RESERVOIR SOLUTIONS

Published quarterly by Ryder Scott Co. LP Sept.–Nov. 2012/Vol. 15 No. 3

U.S. SEC names Hodgin staff petroleum engineer

Hodgin

The U.S. Securities and Exchange Commission hired former Ryder Scott president **John Hodgin** as a petroleum engineer in July. He reviews public company petroleum reserves filings and replaces **Jim Murphy**, who retired last year.

Hodgin joins fellow petroleum engineer **Ron Winfrey**, who also has a professional consulting background. They report to **H. Roger Schwall**, assistant director in the SEC Division of Corporate Finance.

Hodgin and Winfrey exam reserves disclosures along with other first and second reviewers from legal, accounting and engineering disciplines.

Hodgin was president at Ryder Scott for more than seven years. He joined Ryder Scott as a geologist in 1977 and became the geoscience group leader in 1983.

He supervised staff and consulting geologists, geophysicists and petrophysicists in ongoing reservoir evaluation studies worldwide. Hodgin has managed and conducted numerous studies of fields in the United States and in most major international petroleum provinces.

> "This is an opportunity to give something back to an industry that has given me so much."
> — Hodgin

After graduating from Texas A&M University with a BS degree in geology in 1974, he joined Gulf Oil Corp.

Hodgin is under an SEC conflict-of-interest policy for one year that limits his direct involvement in reserves filings of clients of Ryder Scott.

"This is an opportunity to give something back to an industry that has given me so much," he said. "This was not an easy decision to make. However, I look forward to the challenge of using my years of SEC experience in a totally different role."

Gas prices poised to impair YE reserves filed with SEC

The eight-month, trailing average of Henry Hub gas prices was at $2.93 per MMBTU in August, setting up the possibility that public companies filing with the U.S. SEC will have to take reserves off the books at year end. The 12-month average price for the Henry Hub benchmark used in YE 2011 reporting was $4.12 per MMBTU.

Inside Reservoir Solutions

Coming next issue
A recap of the 8th Annual Ryder Scott Reserves Conference

Richoux new Ryder Scott president

The new president at Ryder Scott is **Fred P. Richoux**. He was promoted from executive vice president after former president **John Hodgin** resigned to accept a position as a petroleum engineer at the U.S. Securities and Exchange Commission.

Richoux joined Ryder Scott in 1978 as a petroleum engineer after having worked at Phillips Petroleum Co. for 11 years. For 34 years, he has conducted reservoir engineering studies, reserves reviews and determinations, field development studies, economic evaluations and acquisition and divestiture work.

Richoux managed the Calgary office from 1997 to 1999. He joined the board in 2000. Richoux received a BS degree in electrical engineering from the University of Louisiana at Lafayette.

Richoux

Olds to present in Calgary on Sept. 25

Dan Olds, senior vice president, will present "Basic Petroleum Accounting for Petroleum Engineers" at the Society of Petroleum Engineers Hydrocarbon Economics and Evaluation Symposium in Calgary, Alberta on Tuesday, September 25 at 9 a.m.

The paper, SPE 162967, describes the general accounting process related to reserves and the DD&A (depreciation, depletion and amortization) process under full cost and successful efforts accounting methods and their effect on net income. "Reserves and production data used by accountants directly impacts the company's financial results," said Olds.

