

Drilling Mud.

IT is not always realised that problems relating to even apparently minor technical details of an industry often necessitate prolonged scientific research for their satisfactory solution, and that investigations which at first appear to be of quite an academic nature often lead up to results of great industrial importance. Both these aspects of scientific enquiry are strikingly brought out in a paper on "Drilling Mud: Its Manufacture and Testing" recently published* by Messrs. P. Evans and A. Reid of the Burma Oil Company. It is well known that in present day oil-field development, mud-fluid plays a very important part, and that unsuitable mud is the cause of many drilling troubles and of much loss in production. Though it is true that 'drilling mud' is essentially nothing more than a mixture of clay or shale with water, yet it has been increasingly realised within recent years that in actual practice, it is not always easy to get the right type of mud-water mixture to work with in drilling operations. Quite a large number of investigations bearing on the problem of the manufacture and testing of drilling muds have been made recently by the scientific and technical staff of the Burma Oil Co., and the present paper gives an admirable account embodying the main results of these investigations. In the course of the first 35 pages forming Part I of the paper, the authors deal with the manufacture of drilling mud; and in Part II which runs into nearly 250 pages, a detailed account is given of the testing of drilling mud with reference to its physical properties such as specific gravity, viscosity, thixotropy, surface tension, stability, etc., based on an enormous amount of experimental work carried out by the authors and their colleagues.

It is well known that there are three drilling systems in use in the oil industry: (a) percussion or cable-tool drilling, (b) core-drilling and (c) rotary drilling. Of these, the rotary drill, of comparatively recent development, is by far the most important, enabling the prospector to reach depths of ten to twelve thousand feet in his search for oil; and the use of a mixture

of clay and water—termed 'mud-fluid' or 'drilling mud'—as a circulating fluid in rotary drilling is now a universally accepted practice. Seeing that in a single rotary well, as much as £ 25,000 are sometimes spent on the provision of this drilling mud, it is obvious that the properties determining the efficiency of this mud-fluid deserve the most careful consideration.

Drilling mud is usually made in a central plant for distribution to a number of wells, and the actual methods of manufacture are based either on churning, or jetting or preferably a combination of these. The mud plant must also deal with the problem of the reclamation of used mud, especially so where the cost of fresh mud is high. To obtain the best results, in both manufacture and use, adequate testing is required, and this subject has been discussed at great length in the paper. According to the authors, perhaps the most important test on a mud, and the one least understood, is the measurement of viscosity. The paper describes the various kinds of viscometers used for measurements on mud-fluids, and discusses their relative merits. A very valuable contribution of the authors in this study is their recognition of the fact that a full expression of the viscosity of a drilling mud must take into consideration two factors—'yield value' and 'mobility'. Drilling mud in flow does not behave in the same fashion as a simple liquid, such as water or oil; whereas the smallest force applied to a true liquid in a long narrow tube will cause a slow flow, this is not so with drilling mud, which possesses a 'yield value' which must be overcome before flow takes place. The resistance to flow depends not only on this initial resistance, but also on the 'mobility' of the mud. Thus arises the necessity for describing the viscosity of mud-fluids in terms of both these factors. The nature of this type of flow which the authors propose to call 'plastic flow' has been discussed at great length in view of its importance in the study of drilling muds. The problem of the flow of mud in the circulating system of a well, which has received but little attention so far, has also been tackled and many useful suggestions have been made regarding the possible correlation of the physical properties of the mud with the pressures needed

* "Drilling Mud: its Manufacture and Testing" by P. Evans, B.A., F.G.S., M.Inst.P.T., and A. Reid, M.A., B.Sc., A.M.Inst.P.T.—*Transactions of the Mining and Geological Institute of India, Calcutta*, Vol. XXXII, December 1936. Price Rs. 12.

in the pumps to force the mud through the circulating system. In addition to a full treatment of these important considerations, the paper also deals with various other aspects of the testing of drilling mud and draws pointed attention to the lines on which further experimental investigation and research are necessary.

The paper is profusely illustrated with photographs, diagrams and sketches; and the graphical presentation of experimental results which the authors have frequently

adopted is indeed very effective. The subject-matter has been presented in a very clear and lucid manner and the treatment is throughout thoroughly practical, with numerous references drawn from a wide range, including the authors' own experiences in this field of work. The paper is thus a most valuable and authoritative contribution to the study of an important aspect of present-day oil field development.

L. RAMA RAO.

CENTENARIES

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Morton Richard (1637-1698)

RICHARD MORTON, a British Physician of repute, was born on 30th July 1637. He matriculated in 1654, graduated from the New College, Oxford, in 1657 and became an M.A. in 1659. Having been a minister and ejected from his living in 1662 on account of his refusal to comply with the requirements of the Act of Uniformity, he turned his attention to Medicine, became an M.D. in 1670 and afterwards settled in London.

HIS CAREER

He became a Fellow of the College of Physicians in 1679. James II omitted his name from the charter granted to the College in 1686, but he was restored to his position in 1689. He was censor for several years and eventually became a physician in ordinary to the king.

HIS CONTRIBUTIONS

Morton was recognised to be one of the principal nosographers of the seventeenth century. He popularised the use of cinchona. There was keen rivalry between him and Sydenham. He published two important medical works: *Phthisiologia* (1689) and *Pyretologia* (1692).

The first of these is regarded as a treatise of the highest value. Morton uses the words Phthisis in a very wide sense, to denote not only wasting due to tubercle in the lungs but also the wasting effects of jaundice, gout and other ailments. His second book was one of the first books to recognise scarlet fever as a distinct disease. Morton's works were included in the *Opera medica* which was first published at Geneva in 1696 and went through several editions for nearly half a century.

Morton is said to have been "a man of great gravity, calmness, sound principles, of no faction, an excellent preacher, of an upright life."

He died in London on 30th August, 1698.

Giffen Robert (1837-1910)

SIR ROBERT GIFFEN, a British Statistician, was born at Strathaven, Lanarkshire on 22nd July 1837. His father was a petty merchant. He attended the village school and was in charge of the Sunday-school Library. This opportunity was fully utilised by him. He read all the books he could find and wrote articles and poems for a newspaper.

HIS CAREER

After having been in the legal profession for about ten years, he adopted journalism in 1860. He served for a time with John Morley on the staff of the *Fortnightly review* and later became an assistant editor of the *Economist* under Walter Bagehot. He was also the City editor for many newspapers and one of the founders of the *Statist*. In his classical *Report on local taxation* (1871), Goschen acknowledged his indebtedness to Giffen and in 1876 Giffen was appointed to the Board of Trade as the head of the Statistical Department and was later elevated to the position of Assistant Secretary and Controller. He retired from the latter position in 1897.

HIS CONTRIBUTIONS

He was a prolific writer on financial and statistical subjects. His instructive handling of statistics and his keen eye for pitfalls contributed greatly to raise the reputation and encourage the study of statistics in Great Britain. Besides several articles