OIL SHALE SPECIMEN. *Image Courtesy of United States Geological Survey*

SUBSIDIZING OIL SHALE

TRACING FEDERAL SUPPORT FOR OIL SHALE DEVELOPMENT IN THE U.S.

TAXPAYERS FOR COMMON SENSE
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OIL SHALE SPECIMEN.
Image Courtesy of United States Geological Survey

Although the oil shale industry is still in its commercial infancy, it has a long history of government support that continues today. The Bureau of Land Management recently issued two new research, development and demonstration leases and new federal regulations for commercial leases and royalty rates are expected any day. Before the federal government goes down that road it's important to take a look back and ask whether we should be throwing good money after bad.

Oil shale, or kerogen shale, is a sedimentary rock that contains liquid hydrocarbons that are released when heated. Considered an oil precursor, kerogen is fossil organic matter that has not had exposure to high enough temperatures or been in the ground long enough to have developed into oil. Kerogen requires a large and expensive energy investment to produce liquid fuel. This leaves producers with the challenge of how to get more energy out of the rock than energy used to obtain the liquid fuel in the first place.

Federal intervention in the development of oil shale dates back to the early 20th century when by executive order the naval petroleum and oil shale reserves were created to ensure a military oil supply. In response, the Bureau of Mines program began research into exploiting oil shale technology and in the 1960s private industry followed. But significant action was limited until the 1970s, when in response to the gas shortages Congress intervened in oil shale development, in hopes of creating a domestic fuel alternative. Their unsuccessful attempt to spur large-scale commercial development of oil shale and other unconventional fossil fuels became a notorious waste of federal funds.

Since then federal support has continued in various forms. Although not a key part of the overall energy policy agenda, federal subsidies continue to appear in legislation and administrative actions. A batch of subsides including the requirement of a federal research and development leasing program were included in the 2005 Energy Bill. The 2008 Economic Stabilization Act expanded an existing conventional oil and gas tax break for oil shale, and in 2008 a commercial leasing program emerged out of the Bureau of Land Management. As recently as the spring of 2012, Congress proposed federal sweeteners to help get oil shale get off the ground as part of freestanding legislation and as an add-on to the federal transportation authorization bill.

Despite this support, successful development of a commercial oil shale industry has remained elusive. To this day, oil shale technology has never been successfully demonstrated on a large scale.[1] Many attempts to produce at the commercial level have occurred, but high costs and volatility in the markets have led to plant failures in the past, resulting in the loss of millions of taxpayer dollars. The allure of domestic fuel production continues to make oil shale a favorite discussion piece for lawmakers. But providing oil shale with additional government incentives, including commercial federal leases prior to proving economic viability given oil shale's track record of failure, will only add to the layers of subsidies the oil shale industry has already received and once again leave taxpayers with little to show for it.

OIL SHALE RESOURCES WITHIN GREEN RIVER FORMATION*

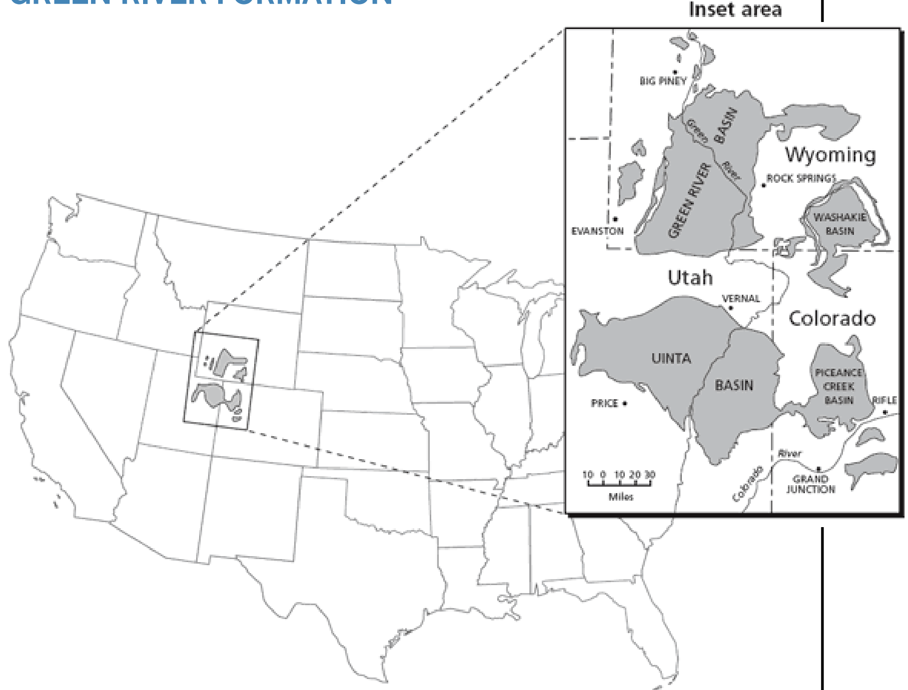


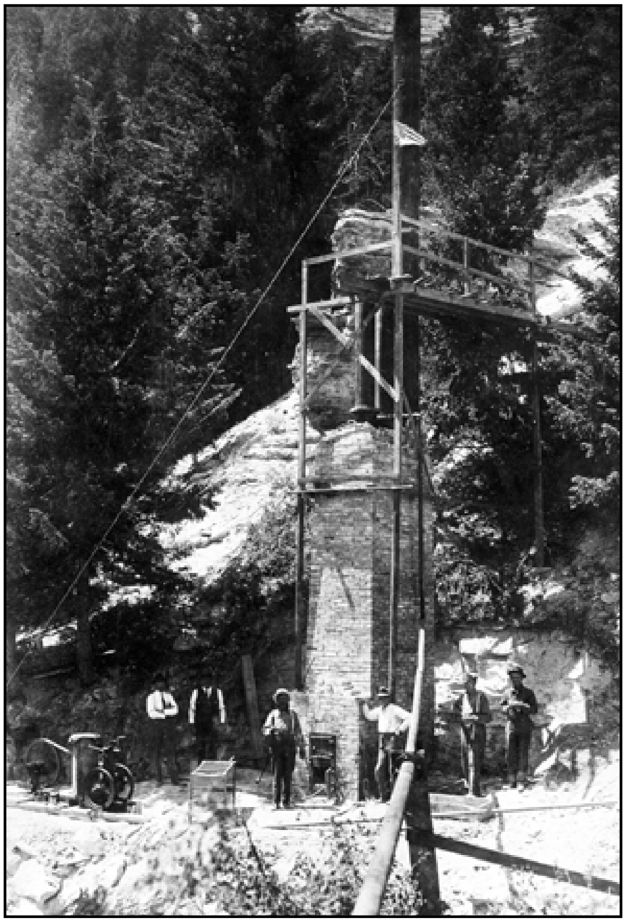
*Image used with permission by the RAND Corporation: James T. Bartis et al., "Oil Shale Development in the United States: Prospects and Policy Issues," RAND Corporation (MG-414-NETL), 2005. Adapted from: Smith, J. W., "Oil Shale Resources of the United States," *Mineral and Energy Resources*, Vol. 23, No. 6, Colorado School of Mines, 1980.