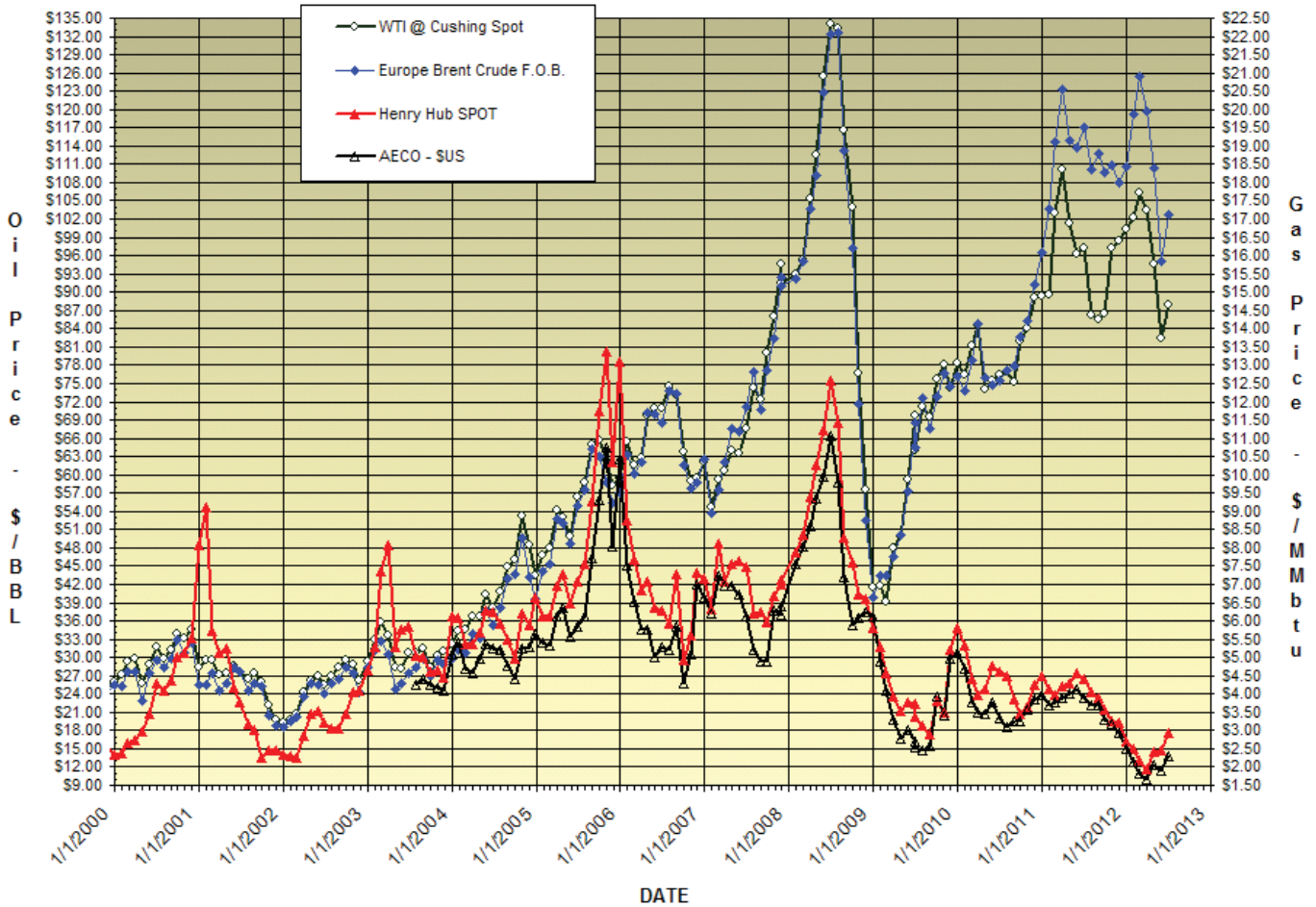
One accounting method doesn't necessarily present more favorable financial results than the other. "The DD&A process is heavily dependent on events of prior years, so it's difficult to make a qualified statement on which accounting method presents better financial results," he said. "The results change over time. Successful efforts may yield more positive results than full cost at a given point in time or the reverse could happen at another point in time."

Under successful efforts, the cost pool concept is limited to a single property or group of properties related by a common geologic or stratigraphic feature. Exploratory dry holes are expensed (written off) in the accounting period in which they occur, so the only costs that are capitalized are those associated with projects that find oil and gas.

Please see Olds on Page 3

Olds

Price history of benchmark oil and gas in U.S. dollars



Published, monthly-average, cash market prices for WTI crude at Cushing (NYMEX), Brent crude and Henry Hub and AECO gas.

