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THE HISTORY OF DRILLING FLUIDS - CLASSIFIED BY DATE RANGES.

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Pre-1900 – Oilwell drilling from the mid-1800s to 1900 was predominantly done by the dry hole cable tool percussion drilling. The cuttings (called drillings) were removed by means of an open-ended bailer. About one barrel of water was added to open hole to make a slurry, helping to suspend the drillings for easier bailing. Hydraulic rotary drilling was used extensively by water-well drillers, both in the US and Europe. Water well drillers did not usually work with mud but used clear water to sweep the cuttings out of the wellbore. The cuttings were then discarded, and clear water was pumped back down the hole.

1901 to 1929 – With the success of Spindletop in 1901, hydraulic rotary drilling became more popular, especially in Texas, Louisiana and California. There is evidence however, that hydraulic rotary drilling with mud was applied successfully in Baku, Azerbaijan, prior to Spindletop. The use of a mud laden fluid was deemed to be essential for rotary drilling. Until the mid to late 1920s the fluid used was just dirt and water. Improvements to the muds used then occurred by using barite for weight control and bentonite for hole cleaning and suspension. The only other additive used was water. In most areas of North America, cable tool drilling remained the method of choice. Documented use of a mud-laden fluid for cable tool operations was first reported in 1915.

1930 to 1941 – The first mud sales and service company was formed in 1930 as *Baroid Sales Company*. Building the first mud products involved R&D efforts by both the operators and the service companies. They quickly developed products to solve various problems, such as viscosity control and "wall building" fluid loss control. The mud balance replaced mud buckets and hydrometers for weight control. Harlan Marsh of *General Petroleum* designed a funnel viscometer for viscosity measurements. *Oil Base Inc.* was established to market oil muds.

1942 to 1946 – World War II severely slowed down R&D progress to just maintain oil and gas production for the war effort. Mud engineers were usually considered essential to the war effort and were exempt from serving in the military. Gasoline and rubber tire rationing were a problem for those field engineers. The world's deepest well was drilled in 1944 to 15,279 ft by *Phillips Petroleum* in West Texas. A water-based mud was supplied by *Magnet Cove Barium Corporation (Magcobar)*.

1947 to 1960 – The number of mud products and mud companies expanded greatly after the war. R&D drilling fluid efforts were a high priority of the operators, assisted by the mud companies, resulting in improved mud products and rig operations. Prior to WWII, *Baroid Sales Company* maintained about 85% market share of the mud business. Most of the primary mud sales companies operated through distributors, such as lumberyards which had fleets of trucks. The suppliers of barite and bentonite, primarily *Baroid* and *Milwhite* through the 1930s and *Magcobar*, *IMC Mud Company*, and *Oil Base* after the war, were tending toward setting up their own distribution systems. Mud technology, testing, products and systems improved dramatically. A number of independent mud companies, some fairly large, were established during this period.

1961 to 1985 – Although the API and the AIME had published a number of papers on drilling fluid technology, it wasn't until 1961 that the API Committee 13 was established to set specifications and recommended practices for the industry. The primary mud systems at the time were chemically thinned water-based muds and diesel oil-based muds. The defining event of this time period was the dramatic depression the drilling industry. The US rig count started the 1980s with about 4,500 rigs but fell to less than a thousand in three years. This caused a number of mergers and acquisitions as well as bankruptcies in the industry. Another event that affected the mud industry was the Santa Barbara oil spill and the resulting rise in the EPA's oversight on the drilling industry.

1986 to 1990 – R&D efforts were much slower due to the downturn in the industry. However, because of the scrutiny of the US EPA, work was done on waste management and replacing diesel and mineral oil with synthetic base fluids. The industry began a slow recovery by 1990.

1991 to 2000 – Drilling was still somewhat depressed throughout this decade. But, deep-water and horizontal drilling were being developed and the operators were interested in solving problems while drilling such as lost circulation and wellbore stability. Joint industry projects were established to

eliminate non-productive time (NPT) due to these issues. Solids control equipment and waste management improvements were developed. The use of chemically thinned, fresh water muds was declining in popularity. The use of both organic and inorganic brines as drill-in fluids was being established for regular drilling.

2001 to today – Wellbore stability techniques and wellbore strengthening products and systems became the industry norm. A move toward automation has resulted in the development of new testing protocols and equipment. The development of products and systems, both water-based and non-aqueous, are being developed to solve current and future extremes in pressure and temperature. The movement to establish solids-free drilling fluids is ongoing.