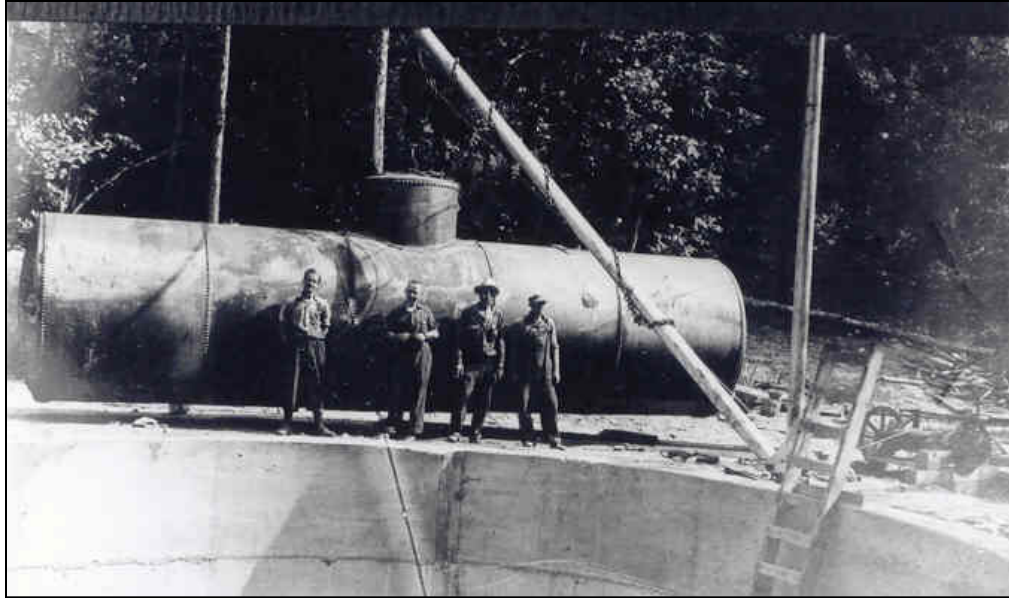


RANNEY Collector Wells



From Oil to Water

The story of Leo Ranney.

By Henry Hunt

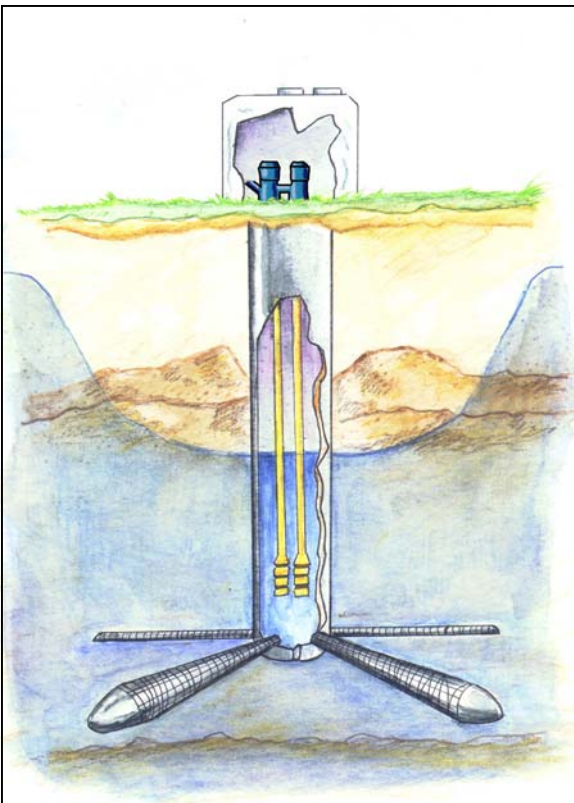
Leo Ranney—Industry inventor and innovator.

By Henry Hunt

During his lifetime, Leo Ranney traveled far and wide as he developed specialized techniques to drill first for oil and later for water. Mostly known as the creator of the radial collector well concept, Ranney is also credited with many other “firsts”.

Leo Ranney was born in 1884 in Hartford, Iowa, graduated from the Iowa State Teachers College in 1905, later received a B.S. in Geology from Northwestern University in 1912, and reportedly took night courses in engineering at Columbia University. Mr. Ranney operated a consulting business across the country from about 1914 until 1925, when he became the president of an oil mining subsidiary of the Standard Oil Company of New Jersey.

He first applied the horizontal well drilling concept to an oil well in Jacksboro, TX (northwest of Ft. Worth) in the 1920's, and refined this to develop the first radial well for oil in southern OH in the First Cow Run Sandstone in about 1927 (see Figure 1). This well consisted of a horizontal bore made about 953 feet into the sandstone formation. This well helped prove his theory that more product could be recovered from a formation by a horizontal boring since more of the borehole would be exposed to the producing formation.



After proving that this technology had merit, he moved several hundred yards up the valley from his first horizontal well and drilled a 40-foot diameter shaft 70 feet into the rock and began drilling out horizontally into the rock formation from within the base of the concrete shaft. This well had sixteen lateral bores made out in a radial pattern from the central concrete shaft into the oil-bearing rock formation. Reportedly, this enabled more oil to be pumped from the formation using this single well over a 6 month period, than a series of vertically-drilled wells had produced for a number of years. An interesting point about this project was that he developed a unique method of drilling whereby he could reverse the rotation of the drill bit and rods with each section of hole drilled. In this way, he could drill a 10-foot section behind the drilling machine as he was pulling the rods to remove the core from the first direction. This allowed him to make productive use during the pull-back of the core barrel. Mr. Ranney's interest and involvement continued with horizontal oil well drilling into the 1940's in such far away places as Australia. In addition to a patent for the horizontal method of oil well drilling, his patents included in-situ conversion of coal to gas, commercial degasification of underground coal, and underground gas storage methodologies, all ideas that were well ahead of their time.

