



# 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 # \_\_\_\_\_  
Name: \_\_\_\_\_  
Address 1: \_\_\_\_\_  
Address 2: \_\_\_\_\_  
City: \_\_\_\_\_ State: \_\_\_\_\_ Zip: \_\_\_\_\_ + \_\_\_\_\_  
Contact Person: \_\_\_\_\_  
Phone: ( \_\_\_\_\_ ) \_\_\_\_\_  
Lease Name: \_\_\_\_\_  
Well Number: \_\_\_\_\_

API No.: \_\_\_\_\_  
Permit No.: \_\_\_\_\_  
Reporting Year: \_\_\_\_\_  
(January 1 to December 31)  
\_\_\_\_ - \_\_\_\_ - \_\_\_\_ - \_\_\_\_ Sec. \_\_\_\_ Twp. \_\_\_\_ S. R. \_\_\_\_  E  W  
(a/a/a/a)  
\_\_\_\_\_ feet from  N /  S Line of Section  
\_\_\_\_\_ feet from  E /  W Line of Section  
County: \_\_\_\_\_

### 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: \_\_\_\_\_ psi Injection Zone: \_\_\_\_\_  
Maximum Authorized Injection Rate: \_\_\_\_\_ barrels per day  
Total Number of Enhanced Recovery Injection Wells Covered by this Permit: \_\_\_\_\_ (Include TA's)

| III. | Month:       | Total Fluid Injected<br>BBL | Maximum Fluid<br>Pressure | Total Gas Injected<br>MCF | Maximum Gas<br>Pressure | # Days of<br>Injection |
|------|--------------|-----------------------------|---------------------------|---------------------------|-------------------------|------------------------|
|      | January      | _____                       | _____                     | _____                     | _____                   | _____                  |
|      | February     | _____                       | _____                     | _____                     | _____                   | _____                  |
|      | March        | _____                       | _____                     | _____                     | _____                   | _____                  |
|      | April        | _____                       | _____                     | _____                     | _____                   | _____                  |
|      | May          | _____                       | _____                     | _____                     | _____                   | _____                  |
|      | June         | _____                       | _____                     | _____                     | _____                   | _____                  |
|      | July         | _____                       | _____                     | _____                     | _____                   | _____                  |
|      | August       | _____                       | _____                     | _____                     | _____                   | _____                  |
|      | September    | _____                       | _____                     | _____                     | _____                   | _____                  |
|      | October      | _____                       | _____                     | _____                     | _____                   | _____                  |
|      | November     | _____                       | _____                     | _____                     | _____                   | _____                  |
|      | December     | _____                       | _____                     | _____                     | _____                   | _____                  |
|      | <b>TOTAL</b> | _____                       | _____                     | _____                     | _____                   | _____                  |



LINN OPERATING  
DREW LOTT  
HAMILTON KS

HCU 1820 D SWD  
TANK

Report Date: 01-22-2016    Sampled: 01-19-2016  
Sample #: 3076                      at 0000  
  
Sample ID: 117230

**CATIONS**

|                               |        |
|-------------------------------|--------|
| Calcium (as Ca)               | 5358   |
| Magnesium (as Mg)             | 1785   |
| Barium (as Ba)                | 0.819  |
| Strontium (as Sr)             | 119.80 |
| Sodium (as Na)                | 62948  |
| Potassium (as K)              | 456.30 |
| Lithium (as Li)               | 8.82   |
| Ammonia (as NH <sub>3</sub> ) | 0.00   |
| Aluminum (as Al)              | 0.00   |
| Iron (as Fe)                  | 69.40  |
| Manganese (as Mn)             | 0.0210 |
| Zinc (as Zn)                  | 1.28   |
| Lead (as Pb)                  | 0.00   |

**ANIONS**

|   |        |
|---|--------|
| Chloride (as Cl)                                | 123600 |
| Sulfate (as SO <sub>4</sub> )                   | 1900   |
| Bromine (as Br)                                 | 0.00   |
| Dissolved CO <sub>2</sub> (as CO <sub>2</sub> ) | 140.00 |
| Bicarbonate (as HCO <sub>3</sub> )              | 130.00 |
| Carbonate (as CO <sub>3</sub> )                 | 0.00   |
| Oxalic acid (as C <sub>2</sub> O <sub>4</sub> ) | 0.00   |
| Silica (as SiO <sub>2</sub> )                   | 0.00   |
| Phosphate(as PO <sub>4</sub> )                  | 0.00   |
| H <sub>2</sub> S (as H <sub>2</sub> S)          | 0.00   |
| Fluoride (as F)                                 | 0.00   |
| Nitrate (as NO <sub>3</sub> )                   | 0.00   |
| Boron (as B)                                    | 5.02   |