Engineers join Ryder Scott in Houston and Calgary

Three engineers have joined Ryder Scott. Petroleum engineer **Marsha Wellmann** is based in the Houston office. She previously worked at WildHorse Resources LLC for two years as a senior reservoir engineer.

Wellmann

Wellmann forecasted production volumes and performed reserves/economic analyses using U.S. SEC standards for reserves reporting and for borrowing-base redeterminations. She also identified workover and recompletion candidates and analyzed the economics of proposed new wells, recompletions and workovers. In addition, Wellmann evaluated potential acquisitions.

Before that, she worked at Osborn Heirs Co. from 2004 to 2010 as a reservoir engineer, preparing year-end and quarterly reserves reports for management, bank lenders and the U.S. Energy Information Administration. Wellmann implemented a petroleum economics evaluation program for 375 properties. She appraised drilling, recompletion and workover projects and prepared production, capital- and operating-expense forecasts for annual budgets. Wellmann also evaluated potential acquisition packages.

She started her career with the Texas Railroad Commission in 2002 where she worked for two years approving injection-, disposal- and production-well permits. Wellmann also analyzed proposed workovers, completions and well construction.

She has a BS degree in petroleum engineering from the University of Texas at Austin.

Charkovskyy

Vitaliy Charkovskyy joined Ryder Scott Canada as a reserves evaluator. He has evaluated heavy oil and conventional oil and gas reservoirs through classic reservoir engineering and simulation.

Charkovskyy most recently worked at the CO2-EOR business unit of the Saskatchewan Research Council Energy Division from 2010 to 2012. He performed reservoir simulations of fields in the Bakken formation.

Charkovskyy characterized complex reservoir fluid systems using an equation-of-state package. He also performed core flood simulations for a miscible CO2 injection project. Charkovskyy also conducted simulations of waterflood, immiscible CO2 WAG, surfactant-polymer flood and polymer-enhanced-foam flood projects in heavy oil reservoirs.

He was a research assistant at the University of Regina from 2008 to 2010 where he performed reservoir simulations of CO2 geo-sequestration projects and to quantify CO2 migration from the storage.

Charkovskyy is registered as an Engineer-In-Training with the Association of Professional Engineers and Geoscientists of Alberta and at the Association of Professional Engineers and Geoscientists of Saskatchewan. He has BEng and MEng degrees in oil and gas recovery from Ivano-Frankivsk National Technical University of Oil and Gas and an MS degree in petroleum engineering from the University of Regina.

Zhang

He Zhang joined the Houston office as a petroleum engineer. He specializes in reservoir and production simulation/integration, flow assurance, PVT characterization, fracture optimization and petroleum economics.

Before joining Ryder Scott, Zhang was an engineer at Schlumberger Houston Technology Center for two years. He analyzed flow assurance, PVT characterization, artificial lift and network model configurations. Zhang also evaluated sandstone and carbonate reservoirs on- and offshore. He assisted in the integration of drilling, production and reservoir characterization. Zhang used black-oil and compositional simulations to model near-critical fluid systems.

He has written numerous technical papers for the Society of Petroleum Engineers. Zhang has BS degrees in polymer chemistry and computer applications from the University of Science and Technology of China, an MS degree in computational chemistry from the University of New Orleans and a PhD degree in petroleum engineering from Texas A&M University.

Olds—Cont. from Page 2

"Investors feel that the financial benefits of a successful discovery or drawbacks to a failure are more readily reflected in the financial results of a successful efforts company," said Olds.

Under full cost, all exploration and development drilling costs, even dry holes, are capitalized in a full-cost pool so the impact of any single well, successful or not, is diluted and not likely to be material.