HISTORY OF OIL SHALE SUBSIDIES

Because the United States is estimated to have 75% of the world's oil shale deposits,[2] the prospect of extracting oil from shale has been around for more than a century. The Government Accountability Office has estimated that oil shale deposits in the Green River Formation of Colorado, Utah, and Wyoming (displayed in the figure above) could yield more than 1.5 trillion barrels of recoverable oil[3] and in 2005 the RAND Corporation estimated that the same area could produce up to 800 billion barrels of recoverable oil.[4]

Federal interest tends to ebb and flow around increases in gas prices, new information on the amount of oil that could be recoverable from oil shale deposits, and most recently a need for increased revenues from royalties and fees charged for its extraction, among other things.

Despite questions regarding its feasibility or environmental consequences, the prospect of capturing some of this oil has led to a long history of federal support for oil shale. Over the years oil shale has received layers upon layers of subsidies. Most support came in the form of loans and loan guarantees and price guarantees provided through the Department of Energy in the 1980s, but other subsidies including valuable land giveaways occurred much earlier.



OIL SHALE COMPANY'S FIRST RETORT*, 1923.
*an air-tight vessel used for oil shale extraction
Image Courtesy of United States Geological Survey

More than a century ago, the **Pickett Act of 1910** authorized the acquisition of petroleum rich lands to ensure an emergency supply of fuel to the Navy during times of war. By 1927, a series of Executive Orders had designated three plots of land between Utah and Colorado for such use—titled the Naval Oil Shale Reserves (NOSR-1, NOSR-2, NOSR-3).[5,6] These three plots of land would be the sites for numerous attempts by oil shale companies and federal government to jumpstart the oil shale industry.

In the 1980s, two subsidies—the loan guarantee and the price guarantee—were the subsidies of choice for the oil shale industry. As previously mentioned, the 1980s were the heyday of federal support for oil shale. An entire federal entity, **the Synthetic Fuels Corporation**, was created solely for the purpose of subsidizing unconventional fossil fuel development like oil shale. More than $3 billion (Table 1) was provided to the oil shale industry in federal loan guarantees.

Federal loan guarantees allow borrowers to receive a loan with the federal government assuming the risk. According to the U.S. House of Representatives Rules Committee, a loan guarantee is a "statutory commitment by the federal government to pay part or all of a loan's principal and interest to a lender or

TABLE 1: LOAN GUARANTEES TO OIL SHALE

PROJECT TITLE	COMPANY	DATE COMMITTED	TOTAL VALUE (MILLIONS)
Colony II Project[1]	The Oil Shale Corporation (TOSCO)	August 1981	$1,150
Cathedral Bluffs Project[2]	Cathedral Bluffs Shale Oil Company*	July 1983	$1,800
Seep Ridge Project[3]	Geokinetics, Inc.	December 1983	$21
Parachute Creek Phase I Project[4]	Union Oil Company	October 1985	$300
		TOTAL	**$3,271**

* *Jointly-owned by Tenneco Shale Oil Company and Occidental Petroleum Corporation*

1 Anthony Andrews. "Oil Shale: History, Incentives, and Policy." *Congressional Research Service*. April 13, 2006. http://www.fas.org/sgp/crs/misc/RL33359.pdf
2 *Energy Law Journal.* "Report of The Committee On Synthetic Fuels." Vol. 5:1. 1984.
3 *Ibid.*
4 *U.S. General Accounting Office.* "Parachute Creek Shale Oil Project's Economic and Operational Outlook." June 1987. http://www.gao.gov/assets/150/145485.pdf

the holder of a security in case the borrower defaults. The Federal Credit Reform Act of 1990 requires that the cost of guaranteed loans be included in the computation of budget authority and outlays. The congressional budget resolution includes loan guarantee totals."[7] Federal loan guarantees placed the full faith and credit of the federal Treasury behind a project leaving taxpayers to assume the risk in the event of default, which is what happened in the case of oil shale.

Another generous form of subsidy provided for oil shale development in the 1980s was the price guarantee. Price guarantees provided companies with a minimum price, thereby ensuring profitability regardless of market conditions. Taxpayers are asked to absorb any difference. Because it is difficult to calculate the cost of both producing commercial oil shale and predicting its overall market rate, a price guarantee can be a very valuable (or costly) subsidy. For example, if fuel derived from oil shale could only sell on the open market at $35 per barrel and a price guarantee was set at $60 per barrel, taxpayers would cover the gap, providing a $25 subsidy per barrel. Some estimates have cited $30-$70 per barrel as a point where oil shale becomes cost-competitive; but even with a range this large, it is difficult to make any assumption without having ever commercially produced oil shale. Below (Table 2) is a list of price guarantees provided to oil shale in the early 1980s and their estimated value at the time.

In addition to loan and price guarantees, tax provisions were written into the Internal Revenue Code (IRC) to provide further incentives for oil shale production. Created in the Windfall Profit Tax Act of 1980, Congress provided the alternative fuel production tax credit—a $3 per barrel credit for oil shale and other alternative fuel producers that was indexed to inflation. The tax credit was designed to take effect only when oil prices fell below $23.50 per barrel and phase out when prices rose above $29.50 (1979 dollars). Soon after, the Economic Recovery Tax Act of 1981 created multiple tax credits for the oil and gas industry from which oil shale producers were also able to benefit.

