KOLAR Document ID: 1389202

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 # 33999
Name: Linn Operating, LLC
Address 1: 600 TRAVIS STE 1400
Address 2:
City: HOUSTON State: TX Zip: 77002 + 3018
Contact Person: Daniel Busch
Phone: (281) 840-4234
Lease Name: MCCABE
Well Number: 2

API No.: 15-067-00014-00-01
Permit No: D19040.0
Reporting Year: 2017
(January 1 to December 31)

____ - NE - SE - NW Sec. 3 Twp. 30 S. R. 35 ☐ E ☑ W
(Q/Q/Q/Q)
3344 feet from ☐ N / ☑ S Line of Section
662 feet from ☑ E / ☐ W Line of Section
County: Grant

I. Injection Fluid:

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

II. Well Data:

Maximum Authorized Injection Pressure: 1200 psi Injection Zone: Topeka
Maximum Authorized Injection Rate: 1500 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	11847	350	0		26
February	10614	300	0		24
March	12196	350	0		29
April	12056	300	0		22
May	11298	350	0		25
June	11117	375	0		28
July	6476	350	0		19
August	10150	300	0		26
September	8912	300	0		24
October	13225	350	0		28
November	9444	350	0		22
December	11557	350	0		29
TOTAL	128892		0		

Submitted Electronically

JACAM LABORATORIES

DownHole R_x

WATER CHEMISTRY

LINN OPERATING
JASON URWIN
GRANT KS

MCCABE SWDW
STOCK TANK

Report Date: 03-08-2017
Sample #: 3076

Sampled: 03-07-2017
at 0000

Sample ID: 147886

CATIONS		ANIONS	
Calcium (as Ca)	10610	Chloride (as Cl)	137800
Magnesium (as Mg)	3830	Sulfate (as SO_4)	1050
Barium (as Ba)	0.204	Bromine (as Br)	0.00
Strontium (as Sr)	265.90	Dissolved CO_2 (as CO_2)	125.00
Sodium (as Na)	60872	Bicarbonate (as HCO_3)	92.00
Potassium (as K)	781.70	Carbonate (as CO_3)	0.00
Lithium (as Li)	16.78	Oxalic acid (as C_2O_4)	0.00
Ammonia (as NH_3)	0.00	Silica (as SiO_2)	0.00
Aluminum (as Al)	1.05	Phosphate(as PO_4)	0.00
Iron (as Fe)	0.0510	H_2S (as H_2S)	0.00
Manganese (as Mn)	0.0120	Fluoride (as F)	0.00
Zinc (as Zn)	0.0820	Nitrate (as NO_3)	0.00
Lead (as Pb)	0.00	Boron (as B)	34.32

PARAMETERS

Calculated T.D.S.	206449
Molar Conductivity	355344
Resistivity	2.81
Sp.Gr.(g/mL)	1.15
Pressure(atm)	1.00
pCO_2(atm)	0.00193
pH_2S(atm)	0.00
Temperature (^oF)	60.00
pH	7.50

COMMENTS

GRANT KS

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

JACAM LABORATORIES

DownHole R_x

DEPOSITION POTENTIAL INDICATORS

LINN OPERATING
JASON URWIN
GRANT KS

MCCABE SWDW
STOCK TANK

Report Date: 03-08-2017 Sampled: 03-07-2017
Sample #: 3076 at 0000

Sample ID: 147886

SATURATION LEVEL	
Calcite ($CaCO_3$)	3.34
Aragonite ($CaCO_3$)	2.95
Witherite ($BaCO_3$)	< 0.001
Strontianite ($SrCO_3$)	0.0791
Calcium oxalate (CaC_2O_4)	0.00
Magnesite ($MgCO_3$)	1.27
Anhydrite ($CaSO_4$)	0.567
Gypsum ($CaSO_4*2H_2O$)	0.770
Barite ($BaSO_4$)	0.404
Celestite ($SrSO_4$)	0.271
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 ($Fe(OH)_3$)	0.300
Strengite ($FePO_4*2H_2O$)	0.00
Siderite ($FeCO_3$)	0.00646
Halite (NaCl)	0.184
Thenardite ($Na2SO_4$)	< 0.001
Iron sulfide (FeS)	0.00

MOMENTARY EXCESS (Lbs/1000 Barrels)	
Calcite ($CaCO_3$)	0.0192
Aragonite ($CaCO_3$)	0.0181
Witherite ($BaCO_3$)	-26.84
Strontianite ($SrCO_3$)	-0.468
Calcium oxalate (CaC_2O_4)	-0.00350
Magnesite ($MgCO_3$)	0.00484
Anhydrite ($CaSO_4$)	-72.37
Gypsum ($CaSO_4*2H_2O$)	-32.28
Barite ($BaSO_4$)	-0.178
Celestite ($SrSO_4$)	-144.73
Fluorite (CaF_2)	-1.85
Calcium phosphate	>-0.001
Hydroxyapatite	-247.65
Silica (SiO_2)	-23.44
Brucite ($Mg(OH)_2$)	0.00468
Magnesium silicate	-80.66
Iron hydroxide ($Fe(OH)_3$)	< 0.001
Strengite ($FePO_4*2H_2O$)	>-0.001
Siderite ($FeCO_3$)	-0.389
Halite (NaCl)	-81738
Thenardite ($Na2SO_4$)	-87622
Iron sulfide (FeS)	-0.205

