

CleanPhase Separator Confirms Three-Phase Flow Rate Test Results

Stand-alone unit provides Sirte Oil Company accurate measurements and faster cleanup

CHALLENGE

Determine the cumulative flow rate in 22 production wells to confirm Sirte Oil Company's commingled cumulative flow rate measurement.

SOLUTION

Use CleanPhase* well test separator with SmartWeir* phase separation technology as a stand-alone unit to efficiently separate fluids into three phases and measure each phase accurately.

RESULTS

Measured a cumulative flow rate of 3,191 m³/d [20,068 bbl/d], which matched Sirte's oil and condensate flow rate measurements and provided faster cleanup.



Two-phase separator indicates low flow rate

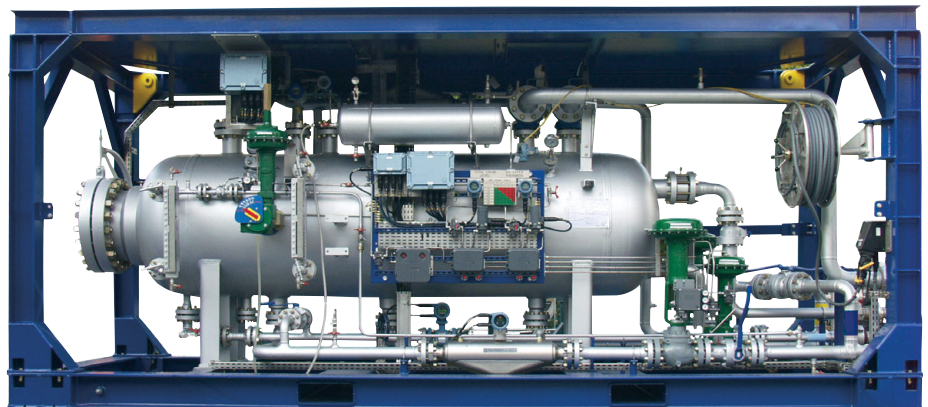
Sirte Oil Company, operating under the National Oil Corporation of Libya, tested 22 production wells in the Lahib field at its central flow rate measuring facility. The total oil and condensate production was slightly more than 3,180 m³/d [20,000 bbl/d]. Production rates for these wells ranged from 7 m³/d to 375 m³/d [45 bbl/d to 2,356 bbl/d], with flow temperatures to 106 degC [222 degF].

Using a two-phase separator, a service company measured the total liquid flow rate and estimated the oil flow rate using the water cut, but it was unable to measure gas flow rates for some of the wells. The company's tests of the 22 wells indicated a total flow rate of 2,627 m³/d [16,520 bbl/d], which was more than 17% less than the measurements provided by Sirte's measuring facility.

Three-phase technology provides new measurements

Sirte called on Schlumberger to verify the cumulative flow using the CleanPhase separator. The three-phase well test separator was used in a stand-alone configuration equipped with Coriolis meters and an electromagnetic meter. The Coriolis meters measure oil and gas mass flow rate rather than volumetric flow, so they are not affected by variances in fluid density, viscosity, pressure, or temperature. The electromagnetic meter monitors the water flow rate; its fullbore design prevents clogging by allowing greater solids volumes to pass through the CleanPhase separator during well cleanup.

With this setup, the system separated the fluids efficiently and measured each phase accurately. Furthermore, environmental risks were reduced because there was no need to dispose of unseparated fluids during cleanup periods. The system was fitted with SmartWeir technology, which accommodates fluctuating water flow rates and high water cuts, allows the oil/water interface level and total liquid level to be adjusted, and enables the separator to be online even during the cleanup phase.



CleanPhase well test separator.

CASE STUDY: Stand-alone unit provides accurate measurements and faster cleanup, Libya

Flow rate measurements prove accurate

Separating the effluents into three phases and measuring them individually using the CleanPhase separator with Coriolis meters indicated a cumulative flow rate of 3,191 m³/d [20,068 bbl/d]—almost exactly the Sirte commingled production rates.

During one of the well tests, the CleanPhase separator was rigged up in series with one of the Sirte conventional separators to allow a flow rate comparison. The rates measured by the two separators were found to be almost identical, but the CleanPhase separator provided the advantage of faster, more environmentally friendly cleanup operations.

Sirte personnel opted for the CleanPhase separator for well testing and cleanup on other wells, and the conventional separator was demobilized.

Time	Client Separator Production Rates			CleanPhase Separator Production Rates		
	Gas, MMcf/d	Oil, bbl/d	Water, bbl/d	Gas, MMcf/d	Oil, bbl/d	Water, bbl/d
15:00	1.26	751	2,634	1.27	756	2,645
15:15	1.26	749	2,628	1.27	754	2,638
15:30	1.25	747	2,621	1.27	747	2,664
15:45	1.24	746	2,621	1.28	738	2,691
16:00	1.23	746	2,618	1.27	750	2,630
16:15	1.22	746	2,620	1.25	752	2,667
16:30	1.22	747	2,621	1.24	757	2,567
16:45	1.22	740	2,597	1.24	748	2,579
17:00	1.21	733	2,571	1.22	739	2,652
17:15	1.21	732	2,568	1.22	738	2,624
17:30	1.21	731	2,565	1.21	744	2,659
17:45	1.21	731	2,565	1.22	734	2,544
18:00	1.21	731	2,565	1.21	737	2,517
18:15	1.21	726	2,548	1.21	na [†]	na
18:30	1.21	722	2,532	1.21	731	2,509

[†] Not available

www.slb.com/welltesting

Schlumberger