TABLE 2: PRICE GUARANTEES TO OIL SHALE

PROJECT TITLE	COMPANY	DATE COMMITTED	TOTAL VALUE (MILLIONS)
Parachute Creek Phase I Project[1]	Union Oil Company	July 1981	$400
Parachute Creek Phase I Project[2]	Union Oil Company	October 1985	$173
Parachute Creek Phase II Project[3]	Union Oil Company	December 1983	$2,700
Cathedral Bluffs Project[4]	Cathedral Bluffs Shale Oil Company*	July 1983	$378
Seep Ridge Project[5]	Geokinetics, Inc.	December 1983	$24
		TOTAL	**$3,675**

** Jointly-owned by Tenneco Shale Oil Company and Occidental Petroleum Corporation*

1 *U.S. General Accounting Office.* "Parachute Creek Shale Oil Project's Economic and Operational Outlook." June 1987. http://www.gao.gov/assets/150/145485.pdf
2 *Ibid.*
3 *Ibid.*
4 *Energy Law Journal.* "Report of The Committee On Synthetic Fuels." Vol. 5:1. 1984.
5 *Ibid.*

SYNTHETIC FUELS CORPORATION

As described above, the U.S. Synthetic Fuels Corporation (SFC) was created as a mechanism to provide subsidies for unconventional fossil fuels like oil shale. The SFC was established in the Energy Security Act of 1980, a bill that was enacted in response to high oil prices in the 1970s. Under this act the DOE provided the SFC with a $20 billion bank account to be used for the creation and development of synthetic fuel projects, including oil shale.[8] The SFC would distribute loan guarantees and price-floor subsidies while requiring production of synthetic fuels to be equivalent to 500,000 barrels a day by 1987 and 2 million (or 1.5m) barrels a day by 1992.[9]

In 1986, six years after its creation, the SFC folded after "spending billions without providing any fuel."[10] The recession that occurred in the early 1980s coupled with a sharp drop in oil prices from $40 to $8,[11] made synthetic fuel production a costly investment. In addition, high interest rate and the passage of the 1982 Tax Equity and Fiscal Responsibility Act, which reduced incentives, made the large investments required to develop synthetic fuels look too risky.[12]

After the corporation's initial investment of $20 billion in federal funds, the corporation was estimated to have spent close to $88 billion over its six-year lifetime.[13] Sluggish activity at SFC, charges of lavish spending, scandals, and improper management were also cited as reasons behind SFC's closure. President Reagan drastically scaled back administrative costs and large subsidies, and required companies to provide most of the capital for proposed plants. Proposals, such as a $5 billion oil shale plant in Parachute, Colorado that was operated by Exxon, were shelved due to high costs without further federal funding (see case study that follows). Companies already in the process of building plants, as was the case with the $2.7 billion Great Plains Coal Gasification Plant, feared significant losses and threatened to cancel construction without further federal assistance.[14]

GEOKINETICS' OIL SHALE DEVELOPMENT SITE, 1981.
Image Courtesy of United States Geological Survey

OIL SHALE SUBSIDIES CONTINUE

More than 20 years after the Synthetic Fuels Corporation, the Energy Policy Act of 2005 (EPAct) both extended and created new tax and leasing subsidies that benefit the oil shale industry. The following is a list of subsidies provided by EPAct and other recent legislation.

- The Energy Policy Act of 2005 provided yet another subsidy to the not-yet-existent oil shale industry by requiring the Secretary of the Interior to establish a program to provide new research and development leases, requiring that lands in Colorado, Utah and Wyoming be made available for this purpose.
- Despite the fact that commercial oil shale development has never been shown to be viable, the Energy Policy Act of 2005 also required the Secretary to prepare a Programmatic Environmental Impact Statement for commercial oil shale leasing, and to prepare regulations establishing such a program. Once the PEIS and the regulations are complete, the Secretary is to begin commercial leasing in consultation with the affected states—again providing the industry further control of public lands despite the fact that no proven commercial oil shale production technology exists.
- A near century-old subsidy, the *percentage depletion allowance* also allows oil shale producers to deduct 15% of gross income for the cost of depletion of oil shale deposits.
- Created in the Energy Policy Act of 2005 and modified in the Tax Increase Prevention and Reconciliation Act later the same year, the *amortization of all geological and geophysical expenditures for two years* tax credit provides a deduction for all costs incurred over two years for oil and gas exploration including oil shale.
- The Emergency Economic Stabilization Act of 2008 amended Section 179c of the 2005 Energy Policy Act by extending the *election to expense certain refineries* to oil shale production. This awards oil shale refineries the option to expense up to 50 percent of the cost of refinery investments, thereby continuing the burden on the taxpayer.

OIL SHALE VS. SHALE OIL VS. SHALE GAS

Oil Shale is often mistakenly reported as 'shale oil.' With many different energy booms taking place in America today, it is important to distinguish among the various types of energy produced through shale.

OIL SHALE Known as 'the rock that burns,' oil shale is **sedimentary rock** found mainly in the Green River Formation of Colorado, Utah, and Wyoming. Despite its name, oil shale does not contain any oil; rather it contains an oil-like substance that must be superheated and refined into a transportation fuel. Oil shale can be extracted through two methods—conventional mining or the in-situ process.

Image Courtesy of United States Geological Survey

SHALE OIL Trapped within geologic formations such as the Bakken Formation of North Dakota and Montana, shale oil is **similar to conventional oil** and can be extracted through hydraulic fracturing or horizontal drilling technology.

SHALE GAS Found in deep rock formations such as the Marcellus Formation in the Appalachian Basin or the Barnett Formation of Texas, shale gas is unconventional **natural gas** trapped in fine grain sedimentary rocks known as gas shales. It can be extracted through horizontal drilling and hydraulic fracturing.

CASE STUDY ONE

CASE STUDY ONE: EXXON-TOSCO COLONY PROJECT

As early as the 1950s, Tosco Corporation worked to perfect the extraction and processing technologies needed to transform the vast oil shale resources of the West into a commercially viable fuel source.[1] In 1964, Tosco entered into a joint venture with two other energy companies— Standard Oil of Ohio (Sohio) and Cleveland Cliffs Mining—to develop plans to construct a pilot oil shale facility titled the Colony Development Project.[2] Located on 7,000 acres of private land in the Piceance Basin near Parachute Creek, Colorado, the pilot project aimed to produce 1,000 barrels per day (bpd)[3] and prove the commercial viability of Tosco's new underground mining and surface retort technology.