166-year-old oil well largely unknown to West until 2002

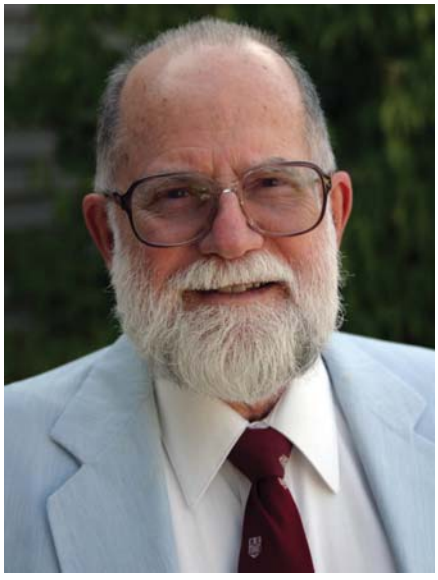
Historians in the West now understand the significance of Azerbaijan's early contributions to the modern oil industry thanks to records there only translated and published into English a mere decade ago.

They indicate that more than 160 years ago, the Republic of Azerbaijan was the first country in the world to drill a successful well in search of oil. The United States was second by more than a decade.

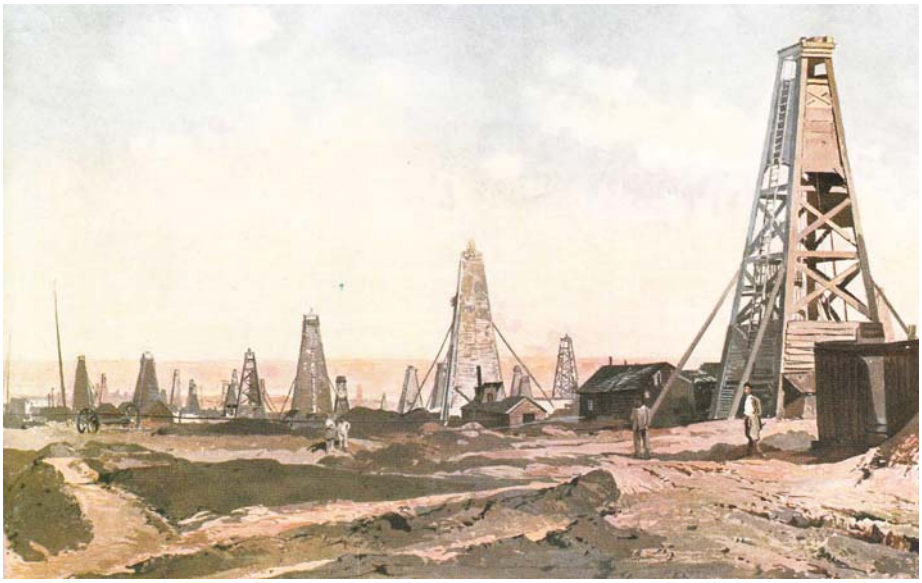
Thanks to the work of researchers, translators and publishers over the past 10 years, Azerbaijan's historical first is no longer relegated to an obscure text or dusty archive.

"One of the problems in the United States was that we didn't know about the historical material in Baku," said **William R. Brice**, a professor emeritus at the University of Pittsburgh at Johnstown. "Without the language skills, few of us could have reviewed the materials, even if we knew of their existence. Now, that is no longer the case."

Brice primarily credits **Mir-Yusif Mir-Babayev**, a professor at Azerbaijan Technical University in Baku, with gaining international recognition for the accomplishments of the Baku pioneers.



Brice



The Bibi-Heybat oil field, rendered here around 1900, was the site of the first drilled oil well in 1846. Courtesy of Azerbaijan National Archives and Petroleum History Institute.

First oil wells

The history of the modern oil industry usually begins with the drilling of the now iconic Drake well in Titusville, Pennsylvania, in 1859. It was a seminal event, a catalyst that sparked the first U.S. oil boom. The Pennsylvania oil rush, in turn, helped spawn an industrial juggernaut—the national and international oil and gas business.

While the U.S. well was an industry maker, the earlier well in Azerbaijan had little effect. The Russian oil business fizzled until reforms were made.

