Secure Fuels from Domestic Resources

Profiles of Companies Engaged in Domestic Oil Shale and Tar Sands Resource and Technology Development

Prepared by INTEK, Inc.

For the U.S. Department of Energy • Office of Petroleum Reserves
Naval Petroleum and Oil Shale Reserves

Fifth Edition: September 2011

Note to Readers Regarding the Revised Edition (September 2011)

This report was originally prepared for the U.S. Department of Energy in June 2007. The report and its contents have since been revised and updated to reflect changes and progress that have occurred in the domestic oil shale and tar sands industries since the first release and to include profiles of additional companies engaged in oil shale and tar sands resource and technology development. Each of the companies profiled in the original report has been extended the opportunity to update its profile to reflect progress, current activities and future plans.

Acknowledgements

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AOC-PSS and INTEK, Inc. wish to acknowledge the efforts of representatives of the companies that provided information, drafted revised or reviewed company profiles, or addressed technical issues associated with their companies, technologies, and project efforts.

Special recognition is also due to those who directly performed the work on this report. Mr. Peter M. Crawford, Director at INTEK, Inc., served as the principal author of the report. Mr. Jeffrey Stone, Analyst at INTEK, Inc., served as a principal investigator and researched and edited many of the profiles. Mr. Stone also coordinated the final preparation and publication of the report.

Disclaimer

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FOREWORD

Reducing Oil Imports is Essential to U.S. Economic Strength and Energy Security

Reducing dependence on foreign oil imports is essential to achieving the nation's energy security objective. Import reductions can be achieved in two fundamental ways – by reducing demand for oil through greater conservation and efficiency and by increasing domestic production of fuels from alternative and unconventional fuels resources.

U.S. Oil Shale and Tar Sands Offer Significant Promise ...

Oil shale and tar sands resources and their potential are well understood.

America is endowed with approximately six trillion barrels of oil shale resources, of which approximately four trillion barrels are concentrated in Colorado, Wyoming and Utah.

The United States is also endowed with approximately 50 billion barrels of tar sands resources, with the largest deposits in Utah.

If these resources can be commercially developed, while protecting the environment, they could contribute up to three million barrels per day to domestic energy supply.

... But Face New Social and Environmental Challenges

Transforming unconventional resources into useable fuels consumes water and energy, impacts surface and subsurface environments, and produces emissions, effluents, and solid wastes that must be captured, managed, and disposed of. An industry that will successfully unlock the promise of oil shale and tar sands must address these challenges with innovative technological solutions.

Technology Continues to Evolve to Address New Challenges and Constraints

Since the early 1900s, public and private research and development efforts have established a foundation of science and technology to enable oil shale and tar sands development. By 1991, when U.S. oil shale efforts were curtailed for market and economic reasons, several technologies approached readiness for commercial demonstration.

Today, many lessons from the 20th century are being applied to develop new technologies that respond to the economic, environmental, and social challenges that constrain 21st century development, such as:

- Energy efficiency
- Water consumption
- Groundwater protection
- Surface impacts
- Carbon emissions
- Other air pollutants, and
- Community infrastructure.

About the Fifth Edition

The fifth edition of this report documents the activities of 34 companies investing private capital and human ingenuity to develop, pilot test, and demonstrate new oil shale and tar sands technologies. The report updates the profiles of most of the companies previously included technology development.

An Information Resource

Links and contacts are provided to help readers find more information about companies, projects, and emerging technologies and to facilitate the sharing of information among industry participants.

The Department of Energy's Office of Petroleum Reserves / Naval Petroleum and Oil Shale Reserves has recently updated a publicly available report of oil shale research and development activities at universities, national laboratories, and geological surveys. Together, this report of technologies and project activities, and the RD&D report, provide a broad view of current efforts in U.S. oil shale and tar sands development.

This report will be updated as the unconventional fuels industry continues to evolve and significant new information becomes available.

Ambre Energy's Utah Pilot Plant

AMERICA'S OIL SHALE AND TAR SANDS RESOURCES

U.S. OIL SHALE RESOURCES

Oil shale is a hydrocarbon-bearing rock that occurs in 27 countries around the world. Worldwide, the known resource base is believed to exceed 10 trillion barrels, of which the vast majority (~6 trillion barrels) is located in the United States.

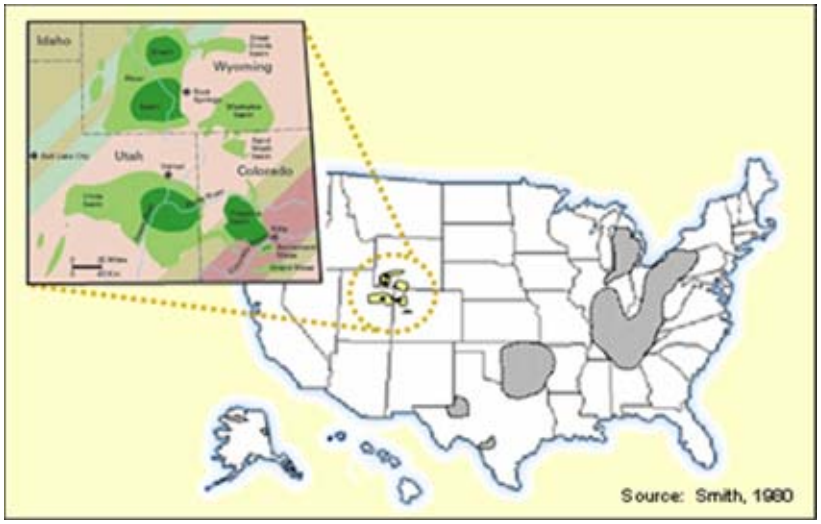
Many areas of the United States contain oil shale deposits, but the composition and richness of these deposits vary significantly. The oil shale deposits in Colorado, Utah, and Wyoming are the richest most concentrated in the world. Thus, they have attracted great interest for potential development to increase oil production in the foreseeable future (Figure 1).