SIMPLE INDICES	
Langelier	1.45
Ryznar	4.59
Puckorius	5.08
Larson-Skold Index	3639
Stiff Davis Index	1.27
Oddo-Tomson	0.324

BOUND IONS	TOTAL	FREE
Calcium	10610	10418
Barium	0.204	0.204
Carbonate	8.89	0.0470
Phosphate	0.00	0.00
Sulfate	1050	194.63

OPERATING CONDITIONS

Temperature (^oF)	60.00
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

LINN OPERATING
MCCABE SWDW
JASON URWIN
STOCK TANK
GRANT KS

Sample ID#: 3076
ID: 147886
Report Date: 03-08-2017
Sample Date: 03-07-2017
at 0000

WATER CHEMISTRY

CATIONS

Calcium(as Ca)	10610
Magnesium(as Mg)	3830
Barium(as Ba)	0.204
Strontium(as Sr)	265.90
Sodium(as Na)	60872
Potassium(as K)	781.70
Lithium(as Li)	16.78
Iron(as Fe)	0.0510
Field Iron(as Fe)	0.00
Ammonia(as NH_3)	0.00
Aluminum(as Al)	1.05
Manganese(as Mn)	0.0120
Zinc(as Zn)	0.0820
Lead(as Pb)	0.00
Sample pH	7.50
Conductivity:	355344

ANIONS

Chloride(as Cl)	137800
Sulfate(as SO_4)	1050
Bromine(as Br)	0.00
Dissolved CO_2(as CO_2)	125.00
Bicarbonate(as HCO_3)	92.00
Carbonate(as CO_3)	0.00
Silica(as SiO_2)	0.00
Phosphate(as PO_4)	0.00
H_2S (as H_2S)	0.00
Fluoride(as F)	0.00
Nitrate(as NO_3)	0.00
Boron(as B)	34.32

PARAMETERS

Temperature(°F)	60.00
T.D.S.	206449
Resistivity:	2.81

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 $FeCO_3$		Mackawenite FeS		CO_2 (mpy)	pCO_2 (atm)
50.00	0.00	2.86	0.0165	0.617	-62.38	0.852	-19.90	0.569	-0.0913	0.302	-132.82	0.00513	-0.425	0.00	-0.203	0.0198	0.00193
65.45	0.00	3.59	0.0203	0.548	-76.00	0.731	-38.45	0.339	-0.235	0.259	-149.19	0.00722	-0.372	0.00	-0.206	0.0370	0.00193
80.91	0.00	4.16	0.0221	0.515	-79.73	0.642	-53.72	0.215	-0.439	0.236	-156.21	0.00930	-0.329	0.00	-0.209	0.0118	0.00193
96.36	0.00	4.43	0.0218	0.510	-75.20	0.574	-65.83	0.144	-0.712	0.223	-158.02	0.0109	-0.295	0.00	-0.212	0.0154	0.00193
111.82	0.00	4.37	0.0196	0.529	-64.73	0.563	-64.08	0.101	-1.06	0.213	-157.57	0.0118	-0.268	0.00	-0.216	0.0161	0.00193
127.27	0.00	4.07	0.0165	0.573	-50.75	0.584	-54.78	0.0723	-1.53	0.204	-157.69	0.0120	-0.246	0.00	-0.220	0.0135	0.00193
142.73	0.00	3.60	0.0131	0.643	-35.40	0.602	-47.71	0.0522	-2.15	0.195	-158.57	0.0114	-0.228	0.00	-0.224	0.0110	0.00193
158.18	0.00	3.07	0.00988	0.748	-20.33	0.617	-42.34	0.0381	-2.96	0.185	-160.20	0.0103	-0.213	0.00	-0.229	0.0114	0.00193
173.64	0.00	2.54	0.00704	0.897	-6.58	0.629	-38.26	0.0282	-4.00	0.176	-162.53	0.00899	-0.201	0.00	-0.234	0.0118	0.00193
189.09	0.00	2.06	0.00470	1.11	5.30	0.638	-35.19	0.0210	-5.32	0.167	-165.58	0.00755	-0.191	0.00	-0.240	0.00360	0.00193
204.55	0.00	1.66	0.00283	1.40	15.15	0.644	-32.92	0.0159	-6.95	0.159	-169.38	0.00614	-0.183	0.00	-0.246	0.00505	0.00193
220.00	0.171	1.27	0.00121	1.81	23.55	0.645	-32.78	0.0120	-9.03	0.149	-177.90	0.00470	-0.180	0.00	-0.256	0.00947	0.00226
		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. $\{Ca\}\{CO_3\}/K_{sp}$. 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.