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High-pressure (3,600 psig) Multiphase Flow Facility: 3-phase (oil/water/gas) field-like multiphase and wet gas conditions



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Gas-liquid separator: High-pressure performance evaluations

Southwest Research Institute® (SwRI®) has a long track record of providing state-of-the-art multiphase flow solutions for the oil and gas industry. For more than 15 years, SwRI has been developing capabilities to help oil and gas companies advance the technology required for deepwater and subsea applications.

Research Areas

Multiphase Flow

- Characterization
- Hydrodynamics
- Modeling

Multiphase Flow Testing

- Multiphase/wet gas meters
- Sampling systems
- Multiphase pumps
- Gas-liquid separators
- Phase fraction instrumentation

Flow Assurance

- Hydrate
 - Agglomeration/deposition
 - Plug removal techniques
 - Transport
- Wax deposition
- Gelled crude oil yield strength

Facility Capabilities

Fluids

- Natural gas, nitrogen
- Crude oil, condensate, refined liquid
- Fresh water, saltwater
- Oil and water combined

Operating Conditions

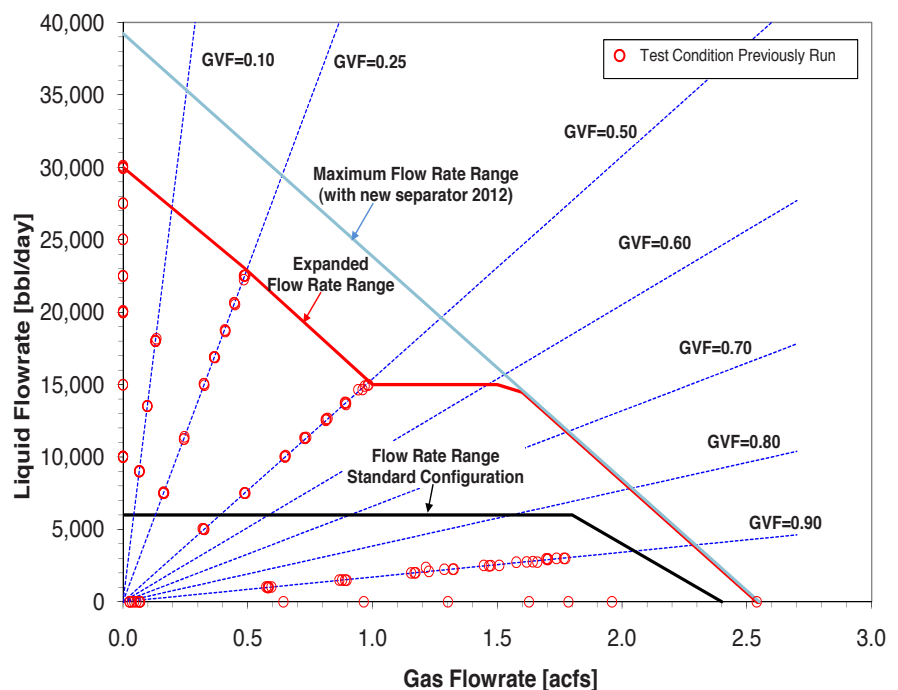
- Pressure: 100 psig to 3,600 psig
- Temperature: ~40°F to ~120°F
- Gas volume fraction: 0% to 100%
- Water cut: 0% to 100%

Instrumentation

- Various gas and liquid reference meters
- Temperature, pressure, differential pressure
- Gas volume fraction (GVF)
- Water cut
- Deposition and holdup monitoring by gamma ray densitometer
- High-pressure optical system to view inside pressurized lines

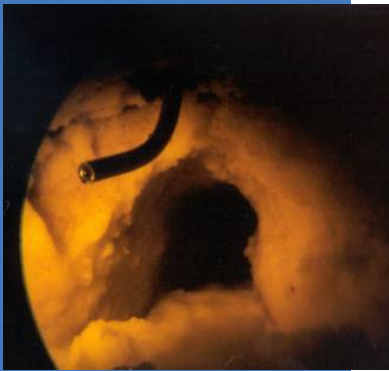
Flowrate Range

Total volumetric rate: 0 acfs to 2.5 acfs (gas and liquid combined)



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The combined flowrates of gas and liquid are constrained to be within the total volumetric limit of 2.5 actual cubic feet per second (acfs).



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Hydrate deposition and transport:
Including high-pressure flow
visualization



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Cone meter: Testing shown under
wet gas conditions



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Downhole multiphase flow meter: Shown
installed on an inclinable test section

Loop Configurations

Customized test sections are assembled using 1-inch to 5-inch nominal pipe sizes of various lengths. Some possible system configurations include:

- Standard
 - Gas and liquid phases metered independently and combined upstream of test section. Available conditions include gas flow rates to 2.5 acfs, liquid rates to 6,000 bpd, and test section differential pressures to 100 psi.
- High DP
 - Test section differential pressures up to 200 psi at flowrates up to 1.0 acfs (gas and liquid combined). Typical projects include hydrate formation and dissociation studies requiring large pressure differentials.
- Submerged Pipe
 - Specialized test section consisting of 1,200 feet of 1-inch ID coiled tubing in water bath. Typical projects include flow assurance and inhibitor testing and gel strength estimation.
- Expanded Flow Rate
 - Liquid flow rates up to 30,000 bpd at 0% GVF.
- Inclinable Test Section
 - 216-ft-long test section with variable inclination angle from 0° to 90°. Downcomer allows for a 108-ft test section with inclination angles from 0° to -90°.



Southwest Research Institute is an independent, nonprofit, applied engineering and physical sciences research and development organization using multidisciplinary approaches to problem solving. The Institute occupies 1,200 acres in San Antonio, Texas, and provides more than 2 million square feet of laboratories, test facilities, workshops and offices for more than 3,000 employees who perform contract work for industry and government clients.

We welcome your inquiries.

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