**PARAMETERS**

|                        |        |
|------------------------|--------|
| Calculated T.D.S.      | 188643 |
| Molar Conductivity     | 309451 |
| Resistivity            | 3.23   |
| Sp.Gr.(g/mL)           | 1.13   |
| Pressure(atm)          | 1.00   |
| pCO <sub>2</sub> (atm) | 0.0168 |
| pH <sub>2</sub> S(atm) | 0.00   |
| Temperature (°F)       | 44.00  |
| pH                     | 6.60   |

**COMMENTS**

HAMILTON KS



|                         |                     |
|-------------------------|---------------------|
| LINN OPERATING          | HCU 1820 D SWD      |
| DREW LOTT               | TANK                |
| HAMILTON KS             |                     |
| Report Date: 01-22-2016 | Sampled: 01-19-2016 |
| Sample #: 3076          | at 0000             |
| Sample ID: 117230       |                     |

**SATURATION LEVEL**

|  |         |
|--|---------|
| Calcite (CaCO <sub>3</sub> )                       | 0.461   |
| Aragonite (CaCO <sub>3</sub> )                     | 0.411   |
| Witherite (BaCO <sub>3</sub> )                     | < 0.001 |
| Strontianite (SrCO <sub>3</sub> )                  | 0.0161  |
| Calcium oxalate (CaC <sub>2</sub> O <sub>4</sub> ) | 0.00    |
| Magnesite (MgCO <sub>3</sub> )                     | 0.129   |
| Anhydrite (CaSO <sub>4</sub> )                     | 0.862   |
| Gypsum (CaSO <sub>4</sub> *2H <sub>2</sub> O)      | 1.22    |
| Barite (BaSO <sub>4</sub> )                        | 9.64    |
| Celestite (SrSO <sub>4</sub> )                     | 0.500   |
| Fluorite (CaF <sub>2</sub> )                       | 0.00    |
| Calcium phosphate                                  | 0.00    |
| Hydroxyapatite                                     | 0.00    |
| Silica (SiO <sub>2</sub> )                         | 0.00    |
| Brucite (Mg(OH) <sub>2</sub> )                     | < 0.001 |
| Magnesium silicate                                 | 0.00    |
| Iron hydroxide (Fe(OH) <sub>3</sub> )              | 4.04    |
| Strengite (FePO <sub>4</sub> *2H <sub>2</sub> O)   | 0.00    |
| Siderite (FeCO <sub>3</sub> )                      | 2.72    |
| Halite (NaCl)                                      | 0.166   |
| Thenardite (Na <sub>2</sub> SO <sub>4</sub> )      | < 0.001 |
| Iron sulfide (FeS)                                 | 0.00    |

**MOMENTARY EXCESS (Lbs/1000 Barrels)**

|  |          |
|--|----------|
| Calcite (CaCO <sub>3</sub> )                       | -0.0122  |
| Aragonite (CaCO <sub>3</sub> )                     | -0.0148  |
| Witherite (BaCO <sub>3</sub> )                     | -23.37   |
| Strontianite (SrCO <sub>3</sub> )                  | -0.924   |
| Calcium oxalate (CaC <sub>2</sub> O <sub>4</sub> ) | -0.00808 |
| Magnesite (MgCO <sub>3</sub> )                     | -0.0588  |
| Anhydrite (CaSO <sub>4</sub> )                     | -47.22   |
| Gypsum (CaSO <sub>4</sub> *2H <sub>2</sub> O)      | 61.27    |
| Barite (BaSO <sub>4</sub> )                        | 0.435    |
| Celestite (SrSO <sub>4</sub> )                     | -64.34   |
| Fluorite (CaF <sub>2</sub> )                       | -2.72    |
| Calcium phosphate                                  | >-0.001  |
| Hydroxyapatite                                     | -241.45  |
| Silica (SiO <sub>2</sub> )                         | -18.80   |
| Brucite (Mg(OH) <sub>2</sub> )                     | < 0.001  |
| Magnesium silicate                                 | -76.55   |
| Iron hydroxide (Fe(OH) <sub>3</sub> )              | < 0.001  |
| Strengite (FePO <sub>4</sub> *2H <sub>2</sub> O)   | >-0.001  |
| Siderite (FeCO <sub>3</sub> )                      | 0.00761  |
| Halite (NaCl)                                      | -86922   |
| Thenardite (Na <sub>2</sub> SO <sub>4</sub> )      | -85295   |
| Iron sulfide (FeS)                                 | -0.0530  |

