Dennis Denney, *JPT* Technology Editor

Fig. 1—Baker Atlas RCI.

Reservoir-Fluid Sampling—The Baker Atlas Reservoir-Characterization Instrument (RCI) **(Fig. 1)** was designed to obtain representative formation-fluid samples with minimal contamination and accurate formation pressures. Saturation pressures are used alongside the limitless preflush volume to monitor sample cleanup and ensure that a single-phase representative formation-fluid sample is captured. Sample tanks are maintained at a positive overbalance pressure to eliminate the risk of sample flashing in the tanks while the sample is transported to surface. The formation tester can enable application of drillstem-test (DST) techniques. At a smaller scale, it can acquire fluid samples and formation measurements of sufficient quality for reservoir characterization and facility design. The system can recover clean fluid samples on a single trip into a well. The system has recovered fluid samples with contamination levels less than 5%, which enables excellent evaluation of hydrocarbon properties and producibility and reduces the need for extensive drillstem testing. DSTs in ultradeep water require producing a large volume of fluid to obtain formation cleanup over the reservoir interval. Conducting a wireline formation test can remove the environmental issue of fluid disposal because cleanup takes place inside the wellbore. A secondary concern may be the requirement to terminate testing to allow disconnects from the seabed. If a well test is terminated mid-test, the quality of the data, and samples obtained, will be reduced. A wireline formation tester can be retrieved from the wellbore quickly without deterioration of data quality.

For additional information, visit www.bakerhughes.com/rci.

Cement Reacts to Microleaks—Schlumberger's FUTUR active set-cement technology seals microleaks that occur in a cement sheath. Pumped and placed as part of the primary cementing operation, the active components of the cement system remain dormant until exposed to hydrocarbons, such as those seeping through cracks or microannuli in the cement sheath. Upon activation by contact with hydrocarbons, the cement sheath will self-repair without intervention, preventing annular migration of fluids between zones behind the casing or sustained casing pressure at the surface **(Fig. 2).** This technology can be mixed and pumped as a lead or tail system during any primary cement job. The properties of this system enable pumping it with standard cementing equipment. Microscale leaks caused by subsidence, pressure/temperature cycling, or tectonic activity will be sealed. The reaction within the matrix, at exposure to hydrocarbons, is spontaneous and completed rapidly. The system retains its reactivity over time and will continue to seal subsequent leaks that may occur over the well's productive life, or even after abandonment. The responsive sealant can be placed strategically as part of the casing- or liner-cementing operation in any section of the well to form an effective long-term seal above the reservoir. To maximize well integrity, the set-cement slurry should be used in at least two barriers above the reservoir, and each barrier should be at least 500 ft in length.

For additional information, visit www.slb.com/futur.

Treat Injection Wells—Halliburton's Crystal Seal service is designed to help stop injected fluids in flood projects from flowing into fractured or highly vugular zones and eventually communicating directly with producing wells. The process treats the injection wells providing a far-reaching effect with no risk of damage to the producers. The process uses a water-swellable synthetic polymer capable of absorbing 30 to 400 times its weight in water **(Fig. 3).** Water absorption is rapid and controllable, with the process taking effect in a matter of hours. The agent is applicable from 80 to 275°F. The formation temperature has only a slight effect on the swelling properties.

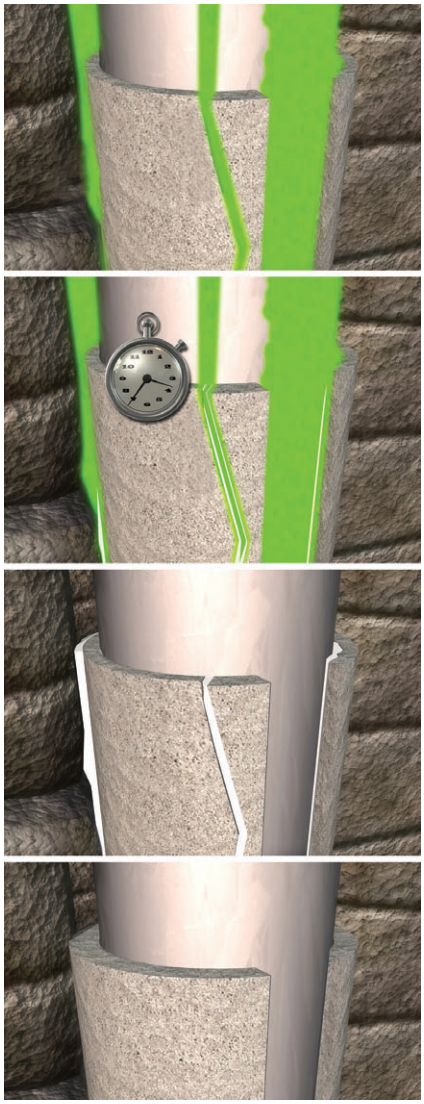

Fig. 2—Schlumberger's FUTUR active set-cement technology seals microleaks.

