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CSM No. 366  
15053

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Copy No. \_\_\_\_\_  
8 March 1956

## CURRENT SUPPORT MEMORANDUM

ALLEGED SUPERIORITY OF TURBINE DRILLING

OFFICE OF RESEARCH AND REPORTS

CENTRAL INTELLIGENCE AGENCY

CIA HISTORICAL REVIEW PROGRAM  
RELEASE AS SANITIZED  
1998

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ALLEGED SUPERIORITY OF TURBINE DRILLING

Press dispatches from Moscow published in the New York Times, 1 March and 3 March 1956 quote Mr. J. B. O'Connor of Dresser Industries as saying that Russia's turbo-drill is 10 times as fast as the conventional rotary drill used in the U.S. because the source of power is just above the bit instead of at the top of the well. This statement is in general true, but the order of magnitude applies only to hard rock formations, and the greater speed of the turbo-drill must be weighed against disadvantages which Mr. O'Connor fails to mention.

Both the turbo-drill and the rotary drill utilize a drilling fluid, usually mud or water. In turbine drilling, the fluid is forced into the hole under high pressure, and provides the motive power for a turbine located at the bottom of the hole. The ideal power fluid must be clean and of low viscosity in order to reduce friction losses to a minimum. Drilling fluid, however, performs one or more other functions with both types of drills, i.e., it carries drill cuttings out of the hole, plasters the walls of the hole to prevent caving, and prevents oil or gas blowouts when the drill penetrates high pressure zones. In order to do these things well, the fluid must be dense, viscous, and have plasticizing properties, or precisely the qualities not desired in a power fluid. Hence, the turbo-drill is most satisfactory in hard rock formations where drill cuttings are ground fine and the danger of caving is at a minimum. It is less satisfactory, or may be completely unsatisfactory, in soft rock formations where a viscous drilling fluid is needed.

Most rock strata in U.S. petroleum producing regions are not of the kind which favor turbine drilling. The major exceptions are in the Appalachian region. Turbine drilling would also be advantageous for certain rock intervals in the West Texas, Mid-Continent, Rocky Mountain, and Canadian oil fields, and it is possible that its use would be warranted to take care of these intervals. It is highly unlikely that turbine drilling would displace rotary drilling in the Gulf Coast or California fields, where most of the formations are relatively soft. The American oil industry has not adopted the turbo-drill, even on a small scale, in spite of research, development and testing dating back at least to 1924.

The turbo-drill is not used universally even in the USSR. In areas where hard rock formations prevail, as in the Urals-Volga area, turbo-drills are used for up to 90 percent of all drilling. Where softer formations prevail, as in the Baku area, only about half the drilling is by turbine. The Russians developed the turbo-drill to solve the problem of "twist-offs"--the breaking of the rotary drill pipe under high torsional stresses. The U.S. solved the problem by improving the equipment and techniques used in rotary drilling.

Analyst

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