Oil shale deposits in these three states occur beneath 25,000 square miles (16 million acres). Nearly 75 percent of these resources- the richest, most concentrated deposits- underlay Federal lands managed by the Department of the Interior (DOI). Industry will require access to some of the resource underlying public lands to achieve oil shale development at a meaningful scale.

QUALITY AND GRADE

The known oil shale resources of the United States have been extensively characterized. Yields greater than 25 gallons per ton (gal/ton) are generally viewed as the most economically attractive, and hence, the most favorable for initial development.

Figure 1. Principal Oil Shale Deposits of the Western United States



With improved understanding, and technological innovation, this cut-off could be reduced, increasing the size of the estimated recoverable resource.

Of the known oil shale resources in Colorado, Utah, and Wyoming, approximately 1.2 trillion barrels are in deposits richer than 25 gallons per ton. Recovery of even a small fraction of this resource could make a significant contribution to the Nation's oil supply for many decades.

Table 1, from the U.S. Geological Survey[i], displays the richness of various oil shale deposits in three areas of the United States.

WESTERN SHALE

The most economically attractive U.S. oil shale deposits, containing in excess of 1.2 trillion barrels, are found in the Green River Formation of Colorado (Piceance

Table 1. U.S. Oil Shale Resource in Place (Billion Bbls)

	Richness (Gallons/ton)		
Deposit Locations	5 - 10	10 - 25	25 - 100
Colorado, Wyoming & Utah (Green River)	4,000	2,800	1,200
Central & Eastern States	2,000	1,000	NA
Alaska	Large	200	250
Total	6,000+	4,000	2,000+

Source: Duncan, and others (1965)

Creek Basin), Utah (Uinta Basin) and Wyoming (Green River and Washakie basins). More than a quarter million assays have been conducted on the Green River Formation oil shale. In the richest zone, known as the Mahogany Zone (Piceance Basin), oil yields generally range from 10 to 50 gal/ton and, in some areas exceed 65 gal/ton.

EASTERN SHALES

U.S. eastern oil shale deposits have also been well characterized as to location, depth, and carbon content. Ninety-eight percent of the accessible deposits are found in Kentucky, Ohio, Tennessee, and Indiana. The Kentucky Knobs region alone has resources of 16 billion barrels, at a minimum grade of 25 gal/ton. Near-surface mineable resources are estimated at 423 billion barrels[ii].

Eastern deposits have a different type of organic carbon than the western shale. As a result, conventional retorting of eastern shale yields less oil and a higher carbon residue compared with the western shale.

Nonetheless, eastern shale still has the potential to become an important addition to the Nation's unconventional fuel supplies. With processing technology advances, for example the addition of hydrogen to the retorting process, potential oil yields could approach those of the western shale.

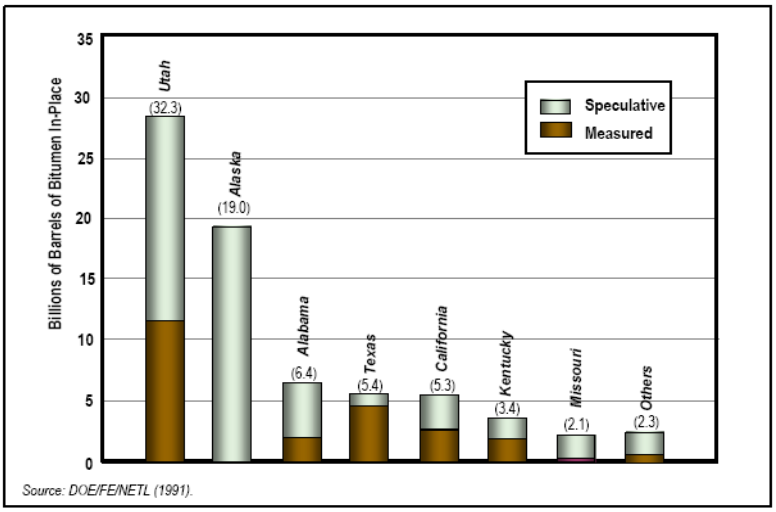
OTHER OIL SHALE DEPOSITS

Oil shale deposits also occur in Nevada, Montana, Alaska, and Kansas. These are either too small, too low-grade, or have not yet been sufficiently explored to be considered for near-term commercial development.

U.S. TAR SANDS

T ar sands ("oil sands" in Canada) are a combination of clay, sand, water, and bitumen (a heavy, black, asphalt-like hydrocarbon). Tar sands can be mined and processed to extract the oil-rich bitumen, which must then be upgraded to become synthetic crude oil.

Figure 2. Known U.S. Tar Sand Resources



Unlike oil, bitumen cannot be pumped from the ground. Instead, tar sand deposits are mined, using open pit techniques, or produced by underground heating processes.

The U.S. tar sands resource is estimated to be 60 to 80 billion barrels. The resource is substantial, but far smaller than Alberta's oil sands or U.S. oil shale resources (Figure 2). About 11 billion barrels of U.S. tar sands resources may ultimately be recoverable[iii].

QUALITY AND GRADE

U.S. tar sands differ somewhat in quality and configuration from Canadian oil sands. They are generally leaner in grade and less uniform in quality. U.S. tar sands are often consolidated, or cemented. New extraction technology approaches may be required.

LOCATION AND AVAILABILITY

The largest measured U.S. tar sands deposits are found in Utah. Utah has between 19 and 32 billion barrels of tar sands, about one-third of the domestic resource. Utah's tar sands resource is concentrated in the eastern portion of the state, predominantly on public land.

