:	330618	Resistivity:	3.02

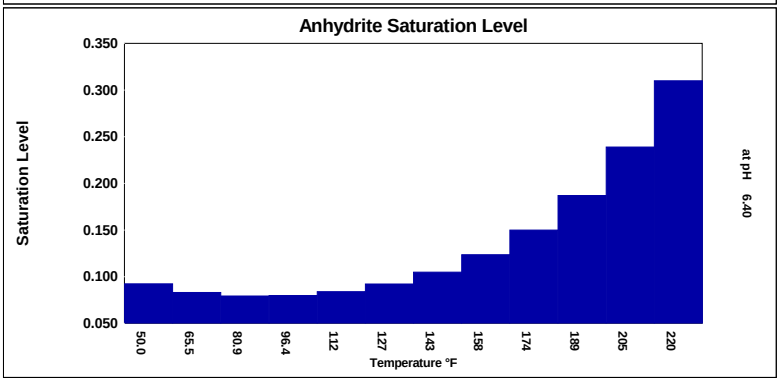
SCALE AND CORROSION POTENTIAL

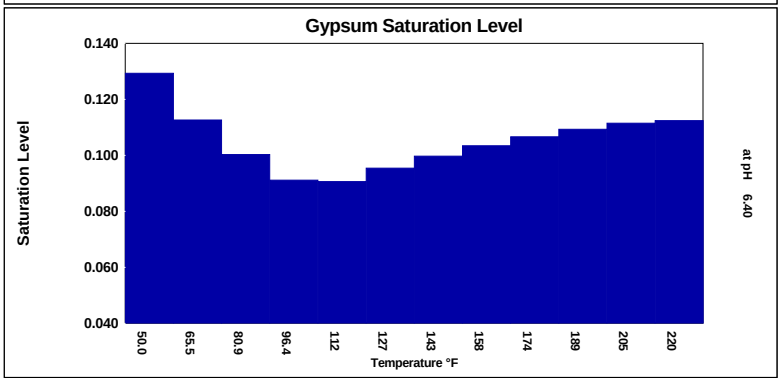
Temp.	Press.	Calcite $CaCO_3$		Anhydrite $CaSO_4$		Gypsum $CaSO_4*2H_2O$		Barite $BaSO_4$		Celestite $SrSO_4$		Siderite $FeCO_3$		Mackawenite FeS		CO_2	pCO_2
(^{O}F)	(atm)	xSAT	Lbs per 1000 Barrels	xSAT	Lbs per 1000 Barrels	xSAT	Lbs per 1000 Barrels	xSAT	Lbs per 1000 Barrels	xSAT	Lbs per 1000 Barrels	xSAT	Lbs per 1000 Barrels	xSAT	Lbs per 1000 Barrels	(mpy)	(atm)
50.00	0.00	0.253	-0.00502	0.0922	-111.61	0.129	-86.66	0.0644	-1.61	0.0961	-116.73	0.115	-0.0152	0.00	-0.307	0.0615	0.00844
65.45	0.00	0.337	-0.00394	0.0831	-116.48	0.113	-94.37	0.0390	-2.59	0.0836	-125.20	0.171	-0.0112	0.00	-0.319	0.131	0.00844
80.91	0.00	0.431	-0.00303	0.0793	-114.53	0.100	-100.38	0.0251	-3.81	0.0775	-127.05	0.244	-0.00821	0.00	-0.331	0.0612	0.00844
96.36	0.00	0.532	-0.00226	0.0797	-106.92	0.0911	-104.71	0.0171	-5.21	0.0742	-125.31	0.334	-0.00592	0.00	-0.345	0.0801	0.00844
111.82	0.00	0.634	-0.00162	0.0839	-95.34	0.0906	-99.34	0.0122	-6.73	0.0723	-122.22	0.438	-0.00416	0.00	-0.361	0.0841	0.00844
127.27	0.00	0.735	-0.00109	0.0921	-81.59	0.0954	-88.87	0.00883	-8.46	0.0702	-119.90	0.557	-0.00277	0.00	-0.378	0.0708	0.00844
142.73	0.00	0.831	>-0.001	0.105	-67.24	0.0997	-80.55	0.00647	-10.43	0.0679	-118.47	0.687	-0.00169	0.00	-0.397	0.0573	0.00844
158.18	0.00	0.910	>-0.001	0.123	-53.49	0.103	-73.93	0.00479	-12.65	0.0655	-117.89	0.817	>-0.001	0.00	-0.418	0.0576	0.00844
173.64	0.00	0.962	>-0.001	0.150	-41.11	0.107	-68.68	0.00358	-15.12	0.0630	-118.11	0.934	>-0.001	0.00	-0.441	0.0578	0.00844
189.09	0.00	0.979	>-0.001	0.187	-30.49	0.109	-64.56	0.00270	-17.87	0.0605	-119.12	1.02	< 0.001	0.00	-0.467	0.0281	0.00844
204.55	0.00	0.959	>-0.001	0.239	-21.72	0.111	-61.40	0.00206	-20.92	0.0579	-120.95	1.07	< 0.001	0.00	-0.496	0.0225	0.00844
220.00	0.171	0.883	>-0.001	0.310	-15.27	0.112	-61.19	0.00157	-24.70	0.0550	-127.29	1.05	< 0.001	0.00	-0.540	0.0309	0.00988

Saturation Levels (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.









