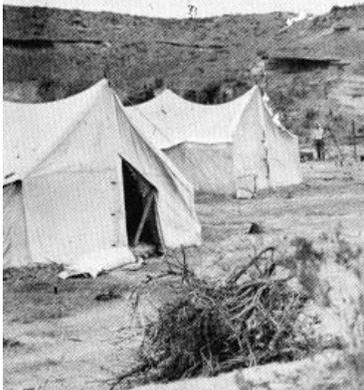
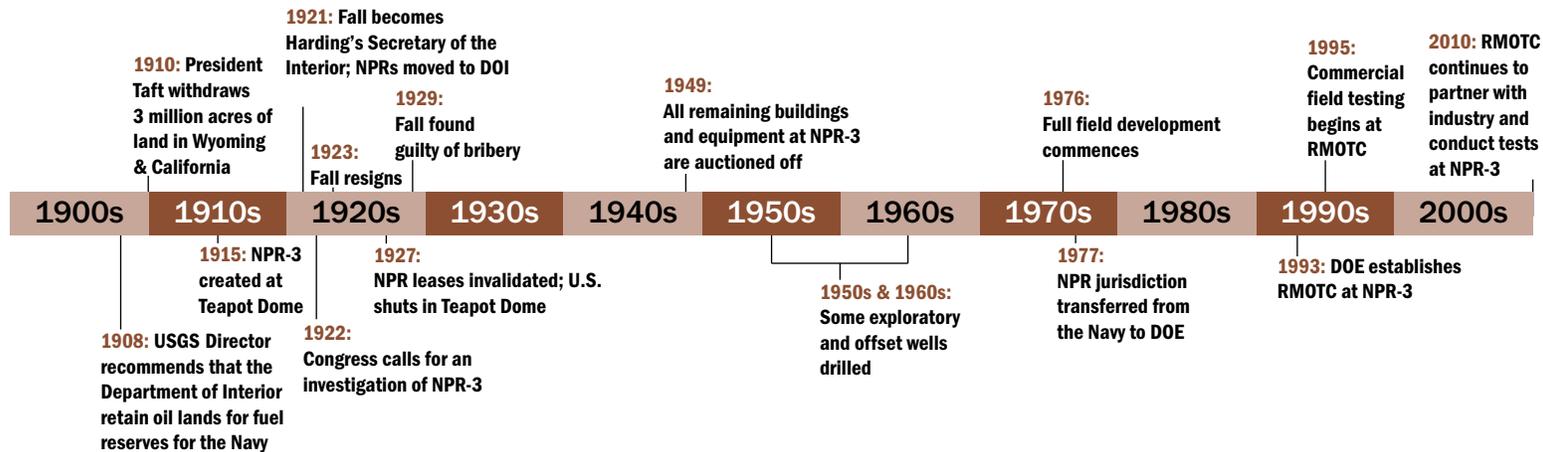


Rocky Mountain Oilfield Testing Center

Naval Petroleum Reserve No. 3
Teapot Dome Oilfield





HISTORY OF TEAPOT DOME & RMOTC

T Teapot Dome was the popular name for the scandal during the administration of U.S. President Warren G. Harding. The scandal, which involved the secret leasing of naval oil reserve lands to private companies, was first revealed to the general public in 1924 after findings by a committee of the U.S. Senate.

The creation of the Naval Petroleum Reserves originated with the growth of federal conservation policy under presidents Theodore Roosevelt, William Howard Taft, and Woodrow Wilson. The reserves were tracts of public land where oil should be kept in its natural reservoirs for the future use of the Navy. “Teapot Dome” originally acquired its name from a rock nearby which resembled a teapot.

Private oil interests and many politicians were opposed to the creation of the naval petroleum reserves, claiming that they were unnecessary and that American oil companies could provide for the needs of the U.S. naval vessels.

One of these politicians was Sen. Albert B. Fall of New Mexico. In 1921, Fall became Harding’s Secretary of the Interior and quickly moved to open the reserves to private exploitation. He attempted to keep his actions secret, but the Senate soon authorized an investigation by the committee on public lands. The Senate committee held extended hearings and found that Fall



FALL

had convinced Secretary of the Navy Edwin Denby and others that the administration of the reserves should be turned over to him. Fall subsequently leased Teapot Dome to Harry F. Sinclair’s Mammoth Oil Company along with other lease deals in the California reserves. Meanwhile, he received “gifts” amounting to \$400,000 from the oilmen.



Teapot Rock in the 1920s.

The Supreme Court found that the oil leases had been obtained corruptly and invalidated all of the reserve leases in 1927. Albert Fall was found guilty of bribery in 1929. He was fined \$100,000 and sentenced to one year in prison. Upon the 1927 Supreme Court Decision, Teapot Dome was immediately shut in. Some exploratory and offset wells were drilled in the '50s and '60s, but the field was closed until opening for full development in 1976.

In 1977, the jurisdiction for the reserves was transferred from the Navy to the Department of Energy (DOE). A downturn in oil prices in the mid-'80s caused major oil companies to cut their research & development budgets and begin concentrating their operations overseas.

RMOTC is born

Industry requested that DOE support more hands-on, applied field technology that could be better utilized by independents. RMOTC was established in 1993 through joint efforts by the



Two unidentified men work on a Teapot Dome wellhead.

DOE, industry, and academia. RMOTC uses NPR-3 resources and facilities to assist the United States oil and gas industry in the field testing of new technologies. Commercial field testing at RMOTC began in 1995. The majority of the technology and processes field tested at RMOTC have primary implications in drilling, oil production, enhanced recovery, and production cost reduction. Environmental and renewable energy testing have been a large growth area, and one of increasing importance in the industry, both domestically and worldwide.