Table 2 shows the estimated resources in major Utah deposits. Other tar sand deposits are found in Alabama, Alaska, California, Kentucky, New Mexico, Oklahoma, Texas, and Wyoming. Many of these other deposits are deeper and thinner, and may be less economic to develop than Utah's.

Table 2. Major Tar Sands Deposits in Utah

Deposit	Known Resource (MMBbl)	Speculative (MMBbl)
Sunnyside	4,400	1,700
Tar Sand Triangle	2,500	13,700
PR Spring	2,140	2,230
Asphalt Ridge	820	310
Circle Cliffs	590	1,140
Other	1,410	1,530
Total:	11,860	20,610

Source: DOE/FE/NETL (1991)

OIL SHALE AND TAR SANDS COMPANY PROFILES

Companies Investing Today to Advance Technology to Provide Clean Secure Fuels for Tomorrow

The 34 Company Profiles that follow describe the activities of companies that are currently and actively engaged in domestic oil shale, tar sands, and/or heavy oil research and technology development. Each profile describes the company, its role in oil shale, tar sands and/or heavy oil development, the scope and features of its process technology, the location of its resource holdings or leases, the status of technology or project development efforts, and plans for further efforts. The information provided in the profiles was provided by the companies or garnered from information in the public domain, found on company websites or in public filings. The Department of Energy and its contractor make no representation as to the accuracy of this information. Summary level information is provided in Table 3. Individual company profiles follow in alphabetical order.

1. Ambre Energy
2. American Shale Oil (AMSO)*
3. Anadarko Petroleum Corp*
4. Chattanooga Corp*
5. Chevron USA Inc.
6. Combustion Resources*
7. Composite Technology Development, Inc.
8. Electro-Petroleum*
9. Enefit*
10. Enshale*
11. ExxonMobil*
12. Brent Fryer*
13. General Synfuels International*
14. Heliosat, Inc.
15. Imperial Petroleum Recovery Corp*
16. Independent Energy Partners*
17. James Q. Maguire, Inc.*
18. James W. Bunger and Associates, Inc.*
19. MCW Energy*
20. Mountain West Energy
21. Natural Soda Inc.*
22. Phoenix-Wyoming Inc.
23. PyroPhase*
24. Quasar
25. RedLeaf
26. Sasor*
27. Schlumberger*
28. Shale Tech International*
29. Shell Frontier Oil & Gas*
30. Standard American Oil Co.*
31. Temple Mountain Energy Inc.*
32. U.S. Oil Sands*
33. Western Energy Partners*
34. Great Western Energy LLC*

* Revised since 2010

Table 3. Oil Shale and Tar Sands Company Profiles Summary

Company	Resource*	Project Developer	Technology Developer	Technology Type	Resource Holder			Page
					BLM	State	Private	
Ambre Energy	S/C	√	√	Surface			√	6
American Shale Oil, LLC (AMSO)	S	√	√	In-Situ	√			8
Anadarko Petroleum Corporation	S						√	10
Chattanooga Corporation	S/T		√	Surface				12
Chevron	S	√	√	In-Situ	√			14
Combustion Resources	S		√	Surface				16
Composite Technology Development, Inc.	S/H		√	In-Situ				18
Electro-Petroleum	S/H		√	In-Situ				20
Enefit	S	√	√	Surface	√	√		22
Enshale	S	√	√	Surface		√		24
ExxonMobil Corporation	S	√	√	In-Situ	**		√	26
Brent Fryer, Sc.D.	S		√	Surf/In-Situ				28
General Synfuels International	S	√	√	In-Situ				30
Heliosat, Inc.	S		√	In-Situ				32
Imperial Petroleum Recovery Corp.	H		√	Upgrading				34
Independent Energy Partners	S	√	√	In-Situ			√	36
James Q. Maguire, Inc.	S		√	In-Situ				38
James W. Bunger and Associates, Inc.	S/T		√	Surface				40
MCW Energy	T	√	√	Surface		√		42
Mountain West Energy	S	√	√	In-Situ		√		44
Natural Soda, Inc.	S	√	√	In-Situ	**	√	√	46
Phoenix-Wyoming, Inc.	S/T/H	√	√	In-Situ				48
PyroPhase	S/T	√	√	In-Situ				50
Quasar Energy	T		√	In-Situ			√	52
RedLeaf	S	√	√	Surface		√		54
Sasor	S/T		√	In-Situ				56
Schlumberger	S		√	In-Situ				58
Shale Tech International	S	√	√	Surface			√	60
Shell Frontier Oil and Gas, Inc.	S	√	√	In-Situ	√		√	62
Standard American Oil Co.	S/T		√	Surface				64
Temple Mountain Energy, Inc.	T	√	√	Surface		√		66
U.S. Oil Sands	T	√	√	Surface		√		68
Western Energy Partners	S	√	√	Surface				70
Great Western Energy Corporation	S					√		72

*Oil Shale = S, Tar Sands = T, Heavy Oil = H, Coal = C

**2nd Round BLM RD&D Lease Application Pending

Ambre Energy North America, Inc.

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(Formerly Millennium Synfuels)

COMPANY DESCRIPTION

Ambre Energy North America, Inc. ("Ambre Energy") is a Delaware company with its headquarters in Salt Lake City, Utah. Its parent company, Ambre Energy Limited, is headquartered in Brisbane, Australia. Ambre Energy intends to establish an alternate fuel production operation using its patented retorting technology.

OIL SHALE INDUSTRY ROLE

Ambre Energy is currently a technology developer and lease owner. The company intends to expand its scope to include production of alternative fuels from coal and oil shale.

DESCRIPTION OF TECHNOLOGY

Ambre Energy owns and controls the patented Oil-Tech vertical surface retort technology and is using it to convert oil shale, coal, and lignite into liquid fuels and other commercial byproducts. The enterprise has a demonstration facility near Vernal, Utah below.