Whether the early drillers in the West and East knew of each other's efforts is not clear. What is clear is that by the turn of the century, Azerbaijan had not only caught up with the U.S. industry but surpassed it.

West and East perspectives

One popular website goes so far as to imply that the Drake well brought the world out of the Dark Ages, stating that "before … Drake sank his first well…, people around the world had gathered oil for centuries around seeps."

That's a Western perspective, however. Not everyone was skimming oil before 1859.

Five years earlier, **Ignacy Lukasiewicz**, a Pole, hand dug wells as deep as 165 ft to pump out the crude in commercial quantities from his industrial rock oil mine in Bóbrka, Poland.

The Drake well was not the first oil well in North America. In 1858, **James Miller Williams** dug a 65-ft water well, Williams No. 1, in Ontario, Canada, but discovered oil. He exploited it commercially to make kerosene.

Those wells, however, did not jumpstart an entire industry like the one drilled by Colonel **Edwin L. Drake**. They also were not pure petroleum wells like his, which was drilled, not dug, to strike and produce oil.

The Drake well was the first one (in the West) to be drilled specifically to find oil, said Brice in his comprehensive, new book, "Myth, Legend, Reality: Edwin Laurentine Drake and the Early Oil Industry." He added, "He (Drake) … proved that it was far easier and more productive to drill for it (oil)."

Not everyone needed proof though. It's safe to say that 13 years before the Drake well was spudded, Russian **Vasily N. Semyonov** already knew that drilling worked better than skimming.

That's because in 1846, he initiated the mechanical drilling of the first oil well in the world with "positive results."

The drill site was on the Absheron Peninsula northeast of Baku in the village of Bibi-Heybat. Semyonov, an administrator in the Trans Caucasus oil trade council, used cable-tool percussion drilling from a 30-ft wooden tripod to chip through the rocky soil almost 70-ft deep. His engineer was **Alekseyev**, a major and director of the Mining Engineer Corps of the Baku oil fields.

Percussion drilling involves dropping heavy, cutting or hammering bits (or rods) suspended by rigging from wooden derricks to chisel the rock. "Lift the bit and pound the rock, then clean it out and do it all over again," said Brice.

Drake also used cable-tool percussion drilling. The use of those rigs in mining and salt-water wells was common then.

"Although rotary drilling was used in some water-well drilling, especially in Europe at that time, those techniques were not applied to oil drilling until later," said Brice.

Drake powered his drilling with a steam engine fed by a wood-fired boiler while Semyonov used the "muscular force of eight men" to raise the heavy bit, said Mir-Babayev.

Drake's operation was advanced for the time. Most rigs then were manually operated using a primitive spring pole/fulcrum system originally developed by the Chinese 2,000 years ago.

Drake also used forged drilling tools fabricated by **William A. Smith**, a blacksmith. Known as "Uncle Billy," the salt-water driller was Drake's right-hand man.

Edwin Drake, on right, with Peter Wilson, an investor in his venture, in 1860 or 1861. The second engine house of the Drake well is in the background. Courtesy Drake Well Museum Archive-Pennsylvania Historical and Museum Commission.

Tools made by William Smith to drill the Drake well. Courtesy Drake Well Museum Archive-Pennsylvania Historical and Museum Commission.

They used piping for well casing to keep the near-surface ground water out of the hole, albeit they were not the first to do that. The well produced about 20 BOPD, double the output of the Bibi-Heybat well.

Claims that the Drake well was the first drilled oil well are refuted by Mir-Babayev. "As is what usually happens, many historians 'with sound thinking' also wrote about the pioneering Pennsylvania well drilling without having checked the facts," he wrote. "Documents stored in …our republic deny the version of U.S. domination in well drilling."

Records of the drilling of the 1846 Bibi-Heybat well are at the Azerbaijan National Archives. The "acts" were published in 1904 in Tiflis and collected by the Caucasian Archeographic Commission.

The archived material went unnoticed for 65 years until Azerbaijani historian **Sardar Balayev** found it and published "Oil of the Country of Eternal Fire," a book that includes the account.

