



An Automatic Casing Swab

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Many older U.S. reservoirs no longer have sufficient natural pressure to force gas or oil to the surface. An increasing number of these reservoirs also produce too slowly to justify the cost of installing conventional surface pumps. Yet large quantities of oil and natural gas remain in these marginal fields. With a \$400,000 DOE grant, Sandia National Laboratories developed a low-cost way to keep these low-volume wells in production. The Automatic Casing Swab (ACS) is a device that seals off the lower portion of a well, allowing gas or oil to flow into the wellbore below the swab. When enough pressure builds up, the ACS unseats and gas or oil is released to the surface. As the flow slows and pressure in the upper portion of the well again builds up, the ACS reseats until sufficient oil or gas again accumulates below it. Sandia transferred the ACS technology to Belden & Blake Corporation, an oilfield equipment manufacturer. A subsidiary of Belden & Blake has applied ACS hardware to approximately 350 wells that are today producing more than 3.5 million cubic feet of natural gas per year that otherwise could not have been economically extracted.

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Modeling the Forces of Nature

In 1987, Lawrence Livermore National Laboratory successfully modified chemical kinetic models originally developed for underground oil shale retorting to locate undiscovered pockets of crude oil. Laboratory scientists applied their knowledge of fossil fuel pyrolysis (decomposition by heat) to develop laboratory experiments that, in a matter of hours, could predict the course of chemical reactions that occur over millions of years. They took the knowledge gained in these experiments and created KINETICS, a computer code that can predict the creation and accumulation of oil and gas in geological formations containing petroleum source rocks.

Run on a personal computer and easily used by nonexperts, KINETICS was licensed for commercial distribution to Humble Instruments and Services Inc. Humble is now one of Houston's fastest growing businesses, due, in large part, to sales of KINETICS technologies. According to Humble President Dan Jarvie, "The benefits this technology provided were national and international sales meaning job creation and taxable income for our country."