When used for oil shale:

- After shale rock has been mined, the rock is then crushed to the appropriate size distribution. This crushed rock is then lifted via a conveyor to a bin at the top of an 80 foot structure which feeds the heating column, or "retort". As the shale rock passes down the retort, it is anaerobically heated until the hydrocarbon vapors contained within the rock are released. These vapors are then vacuumed into a condensing unit, producing raw shale oil.
- One ton of shale rock will typically produce between 30 and 60 gallons of shale oil, depending on resource quality.
- The shale oil is typically subjected to further processing providing a refinery feedstock as well as useful byproducts such as pyridines. Pyridines are basic, nitrogen containing heterocyclic aromatic compounds, with many uses and markets, including use as asphalt strengthening additives. The produced

pyridines represent about two percent of the volume of shale oil produced.

- The refinery feedstock has been shown to be low in sulfur content and is thus viewed as "sweet" or "light".
- The resulting spent shale has sufficient heating value to be used as an energy source for pre-heating new shale rock entering the retort. Alternatively, the residual carbon content of the spent shale may be combusted to produce energy for other purposes.
- Finally, after condensation of the shale oil from the vapor stream, the non-condensable hydrocarbon values are scrubbed ready to be fed back into the retorting process, or to be exported as a high calorific value gas.
- The spent shale has potential market value in various areas as building materials, industrial spill absorbents and for land fill. Such potential has not yet been fully investigated.

When applied to low quality coals and lignite: Ambre's proprietary process, which incorporates the retort technology, produces a clean burning char that results in lower emissions than combusting coal directly, and provides a liquid hydrocarbon stream with applications as a chemical and refinery feedstock. The process also produces surplus co-generated electricity that can be sold into the power grid.

LOCATION OF RESOURCE HOLDINGS

- Ambre Energy controls approximately 34,000 acres of oil shale leases in Utah.
- The company also owns or has access to lignite and other coal resources in the U.S. and Australia.

PROJECT STATUS / STATE OF DEVELOPMENT

A retort pilot-plant testing was completed during the summer of 2007. The retort design is being further optimized for commercial operations.

RELEVANT EXPERIENCE

Ambre Energy builds on a wealth of technical expertise and field experience residing with its founders and employees.

American Shale Oil, LLC (AMSO)

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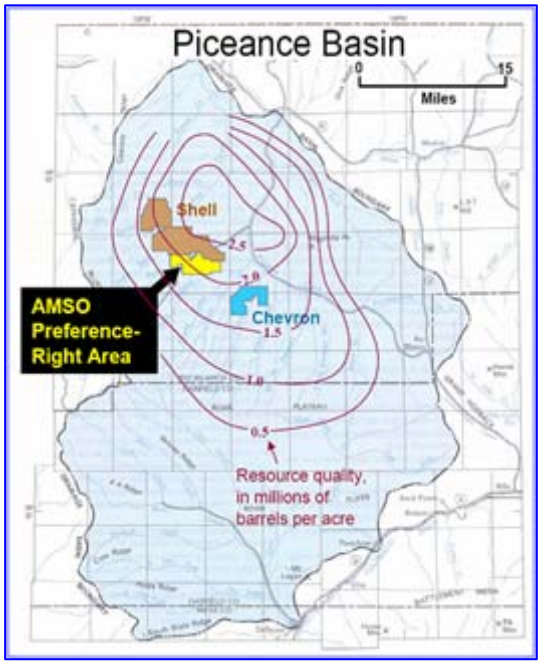
Website: www.amso.net

COMPANY DESCRIPTION

American Shale Oil, LLC (AMSO) is a 50/50 joint venture of IDT Corporation (NYSE: IDT) and Total (NYSE: TOT). AMSO holds a BLM oil shale RD&D lease in Rio Blanco County, CO. The company is developing and testing an innovative, environmentally appropriate, in-situ shale oil extraction process for subsequent commercial production.

OIL SHALE INDUSTRY ROLE

The company is an in-situ technology developer and resource holder. AMSO plans to be a significant shale oil producer marketing product through Total.



DESCRIPTION OF TECHNOLOGY

AMSO is developing a new process for in-situ retorting of oil shale involving the use of proven oil field drilling and completion practices coupled with AMSO's unique in-situ retorting technology:

- Heat is introduced to the retort using a series of pipes placed near the base of the oil shale bed to be retorted;
- AMSO utilizes thermal spalling, convection and refluxing to enhance heat distribution through the retort;
- AMSO's approach addresses key environmental concerns associated with oil shale development, including:
  - **Ground Water Protection:** AMSO targets the illite-rich oil shale interval hundreds of feet below the source of useful ground water. Multiple geologic barriers, including 100 to 300 feet of nahcolite-rich oil shale, will protect usable ground water from retort impacts;
  - **Energy Efficiency:** After initial commercial start-up, combustion of fuel gas that is co-produced with the shale oil is expected to provide sufficient heat to liberate shale oil and gas from the deposit;
  - **Surface Preservation:** The horizontal well retort approach efficiently distributes heat and minimizes surface disturbance by reducing the number of wells per area retorted;

- Water Consumption: AMSO expects to use less than one gallon of water for each gallon of shale oil produced;
- Carbon Management: AMSO is developing methods for reducing the carbon footprint of oil shale. AMSO's slow, elevated pressure retort produces a light, hydrogen-rich oil that needs little refining while leaving much of the carbon that would eventually result in CO_2 emissions underground. In addition, AMSO is exploring methods of storing process-heat-generated CO_2 in the spent retorts through mineralization.