Mir-Babayev published the first English-language account in 2002. The information now has wide distribution on the Internet.

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Baku: Black gold capital

The Bibi-Heybat well did not trigger an oil rush, in part, because Russia lacked a free-enterprise system—the same system under which the two-fisted entrepreneurs who drove the U.S. oil boom flourished. Mir-Babayev wrote that "as Russia conquered northern Azerbaijan in 1813 and 1828, oil wells became the property of the State Treasury. … (They) were put under a lease-out procedure by the government or were administrated directly by the Treasury."

The lease arrangement guaranteed manpower, oil dredging and transportation as well as exploration rights in Baku, but the lease holder had to pay the government "large sums" of money in return. By 1870, almost two-and-a-half decades after the Bibi-Heybat well was drilled, Russia's production rates lagged behind the U.S. because of the lease-out system.

But change was imminent. In 1871, oilman **Ivan M. Mirzoyev** drilled a 150-ft "gusher" that flowed 240 BOPD in the Balakhani oil field.

Mir-Babayev

A year later, a law ended lease-outs and granted rights for private enterprises to rent oil-rich lands. Oil companies and trading societies immediately began to flourish. The activities of the Nobel brothers of Sweden unleashed a Baku oil boom in 1873 and Balakhani became the largest field in the world. The oil industry in Absheron was further bolstered in 1877 when Russia abolished excise tax on production of kerosene from crude.

The Rothschild banking family in France established a trade society in 1883 and began extracting Baku oil. "Baku's rich oil barons sought out the best advice that the scientific world had to offer, seeking recommendations from important figures like German chemist **Carl Engler** and Russian chemist **Dmitry Mendeleyev**," wrote Mir-Babayev. "As a result, innovative new techniques such as rotary drilling and gas lift were tested for the first time in Azerbaijan."

The Nobel brothers oil wells in Balakhani close to Baku. The tightly spaced derricks were fire hazards and the noise levels were described as "horrendous." Photo courtesy of Asbrink Collection and Petroleum History Institute.

By the beginning of the 20th century, almost half of the oil reserves in the world had been produced in Baku. At that time, Azerbaijan produced 11.5 million tons of oil a year while the U.S. lifted 9.1 million tons. The Nobels and Rothchilds became billionaires. The Rockefellers made a fortune in the Baku fields after the turn of the century.

Whether the Bibi-Heybat well would have spurred an immediate oil rush under a different fiscal regime is speculation. Mir-Babayev concedes that "it is indeed the success of the oil business in the United States that prompted attention (in Europe) and later in the Absheron oil fields."

Earliest firsts? Look to the East

The earliest history of petroleum starts in the Absheron Peninsula of Azerbaijan, the "country of eternal fires," where natural gas seeps have been observed since ancient times. As early as 700 B.C., Absheron inhabitants were not only extracting oil for

Temple of the Zoroastrian fire worshippers at Surkhani near Baku.

Courtesy of the Honorary Consulate of the Republic of Azerbaijan.

medicinal purposes and to heat and light homes with fuel oil, they were exporting it to Iran, Iraq and India.

In the 6th century B.C., the army of the Achaemenid Empire (present Iran) invaded castles and cities using weapons of fire made from Absheron oil. More than 2,500 years ago, the Parsee fire worshipers constructed a temple over natural gas vents and channeled and flared the leaking gas to create "eternal flames."

"People in the Middle East and the Caucasus region were not alone in their use of petroleum and natural gas, for in portions of Asia, there has also been a long association with oil," said Brice.

The drilling industry may have started in China. In 500 B.C., the Chinese drilled wells hundreds of feet deep to search for brine, reported **Confucius**.

Further evidence shows that in 347 B.C., the Chinese used bits attached to bamboo poles to drill oil wells up to 800-ft deep. No doubt the Chinese encountered oil and gas in those early deep wells which reached 2,000-ft deep around 150 B.C. China used natural gas more than 2,000 years ago.