Fearing shutdown after multiple delays due to high operating costs and uncertainty surrounding future oil prices, the tide turned in Tosco's favor when the 1967 oil embargo sent the price of oil soaring and interest in oil shale along with it. With new projections of steadily increasing oil prices, the coalition developed plans to construct a commercial scale facility that would process up to 47,000 barrels per day—the Colony II Project.[4,5]

However in April 1972, the pilot project was abandoned after producing only 270,000 barrels of oil shale liquids. Falling oil prices and increasing uncertainties about the viability of oil shale as a transportation fuel source caused the project to collapse.[6] Along with it, plans to construct the 47,000 bpd commercial oil shale facility were suspended after estimated project costs had risen three-fold: from as low as $250 million in 1968 to nearly $1 billion by 1974.[7,8]

COLONY II PROJECT

With the Arab oil embargo of the 1970s, came a renewed interest in a commercial alternative fuels industry. High oil prices, major federal subsidies, and the resurrection of the Colony II Project all laid the groundwork for another attempt at an oil shale industry.

BATTLEMENT MESA, 1981

Image Courtesy of United States Geological Survey

When earlier plans for a commercial facility were suspended, Sohio and Cleveland Cliff's Mining withdrew from the project and Atlantic Richfield Company (Arco) bought their combined shares, allowing Arco to acquire 60% of the Colony II Project. Within only a few years, the project had received most of its permits as well as an environmental impact statement completed by the Bureau of Land Management in 1977.[9]

In 1980, Tosco applied for federal support under a DOE Synthetic Fuels Program (SFP) solicitation—with preference to receive a loan guarantee.[10] After receiving ten proposals from the solicitation and finding none acceptable, DOE decided to

CASE STUDY ONE

discuss the potential for a loan guarantee commitment with Tosco since it was one of the most promising projects.[11] Meanwhile, Arco's shares in the Colony II Project were bought out by Exxon Corporation.[12]

By August of 1981, DOE had committed and finalized a $1.15 billion loan guarantee under the DOE Synthetic Fuels Program to The Oil Shale Corporation, a subsidiary of Tosco Corporation, to uphold its 40 percent share of the Colony II Project and move development forward. The loan guarantee was given with the expectation that the Colony II Project would produce at least 24,150 bpd by 1985 and achieve full production capacity by 1987.[13]

The Government Accountability Office reported that total taxpayer risk for the SFP Colony Project loan guarantee would be $1.2 billion.[14] Of that amount, $1.1 billion would cover the loan guarantee and $120.5 million would cover default and interest costs.[15] Despite the risk to taxpayers, construction of the Colony II Project began in 1981. Soon after, control of Tosco's loan guarantee was transferred to the Synthetic Fuels Corporation from the SFP in February of 1982.

THE DEMISE OF COLONY

Less than a year after DOE finalized the $1.15 billion loan guarantee, Exxon abruptly terminated the Colony II Project after project costs had accumulated to over $5.5 billion—over $12 billion in 2010 dollars.[16]

Due to a contractual obligation, Exxon was forced to acquire the entirety of Tosco's shares—a total of $380 million (1982 dollars)—allowing Tosco to bypass much of the project debt.[17] Consequently, the SFC also terminated Tosco's loan guarantee a month later.

In 1980, Exxon predicted that by 2010 it would be producing eight million barrels of oil per day from oil shale.[18] But just two years later, the project was cancelled. By the mid-1980s, the demise of the Colony II Project had become so detrimental to the synthetic fuels industry that its abandonment seemed to signal the failure of any commercial synthetic fuel production.

Today, the mining town—Battlement Mesa[19]—that Exxon had built for the over 2,000 Colony employees is now a retirement community and May 2nd has come to be known as "Black Sunday" for many in the local region.

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CASE STUDY TWO: UNOCAL'S PARACHUTE CREEK PROJECT

As early as 1961, Union Oil Company—later known as Unocal—began developing its state-of-the-art oil shale processing technology at its Parachute Creek Project in the Piceance Basin of Colorado. However, less than two years later, Unocal was forced to shut down due to rising project costs.[1] Over the next 20 years, Unocal waited patiently for the right economic conditions while continuing to research their retort technology.

In October 1980, Unocal responded to a Department of Energy (DOE) Synthetic Fuels Program (SFP) solicitation for federal financing for the production of alternative fuels, including oil shale.[2]

Less than a year later, the SFP awarded Unocal $400 million in price guarantees over ten years for its proposed Phase I Project which aimed to produce 10,400 barrels per day of fuel. The federally backed price guarantee would be for $42.50/bbl.[3]

The price guarantee worked like this. When the processed fuel was sold, the federal government agreed to pay Unocal the difference between the market price of a barrel of oil and the federally guaranteed price—whenever the market price of oil was lower than the federal guarantee. Following initial production, Unocal was obligated to pay back the U.S. taxpayer a percentage of its annual profits "exceeding $225 million for 16 years."[4]

In February 1982, control of Unocal's $400 million price guarantee was transferred from the DOE Synthetic Fuels Program to the Synthetic Fuels Corporation (SFC)—a quasi-governmental organization created in the Energy Security Act of 1980.[5] Soon after, construction of the Phase I Plant was completed in September 1983.[6]

PARACHUTE CREEK PROJECT PHASE II ABANDONED

While constructing its Phase I Plant, Unocal continued to develop other versions of their retort technologies needed to process oil shale into a viable fuel source. In December 1982, Unocal applied for additional funding for the construction of a second phase facility at Parachute Creek.

Despite reliability issues with the Phase I Project, by December 1983, the SFC signed a letter of intent, committing up to $2.7 billion in price guarantees for Unocal

UNION OIL'S OIL SHALE DEVELOPMENT SITE, 1981.
Image Courtesy of United States Geological Survey

CASE STUDY TWO

to develop a Phase II Project.[7] The Phase II Project aimed to produce 42,000 bpd with plans to increase to more than 80,000 bpd eventually.[8] The federally-backed price guarantee would be for $60/bbl over ten years.[9]

Within a year, Unocal was experiencing problems. Five of the seven Unocal board members resigned and the Phase I Project was experiencing frequent technical difficulties. Consequently, all plans for the Phase II Project were abandoned in 1985.[10]

RETROFIT

Throughout its later years, technical issues and economic uncertainties plagued Unocal's Parachute Creek Phase I Project. From 1983 to 1985, Unocal unsuccessfully attempted to operate the facility more than 40 times.[11] By July 1985, Unocal had spent $926 million (1985 dollars) when it decided to suspend all attempts to get the Phase I Plant operating.[12]

Since the Phase I Plant technology was increasingly problematic, Unocal quickly developed plans to retrofit the Phase I Plant with Phase II Plant technology, in hopes that it would be more successful.[13] In October 1985, the SFC offered Unocal another $500 million in price and loan guarantees, adding to the $400 million already provided, if it could successfully complete the retrofit.[14]

Of the $500 million in federal support the SFC offered Unocal's retrofit project:

- $173 million in price guarantees;
- $300 million loan guarantee for up to 55 percent of the capital costs of the Phase II technology;
- $27 million to cover interest payments in the event of a default.