JACAM LABORATORIES

DownHole R_X

WATER CHEMISTRY

OSAGE RESOURCES
RYAN KLAUSMEYER
BARBER KS

OSAGE 115
DISCHARGE

Report Date: 09-22-2016
Sample #: 2046

Sampled: 09-02-2016
at 0000

Sample ID: 136625

CATIONS		ANIONS	
Calcium (as Ca)	14260	Chloride (as Cl)	132200
Magnesium (as Mg)	2794	Sulfate (as SO_4)	125.00
Barium (as Ba)	0.204	Bromine (as Br)	0.00
Strontium (as Sr)	748.40	Dissolved CO_2 (as CO_2)	200.00
Sodium (as Na)	55319	Bicarbonate (as HCO_3)	48.00
Potassium (as K)	787.80	Carbonate (as CO_3)	0.00
Lithium (as Li)	10.11	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)	16.93	H_2S (as H_2S)	0.00
Manganese (as Mn)	0.0120	Fluoride (as F)	0.00
Zinc (as Zn)	0.669	Nitrate (as NO_3)	0.00
Lead (as Pb)	0.00	Boron (as B)	10.28

PARAMETERS

Calculated T.D.S.	198721
Molar Conductivity	330618
Resistivity	3.02
Sp.Gr.(g/mL)	1.14
Pressure(atm)	1.00
pCO_2(atm)	0.00844
pH_2S(atm)	0.00
Temperature (^oF)	79.00
pH	6.40

COMMENTS

BARBER KS

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

JACAM LABORATORIES

DownHole R_X

DEPOSITION POTENTIAL INDICATORS

OSAGE RESOURCES
RYAN KLAUSMEYER
BARBER KS

OSAGE 115
DISCHARGE

Report Date: 09-22-2016
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SATURATION LEVEL		MOMENTARY EXCESS (Lbs/1000 Barrels)	
Calcite ($CaCO_3$)	0.419	Calcite ($CaCO_3$)	-0.00313
Aragonite ($CaCO_3$)	0.364	Aragonite ($CaCO_3$)	-0.00394
Witherite ($BaCO_3$)	< 0.001	Witherite ($BaCO_3$)	-28.79
Strontianite ($SrCO_3$)	0.0173	Strontianite ($SrCO_3$)	-0.189
Calcium oxalate (CaC_2O_4)	0.00	Calcium oxalate (CaC_2O_4)	-0.00280
Magnesite ($MgCO_3$)	0.103	Magnesite ($MgCO_3$)	-0.0165
Anhydrite ($CaSO_4$)	0.0795	Anhydrite ($CaSO_4$)	-115.10
Gypsum ($CaSO_4*2H_2O$)	0.102	Gypsum ($CaSO_4*2H_2O$)	-99.73
Barite ($BaSO_4$)	0.0264	Barite ($BaSO_4$)	-3.65
Celestite ($SrSO_4$)	0.0780	Celestite ($SrSO_4$)	-127.07
Fluorite (CaF_2)	0.00	Fluorite (CaF_2)	-1.74
Calcium phosphate	0.00	Calcium phosphate	>-0.001
Hydroxyapatite	0.00	Hydroxyapatite	-281.35
Silica (SiO_2)	0.00	Silica (SiO_2)	-31.44
Brucite ($Mg(OH)_2$)	< 0.001	Brucite ($Mg(OH)_2$)	< 0.001
Magnesium silicate	0.00	Magnesium silicate	-91.09
Iron hydroxide ($Fe(OH)_3$)	1.14	Iron hydroxide ($Fe(OH)_3$)	< 0.001
Strengite ($FePO_4*2H_2O$)	0.00	Strengite ($FePO_4*2H_2O$)	>-0.001
Siderite ($FeCO_3$)	0.234	Siderite ($FeCO_3$)	-0.00853
Halite (NaCl)	0.147	Halite (NaCl)	-92711
Thenardite ($Na2SO_4$)	< 0.001	Thenardite ($Na2SO_4$)	-88155
Iron sulfide (FeS)	0.00	Iron sulfide (FeS)	-0.330