Which people in the world were the very first pioneers to exploit oil and gas? The answer depends on what level of technical sophistication is considered as a "jumping off" point.

Mir-Babayev's chronology begins with the Absheron activity and is certainly supportable.

Modern firsts

Baku originated several firsts in the upstream oil industry, including the previously cited advancements in rotary drilling and gas-lift applications. The first offshore wells in the world were dug in the Baku area. In 1803, **Haji Kasymbek Mansurbekov** of Baku started oil extraction in Bibi-Heybat bay from two wells that were 60 and 100 ft from shore.

Brice writes that by 1819, the year of Drake's birth, Baku cumulative oil production had reached 4,000 tons.

In 1847, the first oil well to be completed was at Bibi-Heybat by the Caspian Sea. A "Manual for the Drilling of Oil Wells" was published in 1910 "for the first time in the world's oil practice," said Mir-Babayev. Turbo drilling was developed and used to bore an oil well almost 2,000-ft deep in Surakhani in the 1920s. Baku engineers constructed the first floating platform and drilled from the submersible in 1934.

The first-ever oil-carrying steam ship, Zoraster, commissioned by Ludwig Nobel and built in 1877. Photo courtesy of the Azerbaijan National Archives and Petroleum History Institute.

Baku also achieved firsts in the downstream industry. Canadian geologist **Abraham Gesner** is usually credited as the inventor of kerosene. He first distilled it in 1846. However, in 1834, **Nikolay Voskoboynikov**, director of the Baku oil fields, invented a special distilling machine that produced kerosene from black and white oil. (He originated the idea to drill, not dig, the 1846 Bibi-Heybat well.)

Refining's earliest roots can be traced to the Caucasus region where **Johann Lerche** distilled a "bright yellow illuminating oil" from crude in 1735 to make it combustible. Russian peasant **Doubinin** built and operated the first commercial refinery in 1823 in Caucasus.

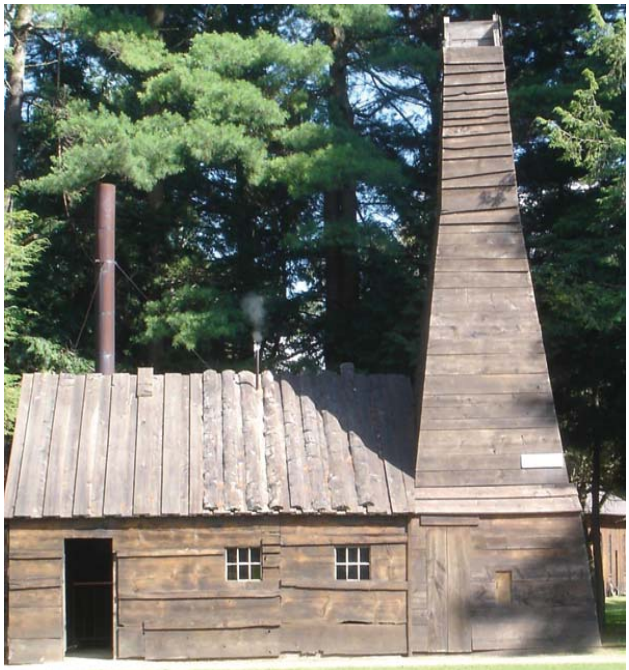
A much larger refinery—the first oil-distilling factory on the Absheron Peninsula—was put into operation in 1840 in Balakhani. By all counts, distillation and refining activity in Baku was successful before efforts in the West had come to fruition.

Later, development of the oil refinery cracking process, a major breakthrough, occurred in 1885 when engineer **G.V. Alekseyev** built a distillation machine in Baku. He extracted kerosene by cracking petroleum asphalt.

Lightening in a bottle

In August, the Drake Well Museum in Titusville celebrated a grand opening of a new 10,000-sq-ft petroleum exhibit, "There's a drop of oil and gas in your life every day!"

