Initial Pressure in the Mississippian

-Mississippian initial pressure from extrapolation of Arbuckle pressure is 1525 psi at initial oil-water contact (-2494 SS)

-Old DST of well Lupton A1 dated 1955 in Sumner County is 1590 psi at the same depth

- Pressure of well Lupton A1 is higher than the extrapolated pressure and maybe more accurate

\[
y = -2.0753x + 670.87
\]
DST 1 in 1-32
Test date: 2011
Mississippian at -2393 SS
Decline in Mississippian Reservoir Pressure

- Initial pressure: 1590 psi at -2494 SS
- Present (2011) pressure: 1113 psi at -2494 SS
- Decline in pressure: 477 psi
Fracture Pressure in Mississippian Based on Arbuckle Step-Rate Test and Eaton Equation

<table>
<thead>
<tr>
<th>Inj</th>
<th>Pinj (psi)</th>
<th>Rate (bbl/d)</th>
<th>InJ Index</th>
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<tbody>
<tr>
<td>1</td>
<td>2160</td>
<td>2880</td>
<td>57.6</td>
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<tr>
<td>2</td>
<td>2321</td>
<td>7200</td>
<td>34.12</td>
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<tr>
<td>3</td>
<td>2562</td>
<td>10800</td>
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<td>4</td>
<td>2773</td>
<td>14400</td>
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<td>5</td>
<td>2901</td>
<td>18000</td>
<td>22.76</td>
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<tr>
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<td>19296</td>
<td>27.97</td>
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<tr>
<td>8</td>
<td>2684</td>
<td>13536</td>
<td>23.58</td>
</tr>
</tbody>
</table>

Arbuckle

- 2666 closure pressure (psi)
- 2900 breakdown pressure (psi)
- 4869 Gauge depth, ft
- 0.55 Closure Fracture gradient (psi/ft)
- 0.60 breakdown Fracture gradient (psi/ft)

Using Eaton’s equation to estimate fracture pressure gradient in the Mississippian @ -2424 SS

\[
F = \frac{((S - P) \div D) \times (v \div (1 - v)) + P \div D}{}
\]

- Pore pressure: 1079 psi
- Overburden pressure: 4038 psi
- Poisson’s ratio: 0.25
- Fracture pressure gradient is 0.56 psi/ft

Using fracture pressure gradient in Arbuckle to estimate fracture pressure in the Mississippian:

- Closure fracture pressure in Mississippian is 2033 psi @ -2424 SS
- Breakdown fracture pressure is 2218 psi @ -2424 SS
Miscibility Pressure

- Laboratory Miscibility pressure was 1798 psi at 129 F
- The Miscibility pressure was adjusted by empirical correlations to a correct temperature of Mississippian (121 F)
- Miscibility pressure at correct temperature is 1660 psi
Drainage Capillary Pressure Curves for Each RQI Range in the Mississippian
Relative Permeability Curves for Each RQI Range in the Mississippian