RMOTC's commitment to wildlife and the environment

Environmentally balanced solutions for oilfield issues are an important part of RMOTC's mission. Through various partnerships since RMOTC's inception 17 years ago, companies have had the opportunity to explore ways to prevent and manage environmental risks in a real-world environment.

In addition to being a producing oil field and testing center, NPR-3 is also a place many animals call home. Deer, antelope, owls, and fox are among the many different species that are spotted daily at the site. Keeping their habitat intact while disturbing their environment as little as possible is important at NPR-3, as well as oil fields across the country and world.

RMOTC, with its partners, continues to test new ideas and products that reduce the impact on the environment. Geothermal, wind, solar, carbon management, gas leak detection, and water management projects are among the technologies tested at RMOTC.



Geothermal

Ormat Technologies signed an agreement with DOE to validate the feasibility of proven technology already used in geothermal and recovered energy generation for the production of commercial electricity using hot water produced during the process of oilfield production. In Summer 2008, Ormat began installing its Organic Rankine Cycle (ORC) power generation system to produce electricity to power the oil field. Two years later, the system is still running and producing electricity.

RMOTC's geothermal capabilities also include EGS testing potential, including the drilling and completion of geothermal wells, stimulation of hot rock, and testing of EGS systems of injection and production.

Alternative Energies

Rocky Mountain Power provided Casper College with a \$50,000 grant to build a 10-kilowatt wind system at RMOTC. After additional financing was secured, a small wind turbine was installed in Fall 2008. The turbine is connected to the existing electric power distribution system near RMOTC's Customer Operations Center. Part of the project also serves as a training program for renewable energy technicians. An additional wind turbine is scheduled for installation in 2010.

RMOTC and DOE's National Renewable Energy Laboratory recently partnered to conduct experiments using solar panels to supply power to a fluid transfer pump at NPR-3. A 2-kilowatt photovoltaic (PV) array

was used for the production and delivery of oil. The solar panels were used in conjunction with the grid to supply the needed energy. The grid fell back into a "redundant" system to assure that electrical power was available all of the time. During testing, a grid-connected pump was kept as a backup, but was only minimally needed.

Carbon Management

Recent RMOTC studies indicate sequestration would be an excellent use of NPR-3 resources. RMOTC can play a significant role in CO₂ sequestration and enhanced oil recovery technology development and field demonstration in order to help stabilize and eventually reduce carbon emissions to the atmosphere.

Gas Leak Detection

In recent years, several companies have tested gas leak detection technologies using NPR-3's virtual pipeline. RMOTC strives to offer testing partners a location tailored to their needs and the virtual pipeline is a prime example of how this is accomplished.

Water Management

RMOTC's water management program focuses on testing, demonstrating, and evaluating a broad mix of complementary technologies spanning reservoir management and production innovations to water treatment and beneficial use. NPR-3's neighbors to the north in the Powder River Basin are facing a problem of having more coalbed methane water than can be put to beneficial use.

RMOTC: Partnering to Power the World

In recent years, RMOTC has undergone a major shift to become a production facility with its primary mission being research and development. It serves an important role in finding solutions for energy development problems through partnerships with industry experts. As the government's only operating oil field, NPR-3 is a meeting ground for industry to partner with government in research, testing, demonstration, and deployment of new technologies across the country and world. The following is a partial list of recent and current RMOTC projects.

RECENT & CURRENT RMOTC PROJECTS

PROJECT	DESCRIPTION
Casing Milling Test	Confirm tool's ability to mill high-grade casing.
Sidetrack Coring Test	Cut a vertical core using proprietary new tool.
Drill Bit Vibration Test	Test tools to detect and control bit vibration.
Logging While Tripping	Field test system of logging tool deployed through drill string.
Rotary Steerable Tool	Use rotary steerable drilling system to drill lateral to depth of 4,200 feet.
Rotary Steerable Tool	Determine directional performance of both push-the-bit and point-the-bit rotary steerable drilling systems.
Gas Leak Detection	Test the client's Airborne Laser Methane Assessment (ALMA) system's ability to detect methane content and volume under simulated pipeline leak conditions.
Stirling Generator	Determine the reliability of a Stirling generator in a remote location to run artificial lift equipment using raw natural gas in cold weather.
Oil Field Water Purification	Test oil field skid-mounted wastewater treatment system.
Geothermal Power	Test a binary geothermal power generation system using hot, produced oil field water from the Tensleep and Madison formations. The project will test the use of waste heat from produced water to generate power to operate an oil field.
Solar Powered Pump System	Install and operate a fluid shipping pump with DC motor powered by solar panel array.
Rotary Gas Separator	Test rotary gas separator on submersible pump intake under actual production conditions. The separator is designed to separate methane from water in a coalbed methane production operation.
Packer Milling Test	Test effectiveness of mill in removing top of packer assembly.
Wellbore Paraffin-Asphaltene Treatment	Evaluate the effectiveness of proprietary product in cleaning out wellbore and near wellbore.
Submersible Pumping System	Field test low-volume, high-efficiency submersible pumps.
Surfactant EOR Flood	Conduct a pilot project to determine economic and technical feasibility of a surfactant enhanced oil recovery flood in NPR-3's Shannon reservoir.
In-Situ Gas Extraction	Test gas bubble formation and flow dynamics of in-situ gas extraction technology; then test EOR capability of this technology.
Science Center Classes	Conduct classes for elementary, middle school, high school, and college students at RMOTC's Science Center.
Airborne Survey	Acquire field-wide survey to test effectiveness of cathodic production systems, locate steel-cased wells, and determine background atmospheric concentrations of CH ₄ , CO ₂ , and total C1-5 hydrocarbons.
Wind Turbine Test Center	Install small wind turbine at NPR-3 as a pilot study.