Figure 1— A schematic diagram of a radial collector well, showing the lateral well screens radiating from the base of the collector caisson into the aquifer.

As the price of oil dropped in the 1930's, he switched the application from oil to water, and traveled to London, England where he installed the first radial collector well for water production for the City of London in 1934 in the midst of a severe water shortage there. He then carried this technology to Europe where collector wells were built for a number of municipalities from Spain to France to Germany to Czechoslovakia. Following his initial forays into the European market, he returned home where the first radial collector well in the United States was built in 1936.

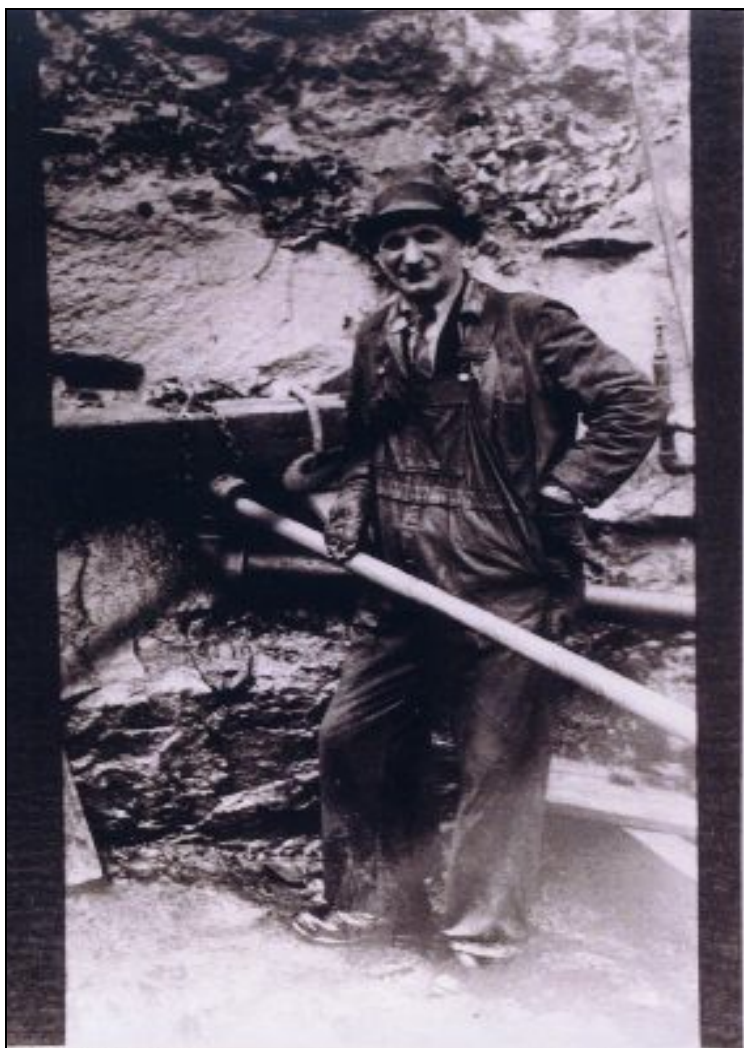
The original method of installing the lateral well screens involved the hydraulic projection of a perforated pipe into the aquifer that would serve as the well screen. These pipe sections were welded together and typically had an open area of about 20 percent. By the nature of the perforation process, the size of the slot openings could not always be small enough to retain the finer materials in the aquifer formations. In some cases, fine sands could enter the screen openings.

As the European market began to develop, several companies improved on the original method of installing the horizontal well screens. A Swiss engineer developed a variation on the hydraulic projection process in the 1940's that used a solid projection pipe to install the well screen in the aquifer. Once the projection pipe reached the desired screen length, a well screen (usually of stainless-steel wire-wound design) was installed within the projection pipe and then the pipe was withdrawn, exposing the screen to the aquifer deposits. This allowed finer slot openings to be used, and increased the available open area of the well screen to 40 percent or more. In the 1950's,

German engineers refined the screen installation process further to allow an artificial gravel-pack filter to be placed around the well screen. These advances allowed horizontal well screens to be placed in a full range of geologic settings. Today, these wells are in use all over the world, with about 250 located within the United States, with individual well yields ranging from about 70 gallons per minute (gpm) to over 28,000 gpm.

The radial collector well designed by Mr. Ranney was one of the real improvements in water well design in many years. His design concepts form the basis for the continuing improvements to this well design concept in use around the world today.

Special thanks and mention to Robert E. Reimund who passed away recently, who worked for many years in the design and construction of radial collector wells, mentoring many of us in this industry, and who spent some time in his early days with the inventor, Leo Ranney. Some of his recollections form the history presented herein.



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Henry Hunt is a senior project manager at Ranney Collector Wells (Columbus, Ohio). He has been involved in the siting, design, construction and maintenance of radial collector wells for more than 25 years. Hunt has visited the site of the first horizontal oil well by Mr. Ranney as well as the site of the most recently completed collector (water) well in Norfolk, Nebraska. He can be reached at hchunt@collectorwellsint.com.

Pictured at left is Leo Ranney, industry inventor and innovator. Ranney is standing by his first horizontal oil well (935 feet long) in the First Cow Run Sandstone, near Malta, Ohio, circa 1927.

Ranney Collector Wells is a Layne Christensen Company Technology, and are located at 6360 Huntley Road, Columbus, Ohio 43229. (614) 888-6263.