The new offer also extended the time period Unocal would be able to collect payments from price guarantees—from 1985 to the end of 2002 or "10 years after initial commercial production."[15] Moreover, the

UNION OIL'S OIL SHALE DEVELOPMENT SITE, 1981.
Image Courtesy of United States Geological Survey

CASE STUDY TWO

CASE STUDY TWO

SFC removed all restrictions on production minimums and maximums in order to receive price supports.[16]

In 1987 the Government Accountability Office (GAO) recommended the $500 million offer be withdrawn.[17] The SFC suffered from a history of mismanagement and was facing significant economic and technical problems. Although no criminal charges were filed, its first and second presidents resigned in 1983 and 1984 in response to fraud charges. Only five years after its creation, Congress abolished the SFC in the Consolidated Omnibus Budget Reconciliation Act of 1985 before Unocal could accept the additional $500 million in federal support.

In January 1987, Unocal was able to get its Phase I Plant operating—though at less than full capacity—and by April 1987 Unocal began to receive payments from the initial SFP award of $400 million in price guarantees.[18] The GAO reports that the first payment to Unocal "was $424,865 for 12,570 barrels at $33.80 a barrel, which was based on a guaranteed price of $44.93 a barrel and a market price of $11.13 a barrel."[19]

TAXPAYERS LOSE AGAIN ON OIL SHALE BET

Despite massive federal support, Unocal's Parachute Creek Project never achieved its goal of commercially producing oil shale. In 1980, Unocal projected it would be producing 50,000 bpd of oil shale by the late 1980s.[20] Unocal even projected the Parachute Creek Plant would reach peak production levels by 1991.[21] However, after over a quarter century of research and development and continued federal financial support, Unocal abandoned its Parachute Creek project. It was clear to Unocal that the plant would face continued economic uncertainties and skyrocketing project costs—reaching as high at $5.3 billion—if it moved forward.[22]

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CASE STUDY THREE: ANVIL POINTS

The Anvil Points Research Facility, located near Grand Junction, Colorado, on a federal Naval Oil Shale Reserve, was an oil shale mining and processing research project built in 1947 and decommissioned in 1986. Over the duration of its operation the facility was first operated by the Bureau of Land Management (BLM), then by the Department of Energy (DOE) from 1977 to 1997, and then again by BLM. Both BLM and DOE oversaw leases of the land to private industry.

The first private lease was granted to the Colorado School of Mines along with six partnering corporations from 1964-1968. Then, from 1972 to 1982, the Paraho Corporation—a 17-member collaboration of oil shale companies including Gulf, Mobil, Shell, Standard, Texaco, and Exxon—leased the facility to construct and carry out pilot projects.[1] During this lease management of the site transferred from BLM to DOE.

Finally, from 1981–1984, two of DOE's national laboratories worked with a consortium of oil companies on a rock fragmentation research project, at the conclusion of which the Anvil Points Research Station was closed.[2] Thirteen years later and fifty years after the creation of Anvil Points, the land was transferred back to BLM in the 1997 "Transfer Act" for cleanup.[3]

BLM hired an outside agency to test the pile of spent shale on the site for contaminants. They found various heavy metals and high enough levels of arsenic to exceed state health department regulations;[4] furthermore, they found that these materials were running into West Sharrard Creek, a nearby tributary of the Colorado River.

Accordingly, BLM contracted a cleanup crew to move 300,000 cubic yards of oil shale to a repository.[5] The total clean-up cost was $15.4 million.[6] This project followed the initial site cleanup, which took place in the mid-1980s under DOE, involved the removal of toxins like polychlorinated biphenyls (PCBs) and asbestos, and cost $3 million.[7]

None of the companies involved in any of the projects have gone on to produce oil shale on a commercial scale, and most of them have since abandoned oil shale entirely, leaving behind their aspirations alongside a nearly $20 million mess to be swept up by the federal government.

1. *Department of Energy,* Office of Naval Petroleum and Oil Shale Reserves. "Decommissioning of the U.S. Department of Energy Anvil Points Oil Shale Facility." April 1936. http://uwlib5.uwyo.edu/omeka/archive/files/3dd9b800e48427e30cd6c8611fdf83e8.pdf
2. *Ibid.*
3. *House and Senate Committees of Agriculture, Livestock and Natural Resources.* Sixty Eighth General Assembly of the State of Colorado. "HOUSE BILL 11-1308." http://www.leg.state.co.us/clics/clics2011a/csl.nsf/502942e83290800b87256d87006c5b8d/9c6dcc1e81c092d587257878007aefe0/$FILE/wptemp.txt
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5. *Department of the Interior.* "BLM awards Anvil Points clean-up contract." July 29, 2008. http://www.blm.gov/co/st/en/BLM_Information/newsroom/2008/blm_news_release_.html
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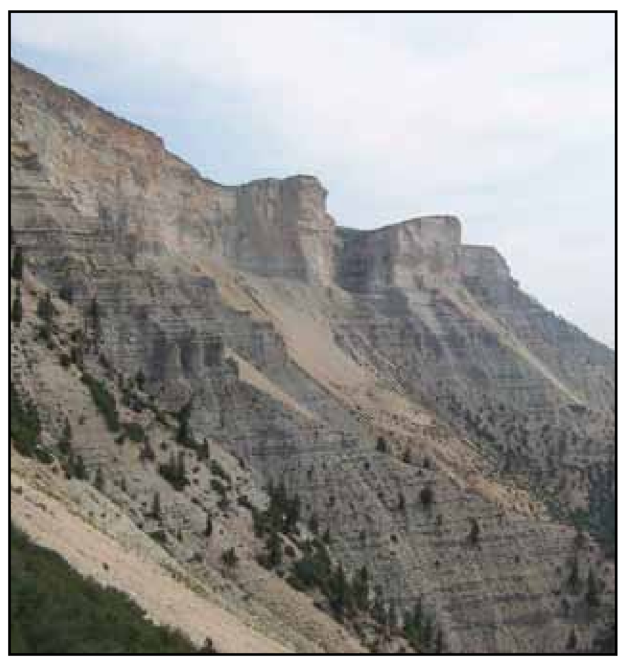
ANVIL POINTS RECLAMATION SITE.
Image Courtesy of United States Geological Survey



OIL SHALE CANNOT PROMISE RETURN FOR TAXPAYERS

Royalties and fees collected from resource development represent a valuable source of income for the federal government and should be collected, managed, and accounted for in a fair and accurate manner. Unfortunately, in the case of oil shale, a fair royalty cannot be established because there is no commercial market on which to base a fair royalty. Further, if the Bureau of Land Management, the federal agency charged with royalty assessment on public lands, sets a rate lower than traditional oil and gas development it will add yet another subsidy to the layers of subsidies oil shale has already received.