**SIMPLE INDICES**

|                    |         |
|--------------------|---------|
| Langelier          | 0.214   |
| Ryznar             | 6.17    |
| Puckorius          | 5.44    |
| Larson-Skold Index | 1935    |
| Stiff Davis Index  | -0.0730 |
| Oddo-Tomson        | -0.936  |

**BOUND IONS**

|           |       |        |
|-----------|-------|--------|
| Calcium   | 5358  | 5096   |
| Barium    | 0.819 | 0.819  |
| Carbonate | 1.56  | 0.0179 |
| Phosphate | 0.00  | 0.00   |
| Sulfate   | 1900  | 634.29 |

**TOTAL**

**FREE**

**OPERATING CONDITIONS**

|                  |       |
|------------------|-------|
| Temperature (°F) | 44.00 |
| Time(secs)       | 0.00  |

# DownHole SAT™ Water Analysis Report



JACAM LABORATORIES

## SYSTEM IDENTIFICATION

LINN OPERATING  
HCU 1820 D SWD  
DREW LOTT  
TANK  
HAMILTON KS

Sample ID#: 3076  
ID: 117230  
Report Date: 01-22-2016  
Sample Date: 01-19-2016  
at 0000

## WATER CHEMISTRY

### CATIONS

|                              |        |
|------------------------------|--------|
| Calcium(as Ca)               | 5358   |
| Magnesium(as Mg)             | 1785   |
| Barium(as Ba)                | 0.819  |
| Strontium(as Sr)             | 119.80 |
| Sodium(as Na)                | 62948  |
| Potassium(as K)              | 456.30 |
| Lithium(as Li)               | 8.82   |
| Iron(as Fe)                  | 69.40  |
| Field Iron(as Fe)            | 0.00   |
| Ammonia(as NH <sub>3</sub> ) | 0.00   |
| Aluminum(as Al)              | 0.00   |
| Manganese(as Mn)             | 0.0210 |
| Zinc(as Zn)                  | 1.28   |
| Lead(as Pb)                  | 0.00   |

### ANIONS

|   |        |
|---|--------|
| Chloride(as Cl)                                 | 123600 |
| Sulfate(as SO <sub>4</sub> )                    | 1900   |
| Bromine(as Br)                                  | 0.00   |
| Dissolved CO <sub>2</sub> (as CO <sub>2</sub> ) | 140.00 |
| Bicarbonate(as HCO <sub>3</sub> )               | 130.00 |
| Carbonate(as CO <sub>3</sub> )                  | 0.00   |
| Silica(as SiO <sub>2</sub> )                    | 0.00   |
| Phosphate(as PO <sub>4</sub> )                  | 0.00   |
| H <sub>2</sub> S (as H <sub>2</sub> S)          | 0.00   |
| Fluoride(as F)                                  | 0.00   |
| Nitrate(as NO <sub>3</sub> )                    | 0.00   |
| Boron(as B)                                     | 5.02   |

### PARAMETERS

|                 |        |
|-----------------|--------|
| Temperature(°F) | 44.00  |
| T.D.S.          | 188643 |
| Conductivity:   | 309451 |
| Sample pH       | 6.60   |
| Resistivity:    | 3.23   |