TYPE / LOCATION OF RESOURCE HOLDINGS

AMSO holds a 160-acre BLM oil shale RD&D lease in the Piceance Basin in Rio Blanco County, CO. Once AMSO proves that its technology is economically viable and environmentally acceptable, it has the right to expand its lease to 5,120 acres for commercialization. In that event, AMSO's lease has an estimated five billion barrel recoverable reserve.

PROJECT STATUS / STATE OF DEVELOPMENT

- AMSO's technology is based on state-of-the-art oil and gas recovery techniques, study of previous in-situ retorting efforts, and calculations of heat and mass transfer;
- AMSO has conducted drilling to characterize the site's geology and hydrology;
- A pilot retort experiment is under construction and scheduled to begin operations in 2011;
- The results of the pilot retort and additional field tests will demonstrate commercial viability.

RELEVANT EXPERIENCE

AMSO has a team of experts with extensive experience in oil and gas drilling, mining, completion and production practices; oil shale technology; and project development. Team members include managers, engineers and scientists that have been active in oil shale and mining for decades. Several AMSO team members worked on oil shale development efforts in western Colorado and Wyoming in the 1970's and 80's. AMSO is also working with national universities, national labs, and the USGS to share research expertise.

OUTLOOK / FUTURE PLANS

AMSO is dedicated to reducing America's dependence on foreign oil by producing energy from oil shale in an economically viable, environmentally acceptable and socially sustainable manner. Utilizing the resources solely within the illitic oil shale layer, commercial production could begin within seven to eight years and reach 100,000 barrels per day four to five years thereafter.

Anadarko Petroleum Corporation

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COMPANY DESCRIPTION

Anadarko Petroleum Corporation is among the world's largest independent oil and natural-gas exploration and production companies, with 2.4 billion barrels of oil equivalent (BOE) of proved reserves at December 31, 2010. Anadarko's primary business segments are managed separately due to the nature of the products and services, the unique technology, and distribution and marketing requirements. The Company's three operating segments are as follows:

- **Oil and gas exploration and production** – This segment explores for and produces natural gas, crude oil, condensate and natural gas liquids (NGLs).
- **Midstream** – This segment provides gathering, processing, treating and transportation services to Anadarko and third-party oil and natural-gas producers. The Company owns and operates natural-gas gathering, processing, treating and transportation systems in the United States.
- **Marketing** – This segment sells much of Anadarko's production, as well as production purchased from third parties. The Company actively markets oil, natural gas and NGLs in the United States, and actively markets oil from Algeria, China and Ghana.

The Company owns interests in several coal, trona (natural soda ash) and industrial mineral properties through non-operated joint ventures and royalty arrangements within and adjacent to its land grant acreage position (Land Grant). The Land Grant, the ownership of which is a significant competitive advantage for Anadarko, consists of land granted to the Company by the federal government in the mid-1800s that passes through Colorado and Wyoming and into Utah. Within the Land Grant, the Company has fee ownership of the mineral rights under approximately 8 million acres.

OIL SHALE INDUSTRY ROLE

Anadarko's current role in the U.S. oil shale industry is that of a resource owner.

DESCRIPTION OF TECHNOLOGY

Anadarko is not developing technology for oil shale processing.

TYPE / LOCATION OF RESOURCE HOLDINGS

- Anadarko engages in the hard minerals business through non-operated joint ventures and royalty arrangements in several coal, trona (natural soda ash), and industrial mineral mines located on lands within and adjacent to its Land Grant holdings.
- The Land Grant is an 8 million acre strip running through portions of Colorado, Wyoming and Utah where the company owns most of its fee mineral rights. (See opposite page).

PROJECT STATUS / STATE OF DEVELOPMENT

- In 2006, Anadarko drilled 22 core holes and shipped a 500 ton bulk sample to Calgary to be tested in the Alberta Taciuk Processor.
- The bulk sampling program was successful and the core analyses are complete.