Over the years taxpayers have lost billions on oil and gas leases that have been charged insufficient royalties or no royalties at all. These taxpayer-funded handouts not only benefit major oil companies like Shell and ExxonMobil, they also impact states and local communities because a portion of collected royalties are distributed to state governments who in turn share revenues with local communities.

Taxpayers currently lose money because of a corrupt and inadequate royalty collection system. Coupled with these existing challenges, establishing a royalty system for oil shale development on federal lands before a commercial industry has been demonstrated will guarantee taxpayers receive inadequate royalties.

A fair return for federal taxpayers for oil shale production is explicitly required under the Energy Policy Act of 2005. But because oil shale is in its very early stages of development, it would be extremely difficult to ensure a fair return for federal taxpayers. As the Bureau of Land Management (BLM) states in its 2008 proposed rule, because the oil shale industry is still in the research and development phase, it is "difficult to predict whether or when multi-buyer/multi-seller markets would develop that would provide FMV (fair market value) pricing for products of oil shale." In other words, if a competitive market for oil shale products does not develop, the federal government will not receive a fair return.

Setting a royalty rate for oil shale leases before a commercial industry is established will likely create

TABLE 3: PUBLIC LAND LEASES

CURRENT FEDERAL LEASES	NUMBER OF HOLDINGS	SIZE (ACRES)	PREFERENCE RIGHT[1]	YEAR AWARDED	STATUS
Shell Frontier Oil and Gas Company	3	480	14,880	2007	Active
Chevron USA, Inc.[2]	1	160	4,960	2007	Active
American Shale Oil, LLC[3]	1	160	4,960	2007	Active
Enefit American Oil[4]	1	160	4,960	2007	Active
ExxonMobil Exploration Company	1	160	480	2012	Active
Natural Soda Holdings, Inc.	1	160	480	2012	Active

1 If oil shale development technology is proven commercially viable, individual public leases approved in 2007 and 2012 possess preference right to expand to a 4,960- and 480-acre tract of land, respectively.
2 Chevron has notified the Bureau of Land Management that it intends to abandon its RD&D and is seeking to transfer the lease to another company.
3 Formerly EGL Oil Shale, LLC
4 Formerly Oil Shale Exploration Company

SOURCE: Department of Interior, Bureau of Land Management

CHEVRON ABANDONS FEDERAL LEASE

In 2007, Chevron signed a ten-year lease through the Bureau of Land Management for a 160 acre tract of land in northwestern Colorado for the research, development and demonstration (RD&D) of commercial oil shale technology. In its proposed plan of operations, Chevron expressed intent to utilize the lease through at least 2013, but if its RD&D efforts proved promising, Chevron would maintain lease holdings through the end of its lease in 2017—or much longer if possible.[1]

However, in February of 2012, Chevron abandoned its lease citing the need to divert resources to other priorities. Currently, Chevron is now looking to transfer its lease to another company.[2] With a long history of financial troubles and technological difficulties, this wasn't the first and will not be the last company to abandon the prospect of commercializing oil shale.

1. Chevron Corporation. "Oil Shale Research, Development & Demonstration Project Plan of Operations." February 15, 2006. http://www.blm.gov/pgdata/etc/medialib/blm/co/field_offices/white_river_field/oil_shale.Par.37256.File.dat/OILSHALEPLANOFOPERATIONS.pdf
2. Margaret Kriz Hobson. "Big money being spent to tap into reserves." E&E Publishing, LLC, EnergyWire. April 9, 2012. http://www.eenews.net/public/energywire/2012/04/09/2

a royalty that is too low to live up to its obligation of ensuring a fair return to taxpayers. In 2008, BLM proposed two scenarios—a 5% flat rate and the sliding rate from 5% to 12.5%—which would have set the royalty rate lower than the federal royalty rate for onshore oil and gas (12.5%). The BLM's decision to impose a lower royalty rate out of fear that a higher rate "may not allow oil shale to become competitive" essentially amounts to another taxpayer subsidy for an industry that is already subsidized by the federal government. The Energy Policy Act of 2005 subsidized oil shale research and development by leasing land for R&D without requiring bonuses or rents and without collecting any royalties from facilities that produced at less than commercial scales.

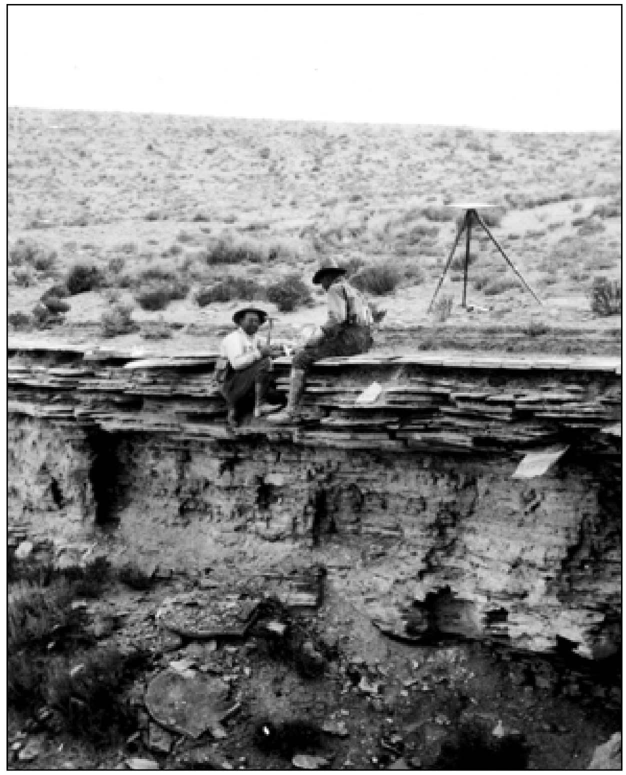
Because the BLM cannot yet assess how profitable oil shale development will be, it is fiscally irresponsible to risk setting the royalty rate too low. Furthermore, the Mineral Leasing Act allows the Secretary of the Interior to reduce, suspend or waive royalties on oil shale if necessary to promote development or if the lease cannot be "successfully operated." Thus, the industry is protected if a royalty rate turns out to be too high, while setting it too low places the taxpayers at risk of a massive giveaway to oil shale companies.