To educate the public, the century-old museum features a replica of Drake's 1859 engine house on the original site. Oil is circulated in a closed loop from the famous well into a "never filling" barrel. Visitors can follow the squeaking rod lines to learn how pioneer oil workers used one engine to pump many wells.



Drake well engine house at museum.

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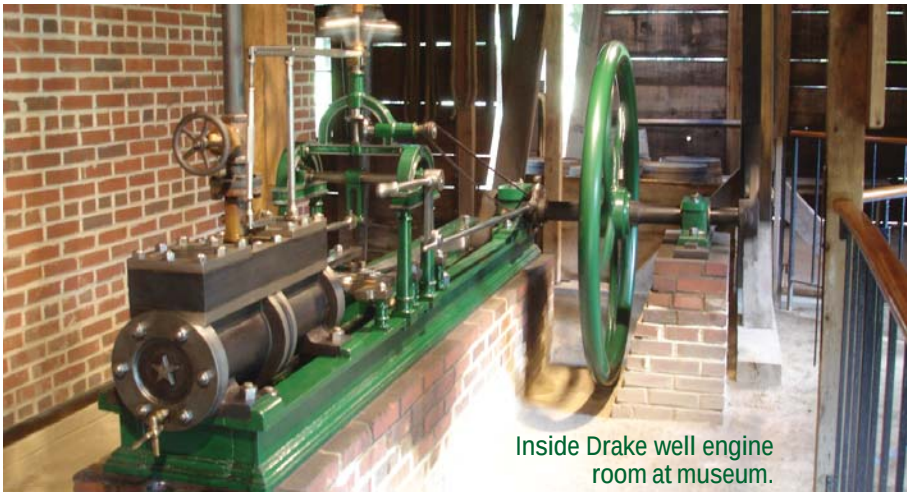
"They invented a whole new industry" is a slogan. Drake and his North American contemporaries did just that and are now enshrined at the museum

Perhaps, less widely known are the efforts of the early oilmen in Baku. Mir-Babayev said, "The time is right to create an analogous museum in Baku in Bibi-Heybat where the first oil well was drilled long before the American one."

The State Oil Co. of Azerbaijan Republic (SOCAR) is leading a cooperative effort for the ambitious museum project. SOCAR, working with the Institute of History of the National Academy of Sciences of Azerbaijan, has completed the first stage of conceptualization.

"The time is right to create an analogous museum in … Bibi-Heybat where the first oil rig was drilled long before the American one."
— Mir-Babayev

Grand plans call for more than 100,000-sq-ft of building space to house various exhibits and offices over the sprawling complex. SOCAR said the museum won't include "frozen" expositions but rather working demonstrations of industrial oil production, including a functioning wooden well and other oilfield machinery. The museum will be designed to accommodate galleries, training and research rooms, multiplex cinemas, children's museum, entertainment park and cafes and shops.



Inside Drake well engine room at museum.

Organizers hope that fund-raising efforts will be successful enough to underwrite some of the costs. Certainly, the legacy of the Baku oil industry pioneers deserves no less. A presentation of the plans for the museum is posted at www.socar.az/neftmuzeyi/konseptualplanen.ppt.

Editor's Note: Brice's book—a heavily researched, but reader-friendly, 661-page biography of Drake—is available for purchase at http://www.oil150.com/store.

Mir-Babayev has published various histories on the Baku oil industry, including a 154-page, third edition of the "Concise History of Azerbaijani Oil" that can be downloaded at no charge at http://socar-aqs.com/files/uploader/eng.pdf.

Publisher's Statement

Reservoir Solutions newsletter is published quarterly by Ryder Scott Co. LP. Established in 1937, the reservoir evaluation consulting firm performs hundreds of studies a year. Ryder Scott multidisciplinary studies incorporate geophysics, petrophysics, geology, petroleum engineering, reservoir simulation and economics. With 130 employees, including 90 engineers and geoscientists, Ryder Scott has the capability to complete the largest, most complex reservoir-evaluation projects in a timely manner.

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