

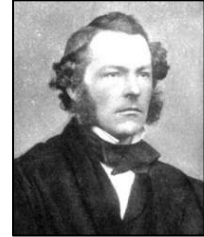


# Separation History

*High-Tech Facts That Work For You*

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Since the beginning of the oil industry in Titusville, Pennsylvania separation has been based on perception, trial and error, the erroneous premise that bigger is better, and various other non-technical theories that have little or no basis in the science of separation. In 1843, after studying separation for years, George G. Stokes published what became known as Stokes' Law. This established the first scientific approach to separation. In 1859, just sixteen years later, Law, the first commercial oil well was drilled in Titusville, Pennsylvania. Oil and water initially flowed, and was later pumped to the surface. It was separated by hand in a labyrinth of small twisting wooden canals. The separation occurred as exactly as had been predicted by Stokes, but Stokes' work was completely unknown to these early industry pioneers. Unfortunately, Stokes' Law went unknown for eight more decades!



The oil industry grew sporadically. The internal combustion engine, the Wright Brothers, Henry Ford, and World War I had dramatic impacts on growth. The nation and the world needed for more fossil fuel of higher quality. Early but rudimentary refinery struggled to fill these needs. More applied of science and technology were urgently needed. The "gut feelings" and "common sense" theories that had dominated the first 60 years of the industry finally began to give way to the practical application of sound science and engineering principles, like Stokes' Law.



Separating water and oil has always been challenging. In the early days, when an oil well began producing more water than oil, the well was considered dead or dying and was shut in or plugged. Those that weren't were produced into huge earthen ponds where water could be separated by gravity and oil could be skimmed off. Produced water was allowed to flow into nearby streams or rivers, or out onto flat lands where it soaked in or evaporated. This water was so contaminated with oil or salty minerals that gross land and water pollution resulted. Finally, in the 1960s oilfield water pollution gained national attention. In the late 1960s the US Congress formulated and passed the original Clean Water Act, designed to eliminate water pollution nationwide.

In the 1960s HTC's principal managed, studied, eliminated the pollution from huge a one million barrel/day waterflood operation, gaining more and more intimate knowledge of downhole conditions, surface facility design, water chemistry and separation ever since. This knowledge is the foundation of HTC today.