KANSAS CORPORATION COMMISSION
OIL & GAS CONSERVATION DIVISION

1294854

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) 840-4000
Lease Name: PERRILL
Well Number: 1-7

API No.: 15-189-00008-00-02
Permit No: D16146.0
Reporting Year: 2015
(January 1 to December 31)

____ - NW - NW - NW Sec. 7 Twp. 31 S. R. 37 ☐ E ☑ W
(Q/Q/Q/Q)
4659 feet from ☐ N / ☑ S Line of Section
4523 feet from ☑ E / ☐ W Line of Section
County: Stevens

I. Injection Fluid:

Type *(Pick one)*: ☐ Fresh Water ☐ Treated Brine ☑ Untreated Brine ☐ Water/Brine
Source: ☑ Produced Water ☐ Other *(Attach list)*
Quality: Total Dissolved Solids: 43657 mg/l Specific Gravity: 1.03 Additives:
(Attach water analysis, if available)

II. Well Data:

Maximum Authorized Injection Pressure: 1500 psi Injection Zone: Glorietta
Maximum Authorized Injection Rate: 1000 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	8497	650	0		19
February	6650	650	0		15
March	7667	650	0		17
April	8729	650	0		20
May	10020	650	0		18
June	10787	650	0		20
July	10304	680	0		19
August	9522	680	0		21
September	9001	680	0		16
October	10180	680	0		18
November	5904	640	0		13
December	6875	625	0		16
TOTAL	104136		0		

Submitted Electronically

JACAM LABORATORIES

DownHole R_X

WATER CHEMISTRY

LINN OPERATING
MICHAEL BELLOMY
STEVENS KS

PERRILL SWD
FLOWLINE

Report Date: 01-26-2016
Sample #: 3076

Sampled: 01-15-2016
at 0000

Sample ID: 117603

CATIONS		ANIONS	
Calcium (as Ca)	1086	Chloride (as Cl)	27000
Magnesium (as Mg)	388.90	Sulfate (as SO_4)	175.00
Barium (as Ba)	0.819	Bromine (as Br)	0.00
Strontium (as Sr)	56.65	Dissolved CO_2 (as CO_2)	50.00
Sodium (as Na)	15106	Bicarbonate (as HCO_3)	36.60
Potassium (as K)	107.00	Carbonate (as CO_3)	0.00
Lithium (as Li)	2.92	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)	8.32	H_2S (as H_2S)	1.00
Manganese (as Mn)	3.90	Fluoride (as F)	0.00
Zinc (as Zn)	0.0840	Nitrate (as NO_3)	0.00
Lead (as Pb)	0.00	Boron (as B)	0.291

PARAMETERS

Calculated T.D.S.	43657
Molar Conductivity	61307
Resistivity	16.31
Sp.Gr.(g/mL)	1.03
Pressure(atm)	1.00
pCO_2(atm)	0.00350
pH_2S(atm)	< 0.001
Temperature (^oF)	51.00
pH	6.82

COMMENTS

STEVENS KS

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

JACAM LABORATORIES

DownHole R_X

DEPOSITION POTENTIAL INDICATORS

LINN OPERATING
MICHAEL BELLOMY
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FLOWLINE

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SATURATION LEVEL		MOMENTARY EXCESS (Lbs/1000 Barrels)	
Calcite ($CaCO_3$)	0.0814	Calcite ($CaCO_3$)	-0.126
Aragonite ($CaCO_3$)	0.0723	Aragonite ($CaCO_3$)	-0.143
Witherite ($BaCO_3$)	< 0.001	Witherite ($BaCO_3$)	-16.67
Strontianite ($SrCO_3$)	0.0163	Strontianite ($SrCO_3$)	-0.966
Calcium oxalate (CaC_2O_4)	0.00	Calcium oxalate (CaC_2O_4)	-0.0532
Magnesite ($MgCO_3$)	0.0200	Magnesite ($MgCO_3$)	-0.461
Anhydrite ($CaSO_4$)	0.0326	Anhydrite ($CaSO_4$)	-960.18
Gypsum ($CaSO_4*2H_2O$)	0.0557	Gypsum ($CaSO_4*2H_2O$)	-722.18
Barite ($BaSO_4$)	4.22	Barite ($BaSO_4$)	0.370
Celestite ($SrSO_4$)	0.118	Celestite ($SrSO_4$)	-106.82
Fluorite (CaF_2)	0.00	Fluorite (CaF_2)	-7.43
Calcium phosphate	0.00	Calcium phosphate	>-0.001
Hydroxyapatite	0.00	Hydroxyapatite	-295.43
Silica (SiO_2)	0.00	Silica (SiO_2)	-26.79
Brucite ($Mg(OH)_2$)	< 0.001	Brucite ($Mg(OH)_2$)	< 0.001
Magnesium silicate	0.00	Magnesium silicate	-89.79
Iron hydroxide ($Fe(OH)_3$)	< 0.001	Iron hydroxide ($Fe(OH)_3$)	< 0.001
Strengite ($FePO_4*2H_2O$)	0.00	Strengite ($FePO_4*2H_2O$)	>-0.001
Siderite ($FeCO_3$)	0.770	Siderite ($FeCO_3$)	-0.00385
Halite (NaCl)	0.00640	Halite (NaCl)	-164278
Thenardite ($Na2SO_4$)	< 0.001	Thenardite ($Na2SO_4$)	-67054
Iron sulfide (FeS)	1.15	Iron sulfide (FeS)	0.0169