Most recently, several bills introduced in the House of Representatives called for an expedited federal leasing program to generate revenue or offset other financial priorities like the highway bill, but with these major questions left unanswered it is not clear that any royalty could be set to recover the necessary income, or that an industry that is not yet commercially viable could provide any royalties at all. The Congressional Budget Office (CBO) concurred. In its cost analysis of the energy provisions included in the highway bill, CBO determined that the oil shale offset would not generate revenue and instead would actually cost taxpayers $5 million in the first five years.[15] It is no surprise that this is what the CBO found since mandating commercial leasing of oil shale will not solve the technological or financial problems facing the oil shale industry. It only adds to the layers of subsidies the industry has already received and locks taxpayers into setting royalty rates before a fair royalty can be assessed.

OIL SHALE SUBSIDIES MUST STOP

Since the 1980s, oil shale has been showered with billions in tax credits, price guarantees, and loan guarantees. In addition, public lands have been given to private companies for oil shale research and development without requiring the payment of rents, bonuses, or royalties for facilities producing at less than commercial scale. After decades of federal support, oil shale has yet to be commercially produced. And simply making more federal lands available or limiting regulations on resource extraction is not a solution to our nation's debt crisis. It could even lead to greater taxpayer liabilities down the road.

The federal government has been in the business of handing out valuable, resource rich public lands to private industry at little to no cost for oil shale development. That practice must stop.



Sampling bed of oil shale south of Green River city, Sweetwater County, WY. 1914.
Image Courtesy of United States Geological Survey

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2. Daniel Fine. "Oil Shale: Toward a Strategic Unconventional Fuel Supply Policy." April 26, 2007. http://www.heritage.org/Research/Lecture/Oil-Shale-Toward-a-Strategic-Unconventional-Fuels-Supply-Policy
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APPENDIX ONE: OIL SHALE LEASES

TABLE 4: CURRENT OIL SHALE PROJECT DEVELOPMENT*

COMPANY	TECHNOLOGY	FEDERAL LEASE	STATE LEASE	PRIVATE HOLDING**	LOCATION
Ambre Energy North America, Inc.	Surface Mining /Retort			X	UT
American Shale Oil, LLC	In-situ	X			CO
Chevron USA, Inc.	In-situ	X			CO
Enefit American Oil	Surface Mining /Retort	X	X		UT
Enshale, Inc.	Surface Mining /Retort		X		UT
ExxonMobil Exploration Company	In-situ	X		X	CO
Independent Energy Partners, Inc.	In-situ			X	CO
Mountain West Energy, LLC	In-situ		X		UT
Natural Soda Holdings, Inc.	In-situ	X	X	X	CO
Red Leaf Resources, Inc.	Surface Mining /Retort		X		UT
Shale Tech International	Surface Mining /Retort			X	CO
Shell Frontier Oil and Gas Company	In-situ	X		X	CO

* With Lease Holdings; Federal, State, or Private
** Resource Owner or Lease Agreement with Private Land Owner

SOURCE: *U.S. Department of Energy Office of Petroleum Reserves*. "Secure Fuels from Domestic Resources." September 2011.

APPENDIX TWO: COMPANY PROFILES

AMBRE ENERGY NORTH AMERICA, INC., based in Salt Lake City, Utah, is the U.S. subsidiary of Ambre Energy Limited of Australia. Founded in 2005, Ambre Energy is an alternative fuel technology developer and private lease owner of coal and oil shale resources in Australia and the U.S. Currently, Ambre Energy is developing a demonstration plant near Vernal, Utah after completing a pilot plant demonstration during the summer of 2007.

AMERICAN SHALE OIL, LLC (AMSO), based in Rifle, Colorado, is a joint-venture between Genie Oil and Gas—a subsidiary of Genie Energy— and Total E&P USA—the U.S. affiliate of Total SA, one of the largest integrated international oil and gas companies in the world. Founded in 2006, AMSO is a technology developer for the in-situ extraction process and one of six companies which hold federal land leases within the Green River Formation. Formally known as 'EGL Oil Shale LLC,' AMSO changed its name in 2008.

CHEVRON USA, INC., based in San Ramon, California, is a subsidiary of Chevron Corporation—the third largest integrated energy company in the U.S. and one of the largest energy companies in the world. Founded in 1977, Chevron is a technology developer for the in-situ extraction process, private lease owner, and one of six companies to hold a federal lease within the Green River Formation. In February 2012, Chevron abandoned its federal lease and is currently looking to transfer it to another company.

ENEFIT AMERICAN OIL, based in Mobile, Alabama, is a subsidiary of EestiEnergia—one of the largest energy and oil shale producing companies in Estonia. Founded in 2005, Enefit is a state and federal land lease owner and technology developer for the mining and surface retort production process. Formally known as Oil Shale Exploration Company (OSEC), Enefit changed its name in 2011 and is one of six companies which hold federal land leases within the Green River Formation. Currently, Enefit is developing plans for a 50,000 bpd underground mining and surface retort facility with initial production proposed as early as 2020.