## SCALE AND CORROSION POTENTIAL

| Temp. (°F) | Press. (atm) | Calcite CaCO <sub>3</sub> |                      | Anhydrite CaSO <sub>4</sub> |                      | Gypsum CaSO <sub>4</sub> *2H <sub>2</sub> O |                      | Barite BaSO <sub>4</sub> |                      | Celestite SrSO <sub>4</sub> |                      | Siderite FeCO <sub>3</sub> |                      | Mackawenite FeS |                      | CO <sub>2</sub> (mpy) | pCO <sub>2</sub> (atm) |
|------------|--------------|---------------------------|----------------------|-----------------------------|----------------------|---|----------------------|--------------------------|----------------------|-----------------------------|----------------------|----------------------------|----------------------|-----------------|----------------------|-----------------------|------------------------|
| 50.00      | 0.00         | 0.528                     | -0.0101              | 0.816                       | -64.70               | 1.15  | 43.66                | 7.81                     | 0.423                | 0.463                       | -72.91               | 3.27                       | 0.00908              | 0.00            | -0.0539              | 0.0450                | 0.0168                 |
| 65.45      | 0.00         | 0.723                     | -0.00523             | 0.740                       | -94.39               | 1.01  | 3.01                 | 4.75                     | 0.383                | 0.406                       | -88.00               | 5.03                       | 0.0127               | 0.00            | -0.0562              | 0.0842                | 0.0168                 |
| 80.91      | 0.00         | 0.938                     | -0.00105             | 0.710                       | -103.09              | 0.904                                       | -30.73               | 3.07                     | 0.327                | 0.378                       | -95.74               | 7.27                       | 0.0158               | 0.00            | -0.0590              | 0.0470                | 0.0168                 |
| 96.36      | 0.00         | 1.15                      | 0.00236              | 0.717                       | -94.21               | 0.825                                       | -57.74               | 2.10                     | 0.254                | 0.363                       | -99.15               | 9.91                       | 0.0184               | 0.00            | -0.0622              | 0.0615                | 0.0168                 |
| 111.82     | 0.00         | 1.35                      | 0.00488              | 0.757                       | -72.55               | 0.823                                       | -55.33               | 1.50                     | 0.162                | 0.354                       | -100.58              | 12.75                      | 0.0201               | 0.00            | -0.0658              | 0.0645                | 0.0168                 |
| 127.27     | 0.00         | 1.51                      | 0.00663              | 0.833                       | -43.16               | 0.869                                       | -36.82               | 1.09                     | 0.0399               | 0.345                       | -102.44              | 15.65                      | 0.0212               | 0.00            | -0.0699              | 0.0541                | 0.0168                 |
| 142.73     | 0.00         | 1.62                      | 0.00751              | 0.951                       | -10.58               | 0.911                                       | -22.98               | 0.799                    | -0.122               | 0.334                       | -104.90              | 18.27                      | 0.0215               | 0.00            | -0.0746              | 0.0438                | 0.0168                 |
| 158.18     | 0.00         | 1.66                      | 0.00750              | 1.12                        | 21.68                | 0.947                                       | -12.65               | 0.592                    | -0.334               | 0.322                       | -107.91              | 20.22                      | 0.0208               | 0.00            | -0.0801              | 0.0457                | 0.0168                 |
| 173.64     | 0.00         | 1.61                      | 0.00667              | 1.36                        | 51.24                | 0.978                                       | -4.98                | 0.442                    | -0.610               | 0.310                       | -111.43              | 21.22                      | 0.0194               | 0.00            | -0.0864              | 0.0473                | 0.0168                 |
| 189.09     | 0.00         | 1.50                      | 0.00524              | 1.70                        | 76.81                | 1.00  | 0.634                | 0.334                    | -0.965               | 0.297                       | -115.48              | 21.15                      | 0.0174               | 0.00            | -0.0939              | 0.0238                | 0.0168                 |
| 204.55     | 0.00         | 1.34                      | 0.00347              | 2.18                        | 98.03                | 1.02  | 4.69                 | 0.254                    | -1.42                | 0.284                       | -120.04              | 20.15                      | 0.0151               | 0.00            | -0.103               | 0.0200                | 0.0168                 |
| 220.00     | 0.171        | 1.13                      | 0.00133              | 2.82                        | 117.02               | 1.03  | 5.52                 | 0.192                    | -2.02                | 0.268                       | -127.74              | 18.00                      | 0.0128               | 0.00            | -0.117               | 0.0272                | 0.0196                 |
|            |              | 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<sub>3</sub>}/K<sub>sp</sub>. pCO<sub>2</sub> (atm) is the partial pressure of CO<sub>2</sub> in the gas phase. Lbs/1000 Barrels scale is the quantity of precipitation (or dissolution) required to instantaneously bring the water to equilibrium.

