

REMEMBER WHEN

A look back at the nation's oil & gas industry.



The nation's, as well as Oklahoma's, oil and gas industry is rich in history. As part of a new partnership with the American Oil & Gas Historical Society (AOGHS), Exploring Energy will bring you energy stories from the past in each publication. Also catch "Remember When Wednesday" each fourth Wednesday of the month with AOGHS Executive Director Bruce Wells joining the discussion on KECO 96.5's Exploring Energy show from 8 to 9 a.m. and on 102.3 KWDQ, sponsored by Big Chief Plant Services. For more articles, photos and features, or to support AOGHS, visit www.aoghs.org.

Exploring Seismic Waves

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When Amerada Petroleum drilled into a Viola limestone formation near Seminole, Oklahoma, in the winter of 1928, it was the first successful oil well produced from a geological structure identified by reflection seismograph.

The exploration technology recorded seismic waves, helping to find oil-bearing formations. Reflection seismography had evolved from efforts to locate enemy artillery during World War I. The new way of finding petroleum reserves came from several competing post-war inventors, but a 1921 experiment by an Oklahoma physicist stood out.

Pioneering research led by the University of Oklahoma's John C. Karcher resulted in the first measured reflection seismograph geologic section. Karcher had received degrees in both electrical engineering and physics in 1916. His preliminary seismic testing was done in June 1921 at Vine Creek outside Oklahoma City.

A month later, confirmation testing was completed near Ardmore by Karcher and fellow O.U. professors William Haseman and David Ohern, and Irving Perrine of Cornell University. All were early members of the American Association of Petroleum Geologists, which had been founded in 1917 in Tulsa.

"Oklahoma is the birthplace of the reflection seismic technique of oil exploration," explains the Oklahoma Historical Society. "The

Arbuckle Mountains were selected for a pilot survey of the technique and equipment, because an entire geologic section from the Basal Permian to the basement mass of granite is exposed."

In 1925 Karcher and another O.U. graduate, Everette DeGolyer, formed Geophysical Research Corporation, a subsidiary of DeGolyer's Amerada Petroleum Corporation. The next year they sent a reflection seismograph crew to the fields around Seminole to map subsurface structures. In December 1928, the technology helped find oil in the Viola limestone for the Amerada Petroleum well (there is a granite marker at Seminole).

The historic discovery came from methods tested by Karcher and his colleagues. But they were not alone. During World War I, inventors Reginald Fessenden and Ludger Mintrop independently contributed to the new earth science.

Work by Fessenden, who was chief physicist for the Submarine Signaling Company of Boston, helped make devices smaller and more practical for the field. Mintrop, a native of Germany, was equally important. He developed portable seismic detection equipment for the German Imperial Army.

Karcher's seismic design dated back to 1917, when he was an employee of the U.S. Bureau of Standards. Both the German and American versions, "crude contrivances at best, were intended for use in locating enemy artillery by measuring the seismic vi-



A sign on I-35 near Ardmore, Oklahoma, is a popular tourist stop for geologists.

brations produced by their firing," explains the Oklahoma Historical Society.

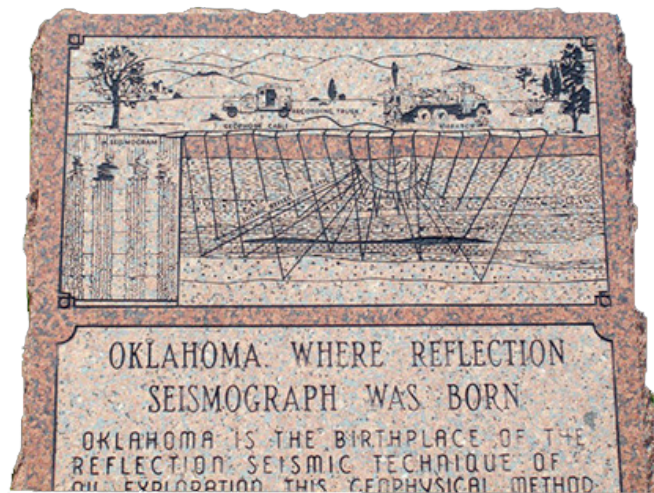
Although the others secured patents after the war, it was Karcher, president of Geophysical Research Company, who successfully applied his apparatus that changed American petroleum exploration. The Midwestern Society of Exploration Geophysicists in 1971 erected a monument at his 1921 test site.

On Interstate 35 in southern Oklahoma, few geologist can resist stopping at a roadside sign illustrating seismic technology. Erected by the Ardmore Geological Society about 25 miles north of Ardmore, it illustrates a cross section of the ancient Arbuckle Anticline in the southwest part of the

Arbuckle Mountains: "These rocks were originally deposited as horizontal layers of sediment in a marine sea. The sedimentary layers overlie igneous rocks (purple) of a volcanic origin about 285 million years ago. The strata were formed by tectonic compression into a high mountain range. Over eons of time, wind and water

have worn away the mountains, leaving only the small hills that presently shape the surrounding countryside."

The 1921 pioneering experiments by the team led by Karcher -- and his 1928 Seminole oil discovery -- earned him the title "Father of Reflection Seismography."



A granite monument commemorates the 1921 successful testing of reflection seismography.

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