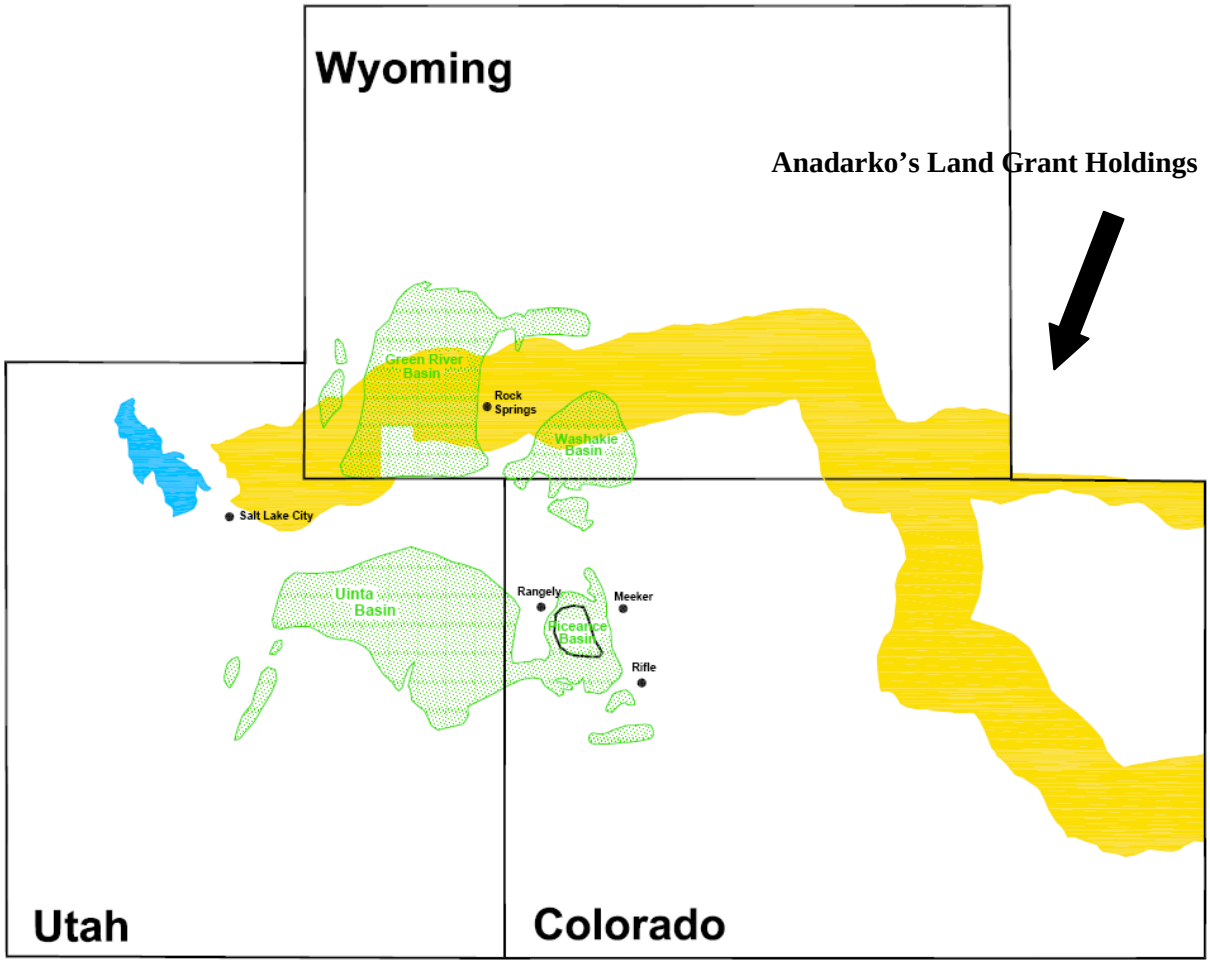
RELEVANT EXPERIENCE

Anadarko and its predecessor companies have participated in and funded many of the numerous studies of the Land Grant oil shales which have included several coring programs.

OUTLOOK / FUTURE PLANS

Anadarko is currently interested in leasing its oil shale lands. Anadarko will make available all studies and the results of all drilling programs to qualified prospective lessees.

Area of Anadarko's Land Grant Holdings Relative to Western Oil Shale Deposit



Chattanooga Corporation

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Website: www.chattanooga-corp.com

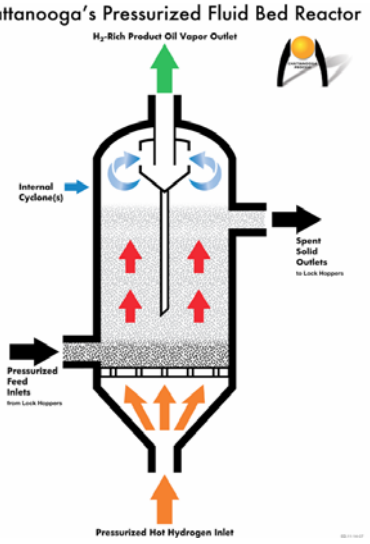
COMPANY DESCRIPTION

Chattanooga Corp is a technology development company focused on clean and efficient processes for producing high grade synthetic crude oil from unconventional resources such as oil shale, oil sands, bitumen and heavy oil with minimum environmental impact. Chattanooga has developed, patented and piloted a new process to directly convert these resources into light, high grade, crude oil.

OIL SHALE INDUSTRY ROLE

Chattanooga Corp is a technology developer and is establishing relationships with producers, government agencies, and investors in its development efforts to bring the Chattanooga Process into commercial operation.

Chattanooga's Pressurized Fluid Bed Reactor

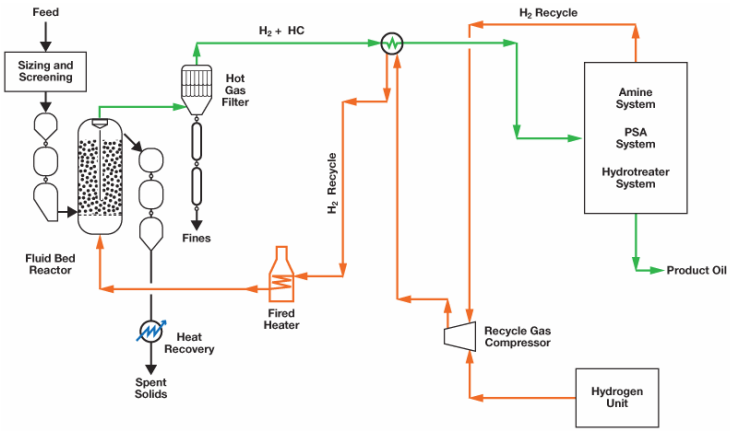


SOCIO-ECONOMIC BENEFITS

Based upon an engineering design and estimates prepared by industry specialists for a commercial scale facility producing 60,000 bbl/d, Chattanooga estimates production costs to be less than thirty dollars ($30) per barrel. Each such commercial facility including mining and land reclamation facilities would generate more than 2,000 jobs during construction and over 800 jobs for operations.

DESCRIPTION OF TECHNOLOGY

The Chattanooga Process is centered on pressurized hydrogen fluid bed reactor technology. Conversion reaction occurs in the fluid bed at relatively low temperatures (sub 537°C/1000°F) without combustion. The reactor is designed to continuously feed oil bearing material such as oil sand, oil shale and liquid bitumen for conversion via thermal cracking and hydrogenation into hydrocarbon vapors while removing spent solids.



Hydrogen's multiple uses in this process include heat conveyance to the feedstock, reactor bed fluidizing gas, and conversion reactant. Hydrogen is heated in an adjacent fired heater fueled by process off-gases and, depending upon economics, either supplemental gas or product oil. This flexibility maximizes operating economics. Additionally, heat from the spent solid material is recovered and used to further reduce Process energy requirements.

