

APPLICATION OF INFRARED IMAGERY FOR THE IDENTIFICATION OF LEAKING HISTORICAL PRODUCTION AND IDLE OIL AND GAS WELLS IN OHIO

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Since 1860, over 275,000 oil and natural gas wells have been drilled in Ohio, ranking the state fourth in the number of wells drilled in the United States. In 1884, the discovery of oil and natural gas in the Trenton Limestone along the Lima-Findlay trend led to the first commercial natural gas production in Ohio. Since that time, thousands of wells have been drilled and production has been found in 76 of Ohio's 88 counties.

Well drilling and construction practices have evolved over time, as have well plugging and abandonment (P&A) methods. In some cases these early practices have resulted in ongoing impacts to the environment with well liquids and gases migrating to and flowing at the ground surface and potentially in the subsurface.

With a duty to protect public health and safety and to conserve natural resources, the State's Orphan Well program works diligently to address potential hazards posed by historical production and idle wells. The State seeks to identify the operators of these wells in order to demand remedial efforts. In some instances, a viable operator no longer exists, but the Orphan Well Program does have the ability to finance the P&A of these historical production and idle wells. The State's due diligence efforts to seek out these responsible parties, as well as the P&A work, require both time and precious financial resources. Considering these limited resources and ongoing impacts, it benefits the State to acquire techniques to efficiently identify and prioritize wells that pose immediate concern.

ALL Consulting has used infrared imagery to identify and document the surface expression of well integrity issues. The use of infrared cameras with optical narrow band filters is accepted by both industry and regulatory agencies to screen for the presence of fugitive hydrocarbon emissions. In a limited study of historical production and orphan wells in Ohio, ALL Consulting has observed that more than half of the wells exhibited fugitive gas emissions or liquids, with many of the

gas emissions exceeding the lower explosive limit (LEL). The infrared camera speeds wellhead surveys and helps to guide prioritization of remedial efforts to eliminate environmental impacts due to historical practices.

RADIOACTIVE OILFIELDS: COLD WAR URANIUM EXPLORATION IN AREAS OF HYDROCARBON DEPOSITS

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Early 20th century radiation studies related to hydrocarbon deposits were part of the fundamental research on natural materials' radioactivity. U.S. oil company research in the 1930s considered the potential usefulness of radioactive anomalies in hydrocarbon exploration. Development and early usage of the gamma ray (GR) log in the late 1930s and 1940s continued to document anomalous oilfield signatures. With the beginnings of the atomic age (1945), the U. S. Atomic Energy Commission (1946), and the Cold War (1947), there was a strategic need to develop domestic uranium supplies. The United States Geological Survey (USGS) was the main federal agency to assist the AEC in this mission. The oil industry was considered the most knowledgeable about sedimentary-rock-related radioactivity. In 1948, the USGS began a 10,000-GR-well-log review from the major oil company files to identify sedimentary deposits which might contain radioactive minerals. Oilfield study began that same year and included the mid-continent of Kansas and Oklahoma and the Texas gulf coast. Besides log examination, samples of cuttings, oilfield pit sludge, precipitated scale and formation water were also analyzed. The AEC formally requested the assistance of the petroleum industry and began a series of meetings with oil industry executives in 1951. Phillip Merritt of the AEC presented a talk in St. Louis at the 1951 American Association of Petroleum Geologists (AAPG) annual meeting entitled "Uranium and the Petroleum Industry." A program for agency/oil company cooperation was initiated which included data sharing and the AAPG's 1952-56 Advisory Committee on Radioactive Mineral Exploration. The USGS incorporated laboratory safety procedures in 1951 and focused upon dust control during sample preparation of the relatively low-radioactivity samples. In 1952, radon analysis of helium-bearing natural gas of the Panhandle Field indicated that several hundred producing gas wells contained radon 10 times higher than the 1941-established maximum permissible concentration of radon in air. When the oil company operator was informed, the company initially refused permission to release the specific data for fear of lawsuits. However, the USGS suggested comparison to radon safety standards of mining operations where the Public Health

Service permissible worker radon standards were higher than the gas well radon measurements. Analytical data indicated that most oilfield-related radioactivity was associated with radium, not uranium. By 1954, radioactive precipitates were documented in eight Texas and two Louisiana gulf coast salt dome oilfields, but uranium deposits were not found. Oilfield-specific uranium research slowed down after the 1950s, but renewed interest in Louisiana salt domes in 1969-71 resulted in regional study but no successful uranium discoveries.

THE PENNSYLVANIA GRADE CRUDE OIL ASSOCIATION: AFTER WWII

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The Pennsylvania Grade Crude Oil Association (PGCOA) was founded in 1923 as a trade association of producers, refiners and jobbers in western New York and Pennsylvania, eastern Ohio, and West Virginia. Its earliest efforts covered marketing of motor oils, “policing” (filing legal cases against firms that sold other oils as Pennsylvania products), and research in production and refining of petroleum. During World War II, the Association supported the war effort through research in refining and aircraft lubrication issues. Members, also, contributed to scrap drives and gasoline rationing programs.

At the end of the conflict, new challenges arose. The economics of the Oil Region (declining production, small refineries, etc...) put the oilmen in a difficult political position. For example, during the war, the U.S. government put in place a stripper-well subsidy, but after August 1945, major oil company leaders wanted to end it, because they saw it as a potential threat to the Oil Depletion Allowance, which provided hundreds of millions of dollars in tax breaks to the largest producers, but little to Appalachian producers. Pennsylvania oilmen went along with the Majors.

The process continued during the 1950s, as major firms lobbied the U.S. government to embrace policies which favored them, at the expense of small producers, refiners, and marketers of petroleum products. For example, by the late 1950s, financial problems led to the sale of the Association’s Bradford production lab, and production research increasingly shifted to producing firms. One highlight of this period was the celebration of the centennial of Col. Drake’s discovery well. Members of the association retained BBD&O, the legendary advertising firm, to coordinate activities, which in-

cluded Dave Garroway broadcasting NBC’s Today show from the grounds of the Drake Well Park on August 27, 1959.

This paper traces the work of the PGCOA from the end of World War II through the beginning of the “energy crisis” in the late 1960s. The association’s members attempted to keep their “place in the sun” in a business environment that seemed to grow increasingly brutal. It is based largely on papers deposited at the Drake Well Museum Archives at Titusville. Other material includes newspapers, books and pamphlets published by Pennsylvania State College and state and national government agencies, and secondary sources.

MARATHON – WHERE IT FIRST BEGAN IN NORTHWEST OHIO TO A FORTUNE 500 COMPANY TODAY.

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KEYNOTE ADDRESS

This is the story of an Ohio oil company, from 1887 to the present, from the early wildcatters, to dealings with John D. Rockefeller, the effects of a Supreme Court decision, the formation of an integrated oil company, and finally to a split of downstream and upstream sectors forming today’s Marathon Petroleum Company and Marathon Oil Company. This is also the story of a father who came out of WWII having his heart set on farming, but during the war, the barn where the farm equipment was stored caught on fire. The Ohio Oil Company was where this young father started into business as an Ohio Oil distributor and his kids rode in the delivery truck in the summer.

A BRIEF HISTORY OF THE UTICA – POINT PLEASANT SHALE PLAY OF OHIO

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The Utica – Point Pleasant shale play, known simply as the “Utica” has a rich and interesting history that has unfolded over the past five years. The first Utica wells were drilled by Chesapeake Appalachia in Carroll and Harrison Counties in 2011. These wells proved significant natural gas, natural gas