SIMPLE INDICES		BOUND IONS	TOTAL	FREE
Langelier	0.409	Calcium	14260	14222
Ryznar	5.58	Barium	0.204	0.204
Puckorius	5.27	Carbonate	0.979	0.00388
Larson-Skold Index	5424	Phosphate	0.00	0.00
Stiff Davis Index	0.262	Sulfate	125.00	20.29
Oddo-Tomson	-0.707			

OPERATING CONDITIONS

Temperature (^oF)	79.00
Time(secs)	0.00

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

DownHole SAT™ Water Analysis Report

JACAM LABORATORIES

SYSTEM IDENTIFICATION

OSAGE RESOURCES
OSAGE 115
RYAN KLAUSMEYER
DISCHARGE
BARBER KS

Sample ID#: 2046
ID: 136625
Report Date: 09-22-2016
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WATER CHEMISTRY

CATIONS		ANIONS	
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Barium(as Ba)	0.204	Bromine(as Br)	0.00
Strontium(as Sr)	748.40	Dissolved CO_2(as CO_2)	200.00
Sodium(as Na)	55319	Bicarbonate(as HCO_3)	48.00
Potassium(as K)	787.80	Carbonate(as CO_3)	0.00
Lithium(as Li)	10.11	Silica(as SiO_2)	0.00
Iron(as Fe)	16.93	Phosphate(as PO_4)	0.00
Field Iron(as Fe)	0.00	H_2S (as H_2S)	0.00
Ammonia(as NH_3)	0.00	Fluoride(as F)	0.00
Aluminum(as Al)	0.00	Nitrate(as NO_3)	0.00
Manganese(as Mn)	0.0120	Boron(as B)	10.28
Zinc(as Zn)	0.669		
Lead(as Pb)	0.00	**PARAMETERS**	
		Temperature(^{O}F)	79.00
Sample pH	6.40	T.D.S.	198721
Conductivity:	330618	Resistivity:	3.02

SCALE AND CORROSION POTENTIAL

Temp.	Press.	Calcite $CaCO_3$		Anhydrite $CaSO_4$		Gypsum $CaSO_4*2H_2O$		Barite $BaSO_4$		Celestite $SrSO_4$		Siderite $FeCO_3$		Mackawenite FeS		CO_2	pCO_2
(^{O}F)	(atm)	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	(mpy)	(atm)
50.00	0.00	0.253	-0.00502	0.0922	-111.61	0.129	-86.66	0.0644	-1.61	0.0961	-116.73	0.115	-0.0152	0.00	-0.307	0.0615	0.00844
65.45	0.00	0.337	-0.00394	0.0831	-116.48	0.113	-94.37	0.0390	-2.59	0.0836	-125.20	0.171	-0.0112	0.00	-0.319	0.131	0.00844
80.91	0.00	0.431	-0.00303	0.0793	-114.53	0.100	-100.38	0.0251	-3.81	0.0775	-127.05	0.244	-0.00821	0.00	-0.331	0.0612	0.00844
96.36	0.00	0.532	-0.00226	0.0797	-106.92	0.0911	-104.71	0.0171	-5.21	0.0742	-125.31	0.334	-0.00592	0.00	-0.345	0.0801	0.00844
111.82	0.00	0.634	-0.00162	0.0839	-95.34	0.0906	-99.34	0.0122	-6.73	0.0723	-122.22	0.438	-0.00416	0.00	-0.361	0.0841	0.00844
127.27	0.00	0.735	-0.00109	0.0921	-81.59	0.0954	-88.87	0.00883	-8.46	0.0702	-119.90	0.557	-0.00277	0.00	-0.378	0.0708	0.00844
142.73	0.00	0.831	>-0.001	0.105	-67.24	0.0997	-80.55	0.00647	-10.43	0.0679	-118.47	0.687	-0.00169	0.00	-0.397	0.0573	0.00844
158.18	0.00	0.910	>-0.001	0.123	-53.49	0.103	-73.93	0.00479	-12.65	0.0655	-117.89	0.817	>-0.001	0.00	-0.418	0.0576	0.00844
173.64	0.00	0.962	>-0.001	0.150	-41.11	0.107	-68.68	0.00358	-15.12	0.0630	-118.11	0.934	>-0.001	0.00	-0.441	0.0578	0.00844
189.09	0.00	0.979	>-0.001	0.187	-30.49	0.109	-64.56	0.00270	-17.87	0.0605	-119.12	1.02	< 0.001	0.00	-0.467	0.0281	0.00844
204.55	0.00	0.959	>-0.001	0.239	-21.72	0.111	-61.40	0.00206	-20.92	0.0579	-120.95	1.07	< 0.001	0.00	-0.496	0.0225	0.00844
220.00	0.171	0.883	>-0.001	0.310	-15.27	0.112	-61.19	0.00157	-24.70	0.0550	-127.29	1.05	< 0.001	0.00	-0.540	0.0309	0.00988

Saturation Levels (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.