Direct reactor hydrocarbon products are condensed and separated from the gas stream after removing particulate solids in a hot gas filter. The liquid product produced at this stage may be lightly hydrotreated to produce a very low sulfur high grade synthetic crude oil.

Efficiency: Use of hydrogen in the initial phase of the Process significantly enhances the value and quality of the product and reduces investment and operating costs in downstream operations providing further economic advantage. Recovery of waste heat, power co-generation and the utilization of the light HC gases produced in the reactor as feedstock for the hydrogen plant make the Chattanooga Process virtually self-sufficient.

Environmental Benefits common to all feedstock: Dry processing of resource material eliminates water pollution and greatly reduces water usage. Greenhouse gas emissions are substantially reduced. The majority of the CO2 produced in the hydrogen plant can be sequestered. Spent shale or sand is immediately available for heat recycling and land reclamation. Process has the ability to remove 99.8% of all sulfur.

Shale: Extremely high yields are achieved due to the addition of hydrogen in the fluid bed during the initial phase of processing and due to the fact that no shale is combusted during processing. There is no breakdown of Western shale or release of CO2 due to the low operating temperature range.

Bitumen: Upgrading of bitumen by the Chattanooga Process produces a high-value, low-sulfur synthetic crude oil, compared to a low-value, raw bitumen which is difficult to transport and environmentally damaging.

Oil Sand: The Chattanooga Process provides a simplified extraction upgrading technology for processing oil sands, resulting in significant benefits to the environment and industry, including reduced greenhouse gas emissions, elimination of tailing ponds, minimal water usage and reduced natural gas consumption.

RESOURCE HOLDINGS

Chattanooga Corp does not have direct holdings in oil shale or oil sands resources.

PROJECT STATUS / STATE OF DEVELOPMENT

- Pilot plant tests have demonstrated that the Chattanooga Process has produced yields of 51.5 gal/ton from Colorado shale (with a Fischer Assay prediction of 28.4 gal/ton), and additional pilot plant tests on Kentucky shale have produced 200% of Fischer Assay predictions. These tests demonstrate effective fluidization using hydrogen with extremely high extraction efficiency results.
- Pilot plant tests on bitumen/sand produced a 28°-30° API product in the reactor with extremely high extraction efficiency results. Hydrotreating would increase this material to a product in the range of 38°- 40° API.
- Based on pilot plant test results and with some hydrotreating, the product from oil shale would be in the range of 36° API. All products would be saturated, stable and pipeline quality.
- Pilot plant tests are performed at the National Centre for Upgrading Technology (NCUT) in Devon, Alberta, Canada. Recent analytical Run Reports are available.
- Chattanooga owns several US and Canadian patents.

RELEVANT EXPERIENCE

Chattanooga Corp was founded by an experienced team of energy and chemical industry professionals to create processes for converting oil resources into synthetic crude oil. The company also utilizes a team of industry experts as consultants and advisors for various aspects of its process and business development.

OUTLOOK / FUTURE PLANS

Having proven the efficacy of the Chattanooga Process for producing synthetic crude oil from oil shale and bitumen/sand in its pilot plants, Chattanooga is exploring opportunities for building and licensing commercial scale facilities. In parallel, Chattanooga will expand its relationships with targeted energy producers, government agencies, financial institutions and investors for the purpose of promoting and establishing commercial-scale facilities and creating licensing and royalty agreements.

Chevron

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COMPANY DESCRIPTION

Chevron U.S.A. Inc. is one of the largest integrated energy companies in the world. Headquartered in San Ramon, California, and conducting business in approximately 180 countries, the company is engaged in every aspect of the oil and natural gas industry.

Chevron Shale Oil Company, a part of Chevron U.S.A. Inc, is leading the way in oil shale development. Chevron has secured a leasing tract - T3S R97W Sec5 - in Rio Blanco County, Colorado. There the company will conduct research, development, and demonstration of its oil shale extraction technology.

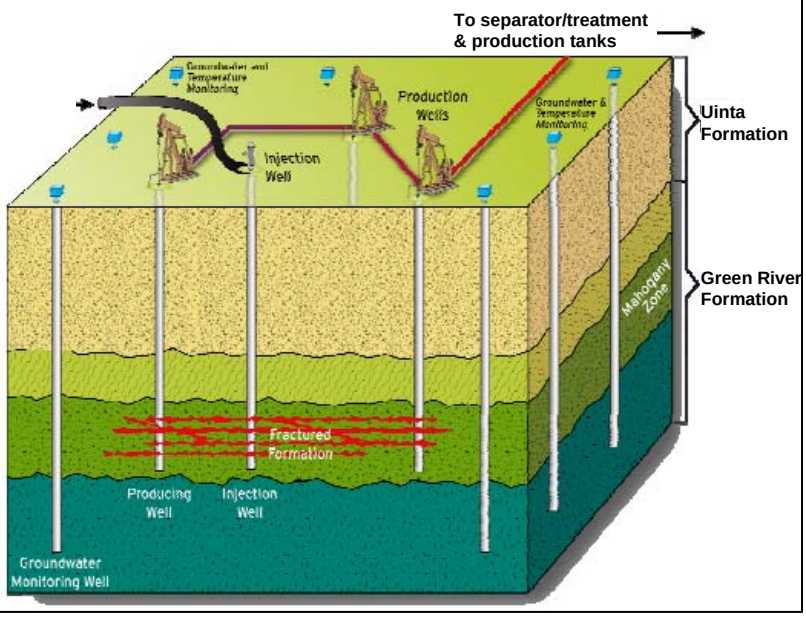
OIL SHALE INDUSTRY ROLE

Chevron USA is engaged in the oil shale industry as a resource owner, technology developer, and project developer. The company has been developing an in-situ process that it intends to test on a BLM RD&D lease. The project could be expanded to commercial scale production depending on a finding of technical, economic feasibility and other investment criteria.

