KANSAS CORPORATION COMMISSION
OIL & GAS CONSERVATION DIVISION

1294608

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, Inc.
Address 1: 600 TRAVIS STE 5100
Address 2:
City: HOUSTON State: TX Zip: 77002 + 3018
Contact Person: Shawn Hildreth
Phone: (281) 840-4234
Lease Name: ARTHUR MAYER SWD
Well Number: 2

API No.: 15-055-21912-00-00
Permit No: D28740.0
Reporting Year: 2015
(January 1 to December 31)

(Q/Q/Q/Q) SE - SE - NE Sec. 8 Twp. 23 S. R. 33 ☐ E ☑ W
2891 feet from ☐ N / ☑ S Line of Section
486 feet from ☑ E / ☐ W Line of Section
County: Finney

I. Injection Fluid:

Type *(Pick one)*: ☐ Fresh Water ☑ Treated Brine ☐ Untreated Brine ☐ Water/Brine
Source: ☑ Produced Water ☐ Other *(Attach list)*
Quality: Total Dissolved Solids: 177939 mg/l Specific Gravity: 1.12 Additives: 15% HCL
(Attach water analysis, if available)

II. Well Data:

Maximum Authorized Injection Pressure: 0 psi Injection Zone: Lansing
Maximum Authorized Injection Rate: 5000 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	19722	-1	0		31
February	10457	0	0		28
March	7418	0	0		31
April	2149	0	0		30
May	16649	0	0		31
June	13731	0	0		30
July	2005	-1	0		31
August	32906	-1	0		31
September	4956	-3	0		30
October	9793	-4	0		31
November	23405	-4	0		30
December	19017	-4	0		31
TOTAL	162208		0		

Submitted Electronically

JACAM LABORATORIES

DownHole R_X

WATER CHEMISTRY

LINN OPERATING
DREW LOTT
FINNEY KS

MAYER A. SWDW 2
TANK

Report Date: 01-22-2016
Sample #: 3076

Sampled: 01-18-2016
at 0000

Sample ID: 117226

CATIONS		ANIONS	
Calcium (as Ca)	7603	Chloride (as Cl)	116000
Magnesium (as Mg)	2475	Sulfate (as SO_4)	1650
Barium (as Ba)	0.888	Bromine (as Br)	0.00
Strontium (as Sr)	172.40	Dissolved CO_2 (as CO_2)	130.00
Sodium (as Na)	55608	Bicarbonate (as HCO_3)	96.00
Potassium (as K)	568.30	Carbonate (as CO_3)	0.00
Lithium (as Li)	8.43	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)	40.35	H_2S (as H_2S)	0.00
Manganese (as Mn)	0.180	Fluoride (as F)	0.00
Zinc (as Zn)	1.31	Nitrate (as NO_3)	0.00
Lead (as Pb)	0.00	Boron (as B)	20.07

PARAMETERS

Calculated T.D.S.	177939
Molar Conductivity	288026
Resistivity	3.47
Sp.Gr.(g/mL)	1.12
Pressure(atm)	1.00
pCO_2(atm)	0.00874
pH_2S(atm)	0.00
Temperature (^oF)	50.00
pH	6.80

COMMENTS

FINNEY KS

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

JACAM LABORATORIES

DownHole R_X

DEPOSITION POTENTIAL INDICATORS

LINN OPERATING
DREW LOTT
FINNEY KS

MAYER A. SWDW 2
TANK

Report Date: 01-22-2016
Sample #: 3076

Sampled: 01-18-2016
at 0000

Sample ID: 117226

SATURATION LEVEL		MOMENTARY EXCESS (Lbs/1000 Barrels)	
Calcite ($CaCO_3$)	0.774	Calcite ($CaCO_3$)	-0.00343
Aragonite ($CaCO_3$)	0.688	Aragonite ($CaCO_3$)	-0.00532
Witherite ($BaCO_3$)	< 0.001	Witherite ($BaCO_3$)	-24.20
Strontianite ($SrCO_3$)	0.0253	Strontianite ($SrCO_3$)	-0.662
Calcium oxalate (CaC_2O_4)	0.00	Calcium oxalate (CaC_2O_4)	-0.00581
Magnesite ($MgCO_3$)	0.225	Magnesite ($MgCO_3$)	-0.0341
Anhydrite ($CaSO_4$)	0.860	Anhydrite ($CaSO_4$)	-35.78
Gypsum ($CaSO_4*2H_2O$)	1.23	Gypsum ($CaSO_4*2H_2O$)	47.44
Barite ($BaSO_4$)	6.39	Barite ($BaSO_4$)	0.443
Celestite ($SrSO_4$)	0.503	Celestite ($SrSO_4$)	-74.92
Fluorite (CaF_2)	0.00	Fluorite (CaF_2)	-2.34
Calcium phosphate	0.00	Calcium phosphate	>-0.001
Hydroxyapatite	0.00	Hydroxyapatite	-252.76
Silica (SiO_2)	0.00	Silica (SiO_2)	-20.99
Brucite ($Mg(OH)_2$)	< 0.001	Brucite ($Mg(OH)_2$)	< 0.001
Magnesium silicate	0.00	Magnesium silicate	-79.51
Iron hydroxide ($Fe(OH)_3$)	7.43	Iron hydroxide ($Fe(OH)_3$)	< 0.001
Strengite ($FePO_4*2H_2O$)	0.00	Strengite ($FePO_4*2H_2O$)	>-0.001
Siderite ($FeCO_3$)	2.00	Siderite ($FeCO_3$)	0.00679
Halite (NaCl)	0.134	Halite (NaCl)	-94495
Thenardite ($Na2SO_4$)	< 0.001	Thenardite ($Na2SO_4$)	-84865
Iron sulfide (FeS)	0.00	Iron sulfide (FeS)	-0.0571

