IMPROVED DRILLING TECHNOLOGY

In addition to the recovery processes featured in this series of drawings, *improved drilling technology* is included as an example of technologies that contribute to improvements in oil production.

Some of the improved drilling technology in use today has been developed under DOE/Industry cooperative research, such as mud pulse telemetry, pressure coring systems, downhole drill motors, and polycrystalline drill bits.

Mud Pulse Telemetry is a drilling system that transmits the location of a drill bit by sending pressure pulses through the drilling mud that circulates from the drill bit to the drilling rig on the surface. The technology, developed during the 1970's under a DOE research program, eliminates the need for costly drill pipe removal and lowering an instrument in the hole to obtain the data. This “measurement-while-drilling” capability enables the continuous monitoring of drilling progress, improves drilling accuracy and saves the industry millions of dollars in operational costs.

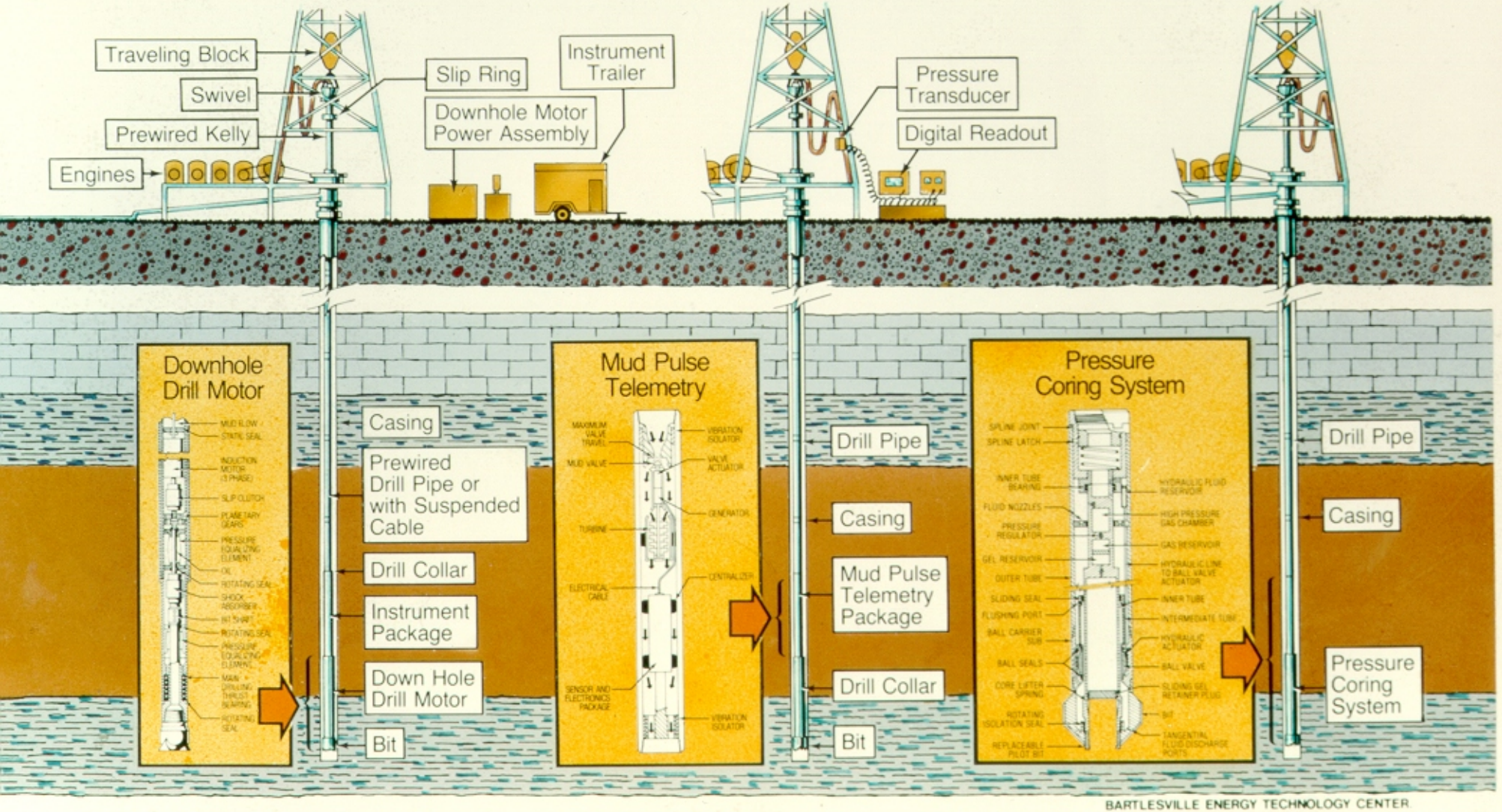
The Pressure Coring System provides the key capability to obtain accurate measurements of underground reservoir conditions - a core barrel for retrieving reservoir rock samples while maintaining the ambient pressure of the reservoir. Developed in cooperation with industry service companies and Sandia National Laboratories in the early 1980's, the technology is now included in the range of tools and services provided in specialized coring operations.

The Downhole Drill Motor concept has been largely responsible for advances now routinely employed by industry in the varieties of slant-hole and horizontal drilling. Improvements in accuracy, equipment and technique, combined with slim-hole drilling technology, have revolutionized access to oil reservoirs and minimized environmental impact of drilling by enabling multiple drillhole emplacement from drill pads having a greatly reduced “footprint.” These improvements are now being promoted by the Department of Energy for use in areas such as Alaska’s arctic North Slope region.

Early use of the superior capabilities of Polycrystalline Diamond Drill Bits was impeded by severe problems of the diamond cutting bits breaking away from the drill bit substrata, requiring costly, time-consuming drill bit retrieval. Research at DOE’s Sandia National Laboratories developed a diffusion technique that permanently bonded the cutters to the bit. In one test, only three such bits were needed instead of the 13 conventional bits that would have been required to drill a 5,000-foot well. The technology is now standard in the industry, providing superior cutting power for drill bits that significantly lowers operational costs, which can be as much as a million dollars per well.

IMPROVED DRILLING TECHNOLOGY

DOE/Industry cooperative research has produced such developments as the Downhole Drill Motor, Mud Pulse Telemetry and a Pressurized Coring System.



BARTLESVILLE ENERGY TECHNOLOGY CENTER
U.S. DEPARTMENT OF ENERGY