SIMPLE INDICES		BOUND IONS	TOTAL	FREE
Langelier	-0.974	Calcium	1086	1074
Ryznar	8.77	Barium	0.819	0.819
Puckorius	8.93	Carbonate	0.115	0.0192
Larson-Skold Index	1338	Phosphate	0.00	0.00
Stiff Davis Index	-1.55	Sulfate	175.00	117.89
Oddo-Tomson	-1.71			

OPERATING CONDITIONS

Temperature (^oF)	51.00
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
PERRILL SWD
MICHAEL BELLOMY
FLOWLINE
STEVENS KS

Sample ID#: 3076
ID: 117603
Report Date: 01-26-2016
Sample Date: 01-15-2016
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WATER CHEMISTRY

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Sodium(as Na)	15106	Bicarbonate(as HCO_3)	36.60
Potassium(as K)	107.00	Carbonate(as CO_3)	0.00
Lithium(as Li)	2.92	Silica(as SiO_2)	0.00
Iron(as Fe)	8.32	Phosphate(as PO_4)	0.00
Field Iron(as Fe)	0.00	H_2S (as H_2S)	1.00
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)	3.90	Boron(as B)	0.291
Zinc(as Zn)	0.0840		
Lead(as Pb)	0.00	**PARAMETERS**	
		Temperature(^{O}F)	51.00
Sample pH	6.82	T.D.S.	43657
Conductivity:	61307	Resistivity:	16.31

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	0.0795	-0.127	0.0328	-957.67	0.0561	-719.50	4.36	0.373	0.119	-106.22	0.746	-0.00432	6.41	0.532	0.0248	0.00350
65.45	0.00	0.113	-0.108	0.0309	-977.04	0.0511	-755.85	2.76	0.308	0.109	-112.35	1.19	0.00253	5.56	0.471	0.0411	0.00350
80.91	0.00	0.153	-0.0914	0.0307	-957.77	0.0474	-781.58	1.85	0.223	0.105	-113.54	1.80	0.00847	4.78	0.410	0.00899	0.00350
96.36	0.00	0.199	-0.0778	0.0321	-906.07	0.0448	-797.38	1.31	0.115	0.105	-112.07	2.58	0.0136	4.09	0.353	0.0135	0.00350
111.82	0.00	0.248	-0.0664	0.0350	-829.77	0.0462	-760.21	0.972	-0.0140	0.106	-109.58	3.54	0.0181	3.51	0.300	0.0142	0.00350
127.27	0.00	0.303	-0.0565	0.0397	-737.14	0.0503	-694.06	0.728	-0.180	0.106	-107.59	4.73	0.0224	3.02	0.255	0.0119	0.00350
142.73	0.00	0.364	-0.0479	0.0466	-636.00	0.0542	-638.67	0.551	-0.392	0.106	-106.20	6.18	0.0265	2.62	0.215	0.00964	0.00350
158.18	0.00	0.429	-0.0403	0.0565	-533.16	0.0578	-592.32	0.419	-0.663	0.105	-105.35	7.87	0.0305	2.28	0.179	0.00390	0.00350
173.64	0.00	0.495	-0.0336	0.0702	-434.13	0.0611	-553.64	0.322	-1.00	0.104	-105.02	9.76	0.0343	1.98	0.146	0.00713	0.00350
189.09	0.00	0.560	-0.0279	0.0895	-342.98	0.0640	-521.56	0.249	-1.43	0.102	-105.17	11.75	0.0377	1.72	0.113	0.00497	0.00350
204.55	0.00	0.620	-0.0232	0.117	-262.32	0.0666	-495.21	0.193	-1.96	0.0996	-105.78	13.71	0.0407	1.48	0.0816	0.00519	0.00350
220.00	0.171	0.661	-0.0207	0.152	-199.07	0.0676	-485.58	0.149	-2.67	0.0953	-108.80	15.27	0.0436	1.44	0.0801	0.00733	0.00410

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.