SIMPLE INDICES		BOUND IONS	TOTAL	FREE
Langelier	0.493	Calcium	7603	7330
Ryznar	5.81	Barium	0.888	0.888
Puckorius	5.46	Carbonate	1.79	0.0202
Larson-Skold Index	2446	Phosphate	0.00	0.00
Stiff Davis Index	0.159	Sulfate	1650	456.80
Oddo-Tomson	-0.666			

OPERATING CONDITIONS

Temperature (^oF)	50.00
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
MAYER A. SWDW 2
DREW LOTT
TANK
FINNEY KS

Sample ID#: 3076
ID: 117226
Report Date: 01-22-2016
Sample Date: 01-18-2016
at 0000

WATER CHEMISTRY

CATIONS

Calcium(as Ca)	7603
Magnesium(as Mg)	2475
Barium(as Ba)	0.888
Strontium(as Sr)	172.40
Sodium(as Na)	55608
Potassium(as K)	568.30
Lithium(as Li)	8.43
Iron(as Fe)	40.35
Field Iron(as Fe)	0.00
Ammonia(as NH_3)	0.00
Aluminum(as Al)	0.00
Manganese(as Mn)	0.180
Zinc(as Zn)	1.31
Lead(as Pb)	0.00

ANIONS

Chloride(as Cl)	116000
Sulfate(as SO_4)	1650
Bromine(as Br)	0.00
Dissolved CO_2(as CO_2)	130.00
Bicarbonate(as HCO_3)	96.00
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)	20.07

PARAMETERS

Temperature(°F)	50.00
T.D.S.	177939
Sample pH	6.80
Conductivity:	288026
Resistivity:	3.47

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	0.774	-0.00343	0.860	-35.78	1.23	47.44	6.39	0.443	0.503	-74.92	2.00	0.00679	0.00	-0.0571	0.0233	0.00874
65.45	0.00	1.05	< 0.001	0.774	-59.30	1.07	16.19	3.86	0.390	0.438	-91.44	3.04	0.0109	0.00	-0.0596	0.0657	0.00874
80.91	0.00	1.34	0.00412	0.739	-67.23	0.957	-9.84	2.49	0.314	0.405	-99.76	4.35	0.0143	0.00	-0.0625	0.0309	0.00874
96.36	0.00	1.64	0.00692	0.741	-62.12	0.868	-30.84	1.69	0.214	0.387	-103.35	5.88	0.0170	0.00	-0.0658	0.0405	0.00874
111.82	0.00	1.90	0.00891	0.779	-47.57	0.861	-30.66	1.20	0.0882	0.376	-104.77	7.49	0.0189	0.00	-0.0696	0.0425	0.00874
127.27	0.00	2.11	0.0102	0.853	-27.36	0.905	-18.86	0.868	-0.0800	0.364	-106.59	9.12	0.0200	0.00	-0.0740	0.0356	0.00874
142.73	0.00	2.25	0.0107	0.969	-4.82	0.944	-10.22	0.634	-0.303	0.351	-109.00	10.55	0.0202	0.00	-0.0790	0.0289	0.00874
158.18	0.00	2.28	0.0104	1.14	17.47	0.977	-3.90	0.467	-0.597	0.337	-111.96	11.59	0.0196	0.00	-0.0848	0.0301	0.00874
173.64	0.00	2.21	0.00935	1.38	37.84	1.00	0.677	0.348	-0.978	0.324	-115.42	12.07	0.0182	0.00	-0.0916	0.0311	0.00874
189.09	0.00	2.05	0.00781	1.71	55.39	1.03	3.93	0.262	-1.47	0.309	-119.41	11.95	0.0162	0.00	-0.0997	0.0157	0.00874
204.55	0.00	1.83	0.00600	2.19	69.91	1.05	6.22	0.199	-2.10	0.295	-123.92	11.31	0.0140	0.00	-0.109	0.0131	0.00874
220.00	0.171	1.54	0.00397	2.82	83.21	1.05	6.72	0.151	-2.92	0.279	-131.75	10.05	0.0118	0.00	-0.125	0.0179	0.0102
		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.