

HISTORY OF THE OIL INDUSTRY AS PRESERVED BY THE PENN-BRAD OIL MUSEUM ON THE DEVELOPMENT OF THE BRADFORD OIL FIELD

James Bryner, Penn-Brad Oil Industry Museum, 50 Parking Lane, Bradford, PA 16701

Although the Bradford area was not the first to be commercially exploited for petroleum, it has played an important role in the development of the oil industry. The Penn-Brad Museum, founded in 1970 as part of the 100th anniversary of the first commercial well in the area, seeks to preserve that contribution.

The first commercial oil well in the Bradford Field was drilled in 1871. This and subsequent wells were producing the unique "Pennsylvania" oil which is a paraffin-based crude which yielded as much as 30% high-grade lubricants. These products led to the development of such companies as Kendall, Quaker State, and Pennzoil. By 1880, the Bradford Field was producing almost 70,000 barrels per day, produced from over 7,500 wells. At one time in the middle 1880s, this field was producing almost 85% of the United States production and 73% of the entire world production. Even with oil at \$3.95/barrel in 1930, the Field created almost 37 million dollars in revenues. Eventually this was the first *billion dollar* oil field.

A central exhibit at the Museum is the 72 ft. high wooden standard drilling rig, believed to be the only one of its kind in the world that is still operation. But this is only one of the many working exhibits that visitors can experience, for the tool-house comes alive when the engines are started. We take great pride in the many working examples of oil industry machines that we have, as well as exhibits designed to showcase the life of the oil field worker and family..

Thus, the Penn-Brad Oil Industry Museum is keeping alive the oil field traditions and offers a celebration of the great contribution made to the early industry by the Bradford region.

A SHORT HISTORY OF GEOPHYSICAL EXPLORATION FOR PETROLEUM

Dean Clark, Society of Exploration Geophysicists, 8801 South Yale, Tulsa, Oklahoma 74137

The U.S. oil industry had already existed for about 75 years and had long established itself as a prominent component, if not the actual underpinning, of the national economy before geophysics became an active participant. However, after geophysical theory and instrumentation went from drawing board to routine use in the 1920s, geophysical data immediately became the key information for petroleum exploration—a position they still hold.

Almost all physical theories can be and are used to explore for petroleum but seismology, recording and analyzing the wave elastic energy transfers through the subsurface, is by far the most prominent. Accurate figures are unavailable but it is routinely estimated that it accounts for at least 90% of worldwide expenditures on geophysical exploration for oil (and perhaps even more than that in the U.S.)

However, although seismology dominates, it was not first. That honor belongs to the torsion balance, a cumbersome but very accurate way to measure gravity that was invented in Hungary at the end of the 19th century. This invention showed immediate promise as an exploration tool but commercial use was delayed by World War I. Ironically, World War I put seismology on the "fast track" to the oil industry. U.S., English, and German scientists were employed to use seismic

techniques to locate enemy artillery and several of them, on both sides, successfully transferred the military applications to oil exploration in the 1920's. Gravity and seismic exploration were both so spectacularly successful in the 1920s that several practitioners felt the need to establish a professional society devoted entire to this new discipline. Thus, the Society of Exploration Geophysicists was formed in 1930. Geophysics now ranks as one of the world's most sophisticated and data-intensive disciplines. It has long ranked among the heaviest users of supercomputers and, incredibly, this is likely to increase as new and astonishing visualization techniques become adopted.

AMERICAN PETROLEUM INSTITUTE PROJECT 43 AND THE ORIGIN OF MODERN PETROLEUM MICROBIOLOGY

Harry M. Edenborn; National Energy Technology Laboratory, U.S. Department of Energy, P.O. Box 10940, Pittsburgh, PA 15236

Microbial activity is known today to have significant positive and negative impacts on the petroleum industry. From a beneficial perspective, microbial activities have been used to prospect for oil, recover oil from subsurface reservoirs, biosynthesize edible proteins, and remediate petroleum-contaminated soil and water. Detrimental activities include the corrosion of iron and steel, the plugging of reservoirs, the degradation of drilling fluid additives, the contamination of fuels, and the deterioration of asphalts. In 1942, API Project 43 was initiated with the assistance of three major university research groups and was funded via private industry. Fueled by the WWII war efforts, the aims of the project were to investigate the roles of physical, chemical and biological forces in the transformation of organic material into petroleum. Basic studies on microbial activities related to petroleum recovery and degradation were directed by marine microbiologist Dr. Claude ZoBell at Scripps Institute of Oceanography and the results published extensively in journals and oil industry publications between 1942 and 1954. Studies by ZoBell's group established the presence of bacteria in recent and ancient sediments, in oil field fluids recovered from great depths, and living at extremely high temperatures and pressures. Specific bacteria, such as sulfate-reducing bacteria, were found to be instrumental in liberating oil from oil-bearing sedimentary rocks by dissolving carbonates, producing detergents, and decreasing the viscosity of oil. In addition, the ability of bacteria to degrade hydrocarbons was shown to be relatively commonplace, a characteristic that has been widely exploited in the bioremediation of accidental oil spills. These and other accomplishments of Project 43 will be discussed in terms of our current understanding of the field of petroleum microbiology.