Clean Up and Test Gas Wells at 120 MMcf/d

PhaseTester multiphase flowmeters with Vx technology enable monitoring the well effluents from the first opening of wells

**CHALLENGE**
- Reduce well cleanup duration by flowing at higher rates while measuring from the beginning to quantify recovered volume of brine and completion fluids and to ensure that the well is entirely clean.
- Get accurate well deliverability information through inflow performance relationships by conducting high gas rate and multirate tests.
- Improve operations safety by eliminating the need for pressurized vessels.
- Improve operations efficiency by minimizing footprint, crew size, and rig-up time on the offshore test platform.

**SOLUTION**
Use PhaseTester* portable multiphase well testing equipment with Vx* multiphase well testing technology to measure gas, condensate, and brine rates with a very high turndown ratio.

**RESULTS**
Dynamically measured the flow rates up to 120 MMcf/d from the opening of the well, quickly completed and confirmed cleanup, accurately estimated well deliverability, and conducted all operations in a safe and efficient manner.

**Optimizing cleanup duration with multiphase flowmeters**
When developing an offshore gas condensate field, quickly producing the wells is a key objective. After the completion string is run, the wells need to be cleaned of brine, remaining drilling fluids, acid, cuttings, and debris. Then the flow can be diverted to the production facility. Faster cleanup generates earlier returns and saves significant operating costs.

A customer in the Middle East decided to use PhaseTester equipment with Vx technology to optimize its high-rate gas wells’ cleanup operations. The wells could be flowed up to 120 MMcf/d, ensuring fast cleanup completion. Measuring recovered liquid volumes from the well opening in real time optimized cleanup and reduced the risk of carrying any water, acid, or solid particles to the production facility while minimizing operations duration.

At the beginning of the cleanup, the well effluent—mainly composed of brine and drilling fluids—was measured by a 29-mm-diameter [3-in-piping] multiphase flowmeter without any limitation on solids production, pH, or water cut. Then, when continuous gas reached the surface, the flow was diverted through a fullbore 88-mm-diameter [8-in-piping] multiphase flowmeter located upstream the choke for better accuracy of liquids measurement and sent directly to the flare, without any flow restriction, at high pressure and high gas rates. Cleanup progress was verified in real time during the entire operation until it was confirmed that the well effluent was clean enough to be safely diverted to the production line.

**Acquiring high-quality data with fit-for-purpose PVT model**
The well-effluent composition and flow rates were measured at all times by the PhaseTester multiphase flowmeters. Multirate tests were conducted to determine inflow performance relationships from low rates to very high gas rates. Because the meters do not require waiting for stabilization, several points could be measured in a short period of time, and high-resolution curves were obtained. A customized PVT model provided accurate information, including the condensate/gas ratio, at both line and standard conditions. It was also used to convert results to actual production-facility conditions, allowing consistent trending between wells.

**Reducing operating costs while minimizing footprint**
The compact setup used in the operation had a 70% smaller footprint than conventional testing equipment and did not include a large pressurized vessel. Rig-up and rig-down time was shortened by 3 days, and the field crew was reduced by two positions. Because the operation duration was also reduced, significant cost savings were achieved during each well cleanup and test.

Using PhaseTester equipment with Vx technology added value to cleanup management, safety, operations efficiency, and well productivity measurement consistency and repeatability. The customer decided to continue using this configuration for subsequent cleanup and well testing operations.
CASE STUDY: Clean up and test gas wells at 120 MMcf/d, Middle East

Surface well testing setup using a combination of small-diameter and large-diameter PhaseTester equipment with Vx technology.

Benefits of Using a PhaseTester Multiphase Flowmeter with Vx Technology Versus a Conventional Mobile Test Separator†

<table>
<thead>
<tr>
<th></th>
<th>Conventional Mobile Test Separator</th>
<th>PhaseTester Multiphase Flowmeter</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rig-up time</td>
<td>6–7 d</td>
<td>3–4 d</td>
</tr>
<tr>
<td>Number of connections</td>
<td>300</td>
<td>150</td>
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<tr>
<td>Crew members</td>
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<td>7</td>
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<tr>
<td>Footprint</td>
<td>10 surface units</td>
<td>3 surface units</td>
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<tr>
<td>Pressurized vessels</td>
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<td>No</td>
</tr>
<tr>
<td>BS&amp;W restrictions to flow</td>
<td>&lt;20%</td>
<td>No restrictions</td>
</tr>
<tr>
<td>pH restrictions to flow</td>
<td>&gt;3.5</td>
<td>No restrictions</td>
</tr>
</tbody>
</table>

†Mobile test separator values are estimated from a testing setup of similar size.