API WIWC TG-5

Well Intervention Well Control Task Group
Winter Conference Update
Alex Sas-Jaworsky P.E Chairman
Technologies Addressed

- Coiled Tubing
- Snubbing/Hydraulic Workover
- Wireline (Slickline and E-Line)
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- Recommended Practice 16ST
  Coiled Tubing Well Control Equipment Systems

First Edition was Reaffirmed in December, 2014
2015 RP 16ST TG TG Membership

- Operators (3)
- CT Vendors (6)
- Manufacturers (3)
- Consultants (1)
- Regulatory (1)
Current Activities

• 5-Year Review of RP 16ST

Further Align RP 16ST Standards with Established SC16 Standards to Maintain Consistency Where Possible
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RP 16ST Review Priority

• Well Control Equipment Operating Systems (Pumps & Accumulators)
• Establish Basis for Maximum Ram Actuation Time (Response Time)
• Align with Spec 16D (where possible)
RP 16ST Review Priority

• Conducted Preliminary Testing of Hydraulic Power Fluids at Various Temperatures to Establish Basis for Maximum Ram Actuation Times:
  February 6-7, 2013 – 95VI ISO 46 AW
# Comparison of Power Fluid Performance Through ES46 SBR at Temperature

<table>
<thead>
<tr>
<th>3/8” ID Hoses (240’ Round Trip)</th>
<th>1/2” ID Hoses (240’ Round Trip)</th>
<th>3/4” ID Hoses (240’ Round Trip)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Temperature</strong></td>
<td><strong>Seconds</strong></td>
<td><strong>Temperature</strong></td>
</tr>
<tr>
<td>95VI - ISO 46 AW Hydraulic Oil</td>
<td>ISO 10 Synthetic SS Control Fluid</td>
<td>95VI - ISO 46 AW Hydraulic Oil</td>
</tr>
<tr>
<td>@ 70°F</td>
<td>16</td>
<td>@ 73°F</td>
</tr>
<tr>
<td>@ 48°F</td>
<td>25</td>
<td>@ 51°F</td>
</tr>
<tr>
<td>@ 30°F</td>
<td>42</td>
<td>@ 32°F</td>
</tr>
<tr>
<td>@ 10°F</td>
<td>132</td>
<td>@ 10°F</td>
</tr>
<tr>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
</tr>
<tr>
<td>@ -15°F</td>
<td>16 Min.</td>
<td>@ -15°F</td>
</tr>
</tbody>
</table>

Power fluid performance tests conducted at the Texas Oil Tools “E-Lab” facility in Conroe, TX. The Chevron Rando power fluid tests were conducted on February 6-7, 2013. The Castrol Brayco Micronic SV3 power fluid tests were conducted on August 27-28, 2013. The temperature of the test apparatus was controlled using a glycol chilling unit, with the accumulator package, hoses and ES46 SBR submerged in the circulating glycol tank.
RP 16ST Review Priority

• May 14, 2015 TG Meeting
• Discussed Test Results for CT Rams
• Proposal for CT SBR is 10-Seconds
• Proposal for all Other Rams in CT Stack is 30-Seconds.
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RP 16ST Review Priority

• Compromise in CT Ram Closing Times Created Conflict in Equipment:
• All CT Units Will Require SBR
• Introduces “Unique” CT Ram Interface With Accumulator System(s)
RP 16ST Review Priority

- Conducted Full Scale Testing of Hydraulic Power Fluids at Various Temperatures to Establish Basis for Maximum Ram Actuation Times:
  - Sept. 23-24, 2014 – 95VI ISO 68 AW
ACCUMULATOR SYSTEM PERFORMANCE - ISO 68 HYDRAULIC OIL at 35° F
TOT 3-1/16", 10M EK34 WELL CONTROL STACK RAMS TESTED AT IPS FACILITY ON SEPTEMBER 22, 2014 (Broussard, LA)

Pipe Rams 7 Seconds
Blind Rams 8 Seconds
Pipe-Safety Rams 9 Seconds
Slip Rams 35 Seconds
Pipe Rams 9 Seconds
Blind Rams 14 Seconds
Pipe-Safety Rams 14 Seconds
Shear Rams 28 Seconds
Shear-Blind Rams 36 Seconds
Shear Rams 25 Seconds
Slip Rams 27 Seconds
Shear-Blind Rams 37 Seconds

CLOSED STACK RAMS
HOLD PERIOD - Stabilization
OPEN RAMS
HOLD PERIOD - Stabilization

Lower Pressure Limits - Usable Accumulator Volume
Precharge Pressure

IPS CTU 111 Console & Power Pack 55-Gallon Accumulator With Ppre Pressure at 1,200 Psig and Pmax Pressure at 3,000 Psig

TIME DURATION OF TEST, Hours:Minutes
January 24, 2015
ACCUMULATOR SYSTEM PERFORMANCE - CASTROL E1802E SYNTHETIC OIL at 35° F

TOT 3-1/16", 10M EK34 WELL CONTROL STACK RAMS TESTED AT IPS FACILITY ON SEPTEMBER 23, 2014 (Broussard, LA)

Open Isolation Valve on CT Panel

Pipe Rams 3 Seconds

Slip Rams 7 Seconds

Shear Rams 7 Seconds

Shear-Blind Rams 6 Seconds

Closed Stack Rams

Hold Period Stabilization

Open Rams

Hold Period Stabilization

Lower Pressure Limits - Usable Accumulator Volume

Precharge Pressure

IPS CTU 111 Console & Power Pack 55-Gallon Accumulator With Ppre Pressure at 1,200 Psig and Pmax Pressure at 3,000 psig

SAS INDUSTRIES, INC.

TIME DURATION OF TEST, Hours:Minutes

January 24, 2015
RP 16ST Review Priority

• Maintain Current Well Control Stack Configuration Requirements

• Simplify Recommended Practice to Apply to all CT Rams and Allow Time For Industry to Make Adjustments
RP 16ST Review Priority

• May 14, 2015 TG Meeting

• Rewriting RP Accumulator Design Sections to More Closely Align With API Spec 16D Requirements
RP 16ST Review Priority

- Revise RP 16ST Sections Related to Well Control Choke and Kill Lines to Comply with API Spec 16C (Latest Ballot Version)
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RP 16ST Review Priority

- Well Control Equipment Repair & Remanufacture Issues (small rams)
- Reference STD 16AR (if possible, or)
- Establish Recommendations Within RP 16ST Consistent with STD 16 AR
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RP 16ST Review Priority

- Conducting Line-By-Line Review of Remainder of RP 16ST to Correct Typos, Reconfirm Value of Standards and Clarify Performance Expectations
RP 16ST Review Priority