Petroleum Pioneers

In 1859 Edwin Drake first applied well-drilling technology to produce significant quantities of crude petroleum at Titusville, Pennsylvania. Few realize, however, that Samuel Kier had refined crude oil in Pittsburgh by distillation five years earlier than Drake. Kier’s primary product was kerosene, a clean burning lamp fuel.

To commemorate the 150th anniversary of the drilling of the Drake well, the American Chemical Society (ACS) will present a National Historical Chemical Landmark award commemorating Samuel Kier’s work in Pittsburgh on August 26, and another to the Drake Well Museum at Titusville on August 27. Today’s extensive worldwide petroleum industry is a direct outgrowth of the efforts of Drake and Kier, first demonstrated in Western Pennsylvania. Here’s a primer on these two and some other pioneers of the oil industry:

Petroleum (literally, “rock oil”) had been gathered at numerous natural seeps for hundreds of years. The Seneca Indians, one of
wells near Tarentum where petroleum was skimmed off. When Kier’s wife developed consumption, her doctor prescribed “American Medicinal Oil,” inspiring Kier about 1848 to bottle and sell the oil from his father’s land. Selling his “Rock Oil” for 50 cents per half-pint bottle, Kier advertised it as a cure-all for rheumatism, gout, neuralgia, coughs, sprains, bruises, and many other conditions. He had a circular that advertised:


Kier’s remedy was sold in the Northeast by peddlers traveling in highly decorated wagons; he employed about 50 sales agents at the company’s peak, but finally abandoned this sales approach to sell directly to pharmacies.

In 1853, Francis Brewer, a graduate of Dartmouth College living in Titusville, took a sample of seep oil skimmed from Oil Creek to the Chemistry Department of his alma mater. George Bissell (1824–1888), a New York City lawyer and fellow Dartmouth graduate, was familiar with Kier’s Rock Oil. On a visit to the tribes of the Iroquois Nation, traded seep oil. It was collected in shallow pits and used as salve, mosquito repellent, purge and tonic, as well as wigwam water-proofing, body paint, and for religious practices. The product was simply called Seneca Oil.

Western Pennsylvania’s large, underground brine deposits were harvested and boiled down to produce crystalline salt. To access the brine, holes several hundred feet deep were dug by dropping a metal weight down a shaft to crush the rock and release the brine, which flowed to the surface. Oil would sometimes seep into these wells, making them unusable, but providing another source of petroleum.

Samuel Kier (1813–1874) operated various companies in the region, from flatboats to firebrick manufacture, iron works to coal mines. His father operated two salt
Dartmouth, Bissell saw the petroleum sample, recognized its similarity to Rock Oil, and was inspired to lease 105 acres near Titusville from Brewer for 99 years at $5,000. This was the world’s first oil lease. Bissell sent a petroleum sample to Professor Benjamin Silliman, Jr., at Yale, who recommended distilling the crude oil to recover kerosene and products such as paraffin and naphtha. His report, projecting profitability, attracted investors, but a dependable supply of oil was still needed. Bissell organized the nation’s first oil company, the Pennsylvania Rock (later Seneca) Oil Co., on December 30, 1854.

Drilling was treated with great skepticism, but Bissell and his partners nonetheless contracted Edwin Drake (1819–1880), a former railroad conductor and jack-of-all-trades, to drill for oil in the region. Under the auspices of the Seneca Oil Co., Drake went to Titusville in 1857. After experimenting with damming creeks and digging shafts in unsuccessful efforts to recover petroleum, Drake turned to the drilling concept. He visited the Kier brine well at Tarentum where he engaged the services of William “Uncle Billy” Smith, who was the Kier family’s salt well driller. After some hesitation, Smith went to Titusville to tackle the job. It was derided as “Drake’s Folly” but Smith brought in the first oil well on August 27, 1859. The well was drilled to 69 feet and yielded about 20 barrels per day.

Kier had become interested in petroleum for uses other than medicinal, such as a
lubricant for use on factory machinery. He also sent a sample of crude oil to James Curtis Booth, Professor of Chemistry Applied to the Arts at the University of Pennsylvania, Philadelphia. Booth's advice was to distill crude oil to produce an illuminant to serve as a replacement for whale oil, which had become scarce and expensive. Booth also provided Kier with drawings of a still. Based on this, about 1854 Kier set up a wrought iron whiskey still of one barrel capacity, equipped with a condenser at his offices at 363 Liberty St. (now Ave.) in Pittsburgh. Initially using raw petroleum recovered from his father's brine wells at Tarentum, Kier sold the liquid product as an illuminant, calling it "carbon oil."

But a significant problem developed: burning carbon oil in existing lamps used for coal oil and whale oil produced smoke and odor. An inventive man, Kier devised a lamp with a four-pronged holder for the wick that eliminated these problems, and he proceeded with a four-pronged holder for the wick that produced an illuminant to serve as a replacement for whale oil, which had become scarce and expensive. Booth also provided Kier with drawings of a still. Based on this, about 1854 Kier set up a wrought iron whiskey still of one barrel capacity, equipped with a condenser at his offices at 363 Liberty St. (now Ave.) in Pittsburgh. Initially using raw petroleum recovered from his father's brine wells at Tarentum, Kier sold the liquid product as an illuminant, calling it "carbon oil."

Shortly after the completion of Drake's well, Lockhart and many others began producing crude oil in the Oil Creek area. Lockhart's crude was the first oil from Oil Creek to come down the Allegheny River, and Kier was the first to distill it. In 1861, Lockhart and partners built the first commercial scale oil refinery in the United States at Brilliant Station on the south bank of the Allegheny River near Negley Run. Capacity was 250 barrels a day. The oil industry was on its way.

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15. Williamson and Daum, pp. 63-81.