

Mercury Measurements in Appraisal Wells



Accurate concentrations of mercury in reservoir fluids are important to facility and process design. Mercury Technology Services (MTS) and Measurement and Monitoring Solutions (MMS) provide testing services for mercury in fluids obtained during tests of appraisal wells. Special procedures are required to obtain measurements that are predictive of reservoir amounts.

Mercury in Reservoir Fluids

The exact concentration of mercury in newly discovered reservoirs often is elusive. Measurements of mercury at the surface during flow tests do not reflect actual concentrations because the metal surfaces in tubing and surface equipment that contact produced fluids scavenge mercury. Measured concentrations using a test separator at the surface are typically lower than those eventually measured during actual production. To circumvent these inherent difficulties, special computational tools and measurement procedures have been developed by MTS and MMS.



Computational Approach

- Examination of tubing and equipment metallurgy.
- Calculation of surface areas.
- Construction of well temperature profile under flowing conditions.
- Examination of well flow scheme and measurement sequence.
- Calculation of scavenging rates and amounts.
- Specification of analytical procedures.
- Conduct speciation tests to correct background levels
- Review analytical data; perform thermodynamic calculations
- Calculate reservoir range and uncertainty.
- Compare to industry experience and statistics.

Computational Modeling

MTS has developed proprietary computational tools to quantify scavenging of mercury by steel tubulars and equipment. The amount of mercury absorbed into steel is a function of temperature, surface area, metallurgy, fluid composition and mercury fluid concentration. From the calculated amounts of mercury in steel, analytical measurements can be adjusted to reflect the actual amounts in the reservoir.

Analytical Services

Low levels of detection for mercury in gas and oil are needed for accurate prediction of reservoir concentrations. MMS measures mercury in gas, and condensate using both samples from the test separator, and samples obtained from bottom-hole to allow prediction of mercury reservoir levels. In addition, MTS and MMS employ specially designed analytical methods for speciation of mercury in liquids to assist computational predictions.



Mercury Species

Not all mercury species are scavenged by metallic surfaces. Measurements of mercury in liquid phase should consider species effects. Special sampling and analysis procedures are specified to allow correction of measured amounts for the concentration of the elemental species.



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