Wireline Formation Testing Without the Wireline
Memory Formation Testing

- Power supplied by downhole battery
- Logic and data recording in downhole memory sub
- Commands and replies by two-way pressure pulse communications
- Conveyance by –
  - Garaged inside drillpipe “Shuttle (CWS)”
  - Drop Off
  - Toolpush for 3⅛ - 4⅛” (98 - 105mm)
 Memory Formation Testing Applications

- Horizontal / deviated wells
- Problem hole conditions
- Provides a solution if wireline unit is unavailable
- Smaller hole sizes
- Identify oil water gas contacts
- Identify compartmentalized reservoirs
- Depleted reservoirs
Memory Formation Testing Advantages

- Access to pressure data previously inaccessible
- Reliable operation
- Low sticking risk – tool is self centering when set, and generates positive pressure at pad at the end of each test
- Triple draw down
- Tool attached to drill pipe (already fished!)
- Small rig footprint
- Operated with a crew of two
Memory Formation Testing Challenges

- Drill pipe depth not wireline depth
- Parameters fixed at start of job
- Dataset is ‘near time’ not realtime
- Realtime LQC is limited to delta-P
Memory Formation Testing Drawdown Options

- Single, dual or triple pretest option
- Programmed Tests are fully adjustable in terms of time, drawdown rate and volume
- Drawdown pressure – 6,000 psi
- 40cc pretest size available
- Up to 1.2cc/sec rate
- Sidewall force – Variable to 3,300 lb
- Suggest small slow test first followed by faster second / third test
Memory Formation Tester Deployment
Signalling from Surface

- Signals are sent from surface using the mud pumps
- Command options are:

<table>
<thead>
<tr>
<th>Pulse Sequence</th>
<th>Command</th>
</tr>
</thead>
<tbody>
<tr>
<td><img src="Image" alt="Pulse Sequence 1" /></td>
<td>Status (Caliper open/closed)</td>
</tr>
<tr>
<td><img src="Image" alt="Pulse Sequence 2" /></td>
<td>Release</td>
</tr>
<tr>
<td><img src="Image" alt="Pulse Sequence 3" /></td>
<td>Pretest Routine</td>
</tr>
<tr>
<td><img src="Image" alt="Pulse Sequence 4" /></td>
<td>Reset Toolstring (Power reset off/on)</td>
</tr>
</tbody>
</table>
Memory Formation Testing Sequence
Real Time LQC – Defining Delta P

Measuring Delta P

\[ \Delta P = P_1 - P_2 \]

(P<sub>1</sub>)

Drawdown #1

Final Shut-In Pressure (P<sub>2</sub>)

Time (secs)
Why Delta P and not Final Shut in Pressure?

- No Seal
- Tight Test
- Good Test
Realtime LQC – Animation

Two pulses sent down to request a test
Tool replies, command received
Test carried out, tool replies test complete

12-bit sequence
Summary

- The Memory Formation Tester has unique well access advantages
- Demonstrated significant rig time savings and improved safety compared to wireline pipe conveyed logging
- The Memory Formation Tester has demonstrated a low differential pressure sticking risk
- Memory Formation Testing has produced significant data value to clients
Questions?