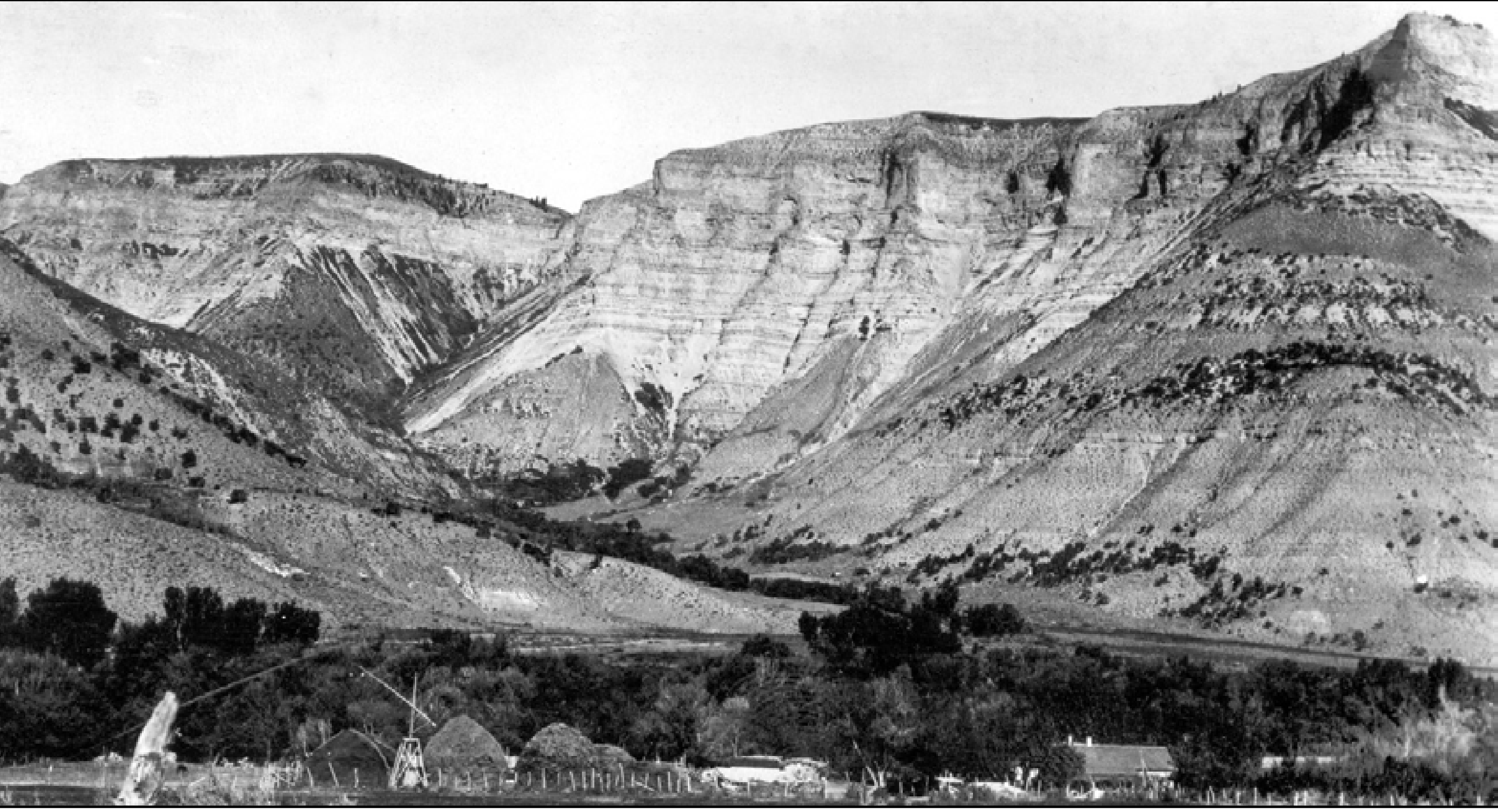
ENSHALE, INC., based in Orem, Utah, is a subsidiary of Bullion Monarch Mining, Inc.—an international gold mining company. Founded in 2005, Enshale is a state land lease owner and technology developer of the mining and surface retort production process. Currently, Enshale has constructed a pilot plant which processes as much as 50 bpd.

EXXONMOBIL EXPLORATION COMPANY, based Houston, Texas, is a subsidiary of ExxonMobil Corporation—the largest integrated energy company in the U.S. and one of the largest energy companies in the world. Founded in 1991, ExxonMobil Exploration is a federal and private lease owner and technology developer of the in-situ extraction process. In 2009, ExxonMobil Exploration applied for a federal lease in the Green River Formation. In August 2012, the application was approved. ExxonMobil Exploration is now one of six companies to hold a federal lease within the Green River Formation.

INDEPENDENT ENERGY PARTNERS, INC. (IEP), based in Parker, Colorado, is a private lease owner and technology developer of the in-situ extraction process. Founded in 1991, IEP is currently planning the Uintah Gateway Project—a joint-venture project between IEP and Uintah Resources Inc. with financial backing from Total SA, one of the largest integrated international oil and gas companies in the world.

MOUNTAIN WEST ENERGY, LLC (MWE), based in Highland, Utah, is a state lease owner and technology developer of the in-situ extraction process. Founded in 2005, MWE has completed simulation tests at the Department of Energy's Rocky Mountain Oilfield Testing Center. MWE's goal is to demonstrate profitable production of oil shale by 2013—with plans to develop a commercial scale facility by 2015.

NATURAL SODA HOLDINGS, INC., based in Rifle, Colorado, is a federal, state, and private lease owner and technology developer of the in-situ extraction process. Founded in 2000, Natural Soda primarily engages in solution mining for sodium bicarbonate (i.e. baking soda) which is commonly co-deposited with oil shale. Currently, Natural Soda is pursuing exploration drilling plans to examine its oil shale resources with financial support from Sentient—a venture capital firm based in the Cayman Islands. In 2009, Natural Soda applied for a federal lease in the Green River Formation. In August 2012, the application was approved. Natural Soda is now one of six companies to hold a federal lease within the Green River Formation.



GREEN RIVER FORMATION WEST OF PARACHUTE CREEK, CO.
Image Courtesy of United States Geological Survey

RED LEAF RESOURCES, INC., based in Sandy, Utah, is a technology company which focuses on unconventional fossil fuels. Founded in 2006, Red Leaf is a state lease owner and technology developer of the mining and retort production process. In March 2012, Red Leaf entered into a joint-venture with Total E&P USA—the U.S. affiliate of Total SA, one of the largest integrated international oil and gas companies in the world. Red Leaf and Total aim to prove the commercial viability of their mining and retort technology.

SHALE TECH INTERNATIONAL (STI), based in Rifle, Colorado, is an international oil shale technology and development company. Found in 2006, STI is a private lease owner and technology developer of the mining and surface retort production process. STI owns rights to the original Paraho Technology developed for a U.S. Navy contract to produce oil shale fuels in the 1980s. Currently, STI operates a pilot plant in Rifle, Colorado to continue research into its Paraho II Technology.

SHELL FRONTIER OIL AND GAS COMPANY, based in Denver, Colorado, is a subsidiary of Royal Dutch Shell Plc.—the second largest integrated energy company in the U.S. and one of the largest energy companies in the world. Founded in 1897, Shell is a technology developer for the in-situ extraction process, private lease owner, and one of six companies to hold a federal lease within the Green River Formation. Contrary to other companies which hold a single federal lease, Shell holds rights to three separate federal leases. In early 2011, all relevant permit applications were submitted to the Bureau of Land Management for development of a pilot plant on one of Shell's federal leases. Currently, Shell is planning to begin construction of its pilot plant in 2012.

FOR MORE INFORMATION

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