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PETROLEUM

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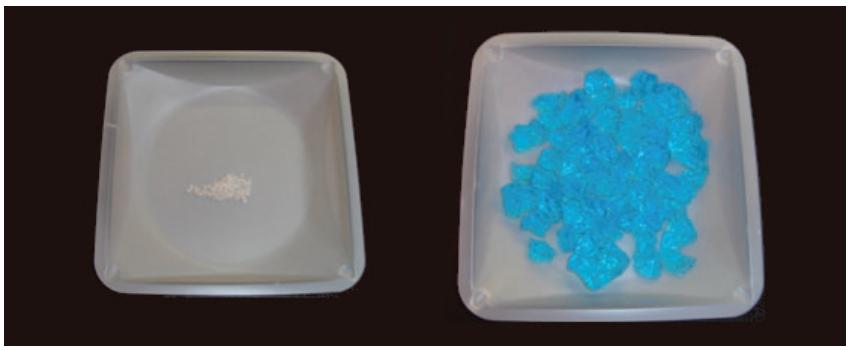

Fig. 3—Halliburton's Crystal Seal product before and after swelling (here water was dyed to show effect).

The polymer is resistant to carbon dioxide contamination, acid contamination, and hydrogen sulfide environments. The carrier fluid will help determine the swelling rate of the agent. The recommended carrier fluid is sodium chloride brine, but based on well requirements, the carrier fluid can be potassium chloride brines, calcium chloride brines, produced water, seawater, or a porosity-fill conformance-control system. The most suitable carrier fluid is determined by well depth, tubing and casing capacity, and pumping rate. The service can address problems such as fissures and fractures in communication, deteriorated layers of formation rock, and friable or karsted aspects, where the presence of a highly communicated crossflow behind casing can cause workover problems such as dilution of any sealant or cement, or preflush on casing-leak squeezes with cross-flowing water behind pipe.

For additional information, email stimulation@halliburton.com.

Pumpoff Control—Typically, when beam-pumped artificial-lift systems are designed for expected loads, stress, and torque, they tend to overproduce wells, especially in the case of older wells that are depleting. When overproducing is a problem, the result is fluid pound. Pumpoff controls minimize the effects of fluid pound. Rather than detecting pump-off with strain gauges or load cells, the D-Jax Penny Pincher pumpoff control detects pump-off by measuring pumping-speed increases, in milliseconds. The absence of strain gauges and load cells minimizes maintenance. The pumpoff controller uses fiber-optic circuitry to reduce the chances of power surges and electrical spikes causing catastrophic damage to the control logic board. The time-based method of pumpoff detection enables a wide range of applications, shallow and deep wells (13,000 ft) and low- and high-volume wells. When used with a load cell, the system provides information on peak and minimum loads, provides surface and downhole dynamometer cards, and stores the last five dynamometer cards before shutdown. The dynamometer system installs on the polished rod and dynamometer-card sessions are saved and stored through the system software. Data are transmitted from the polished-rod unit to the portable computer by radio (up to 300 ft away). This system can be made telemetry-ready for remote monitoring and control by use of radio, cell phone, hard wire, or satellite.

For additional information, visit www.djax.com.

Moisture Detection During Liquefaction—SpectraSensors' tunable-diode-laser analyzer helps prevent catastrophic ice formation in liquefied-natural-gas (LNG) liquefaction. The presence of even trace amounts of H_2O or CO_2 can cause ice formation and threaten the integrity of processing equipment during compression and liquefaction of the natural gas. Very fast detection is essential. In the LNG liquefaction process, it is desirable to extend the life between regeneration of the mole sieve or to monitor performance of a glycol or amine contactor while avoiding contamination to the natural gas. Checking the output of the bed or column determines the breakthrough point (the exact point at which the concentration of H_2O and CO_2 rises), which indicates that the desiccant is saturated. The new analyzer technology **(Fig. 4)** uses tunable-diode-laser spectroscopy to provide highly accurate and virtually instantaneous measurements of trace amounts of a particular gas (H_2O or CO_2 in this case). This gas-detection method is not susceptible to aging effects, making its factory calibration a timeless constant. The technology uses a simple measurement that is based on a fundamental principle: Molecules vibrate when excited by light at specific wavelengths. Therefore, detecting how much light is absorbed at these wavelengths enables precise measurement of the concentration of a given gas.

Fig. 4—The SpectraSensors system comprises a sample cell that the gas flows through, a tunable-diode laser that emits a specific wavelength of light through the gas, an optical detector, and software to analyze data and deliver the results.

For additional information, visit www.spectrasensors.com/h2s.

Integrated Well Planning and Drilling—Paradigm has released its Sysdrill Version 3.0 software. The new version is an evolved product suite of well-planning and drilling software. The software focuses on four areas of improvement: functionality, efficiency, accessibility, and interoperability. Software components include automatic well planning, advanced target definition, casing-wear prediction, dual-gradient modeling, temperature modeling, well-control kill sheet, volume calculator, packer calculation, and direct-exchange/wellsite-information-transfer standard-markup-language interoperability. **JPT**

For additional information, email info@pdgm.com

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