DESCRIPTION OF CHEVRON'S TECHNOLOGY

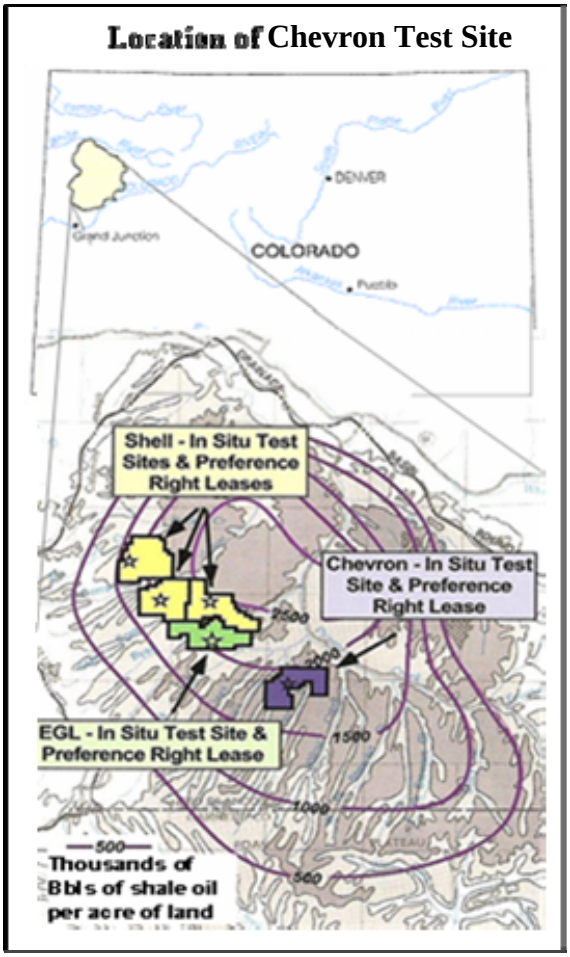
- Chevron is developing an in-situ technology which will be economically sustainable and environmentally responsible.
- It involves the application of a series of fracturing technologies to rubblize the formation to enhance the surface area of exposed kerogen.
- The exposed kerogen in the fractured area is then converted to oil and gas through chemistry.
- The produced hydrocarbon fluids are recovered and transported to a refinery, which converts them into transportation fluids and other petroleum products.

Chevron's Technology



LOCATION OF RESOURCE HOLDINGS

- Chevron was awarded a 160 acre RD&D lease by the U.S. Bureau of Land Management.
- If efforts are successful, Chevron will have the right to convert the RD&D to a 5,120 acre commercial lease.
- The RD&D lease is located at -T3S R97W Sec5 - in Rio Blanco County, Colorado.



PROJECT STATUS / STATE OF DEVELOPMENT

- Chevron successfully proposed a research, development, and demonstration (RD&D) lease to the Department of Interior, Bureau of Land Management (BLM).
- Chevron has been testing its technology in several laboratory, bench, and medium scale tests. Chevron and technical partners have made progress in conversion techniques, and in our understanding of the kerogen structure. Chevron is developing specialized modeling expertise to monitor and predict performance.
- Chevron has cored, logged, and cased one corehole, drilled fifteen groundwater/hydrology monitoring wells and four tracer wells. The core is being analyzed using both conventional and unconventional test methods. Chevron is near completion for a basin scale hydrology model, and has developed procedures for tracer work.

OUTLOOK / FUTURE PLANS

Chevron proposed a pilot test to BLM consisting of a 5 spot patterns (4 injectors and 1 producer per pattern) in Rio Blanco County, Colorado. The project schedule includes:

- An unspecified period of time for research, development, and demonstration on the lease acquisition, for BLM completion of the Environmental Impact Statement, and for Chevron development and BLM approval of a plan of operations;
- A multi year period of time to fracture, treat, and produce the first pilot pattern;
- An unspecified period of time for analyzing test results and planning next steps.

Combustion Resources, Inc.

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COMPANY DESCRIPTION

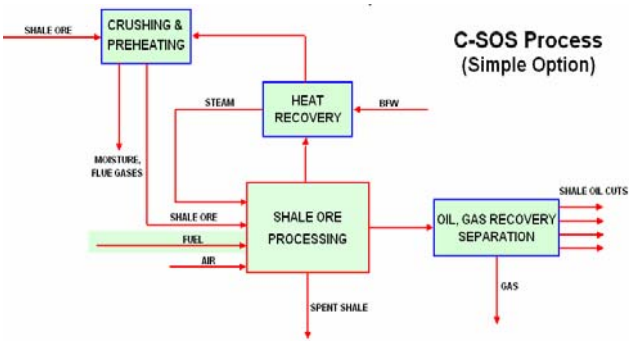
Combustion Resources, Inc. (CR) is a small-business corporation (www.combustionresources.com) whose focus is fossil fuels energy, with a substantial record of research and development and a highly educated and experienced professional team. CR work includes oil shale process development. Work on oil shale started in 2005. Funding for process development has been principally from the U.S. Department of Energy. CR principals are financial investors in the process.

OIL SHALE INDUSTRY ROLE

CR professionals have invented a new, patent-pending, oil shale surface process (February, 2007). A second patent application (May, 2009) discloses a rotary kiln design with capacity 2-3 times existing kilns while controlling oil shale temperature along the kiln length. CR has demonstrated this process in a 5 tpd pilot-scale plant through extensive testing and has established optimum operating conditions. CR seeks corporations and investors to participate in scale-up and commercialization of this new process. CR welcomes inquiries about licensing or acquiring the technology.

DESCRIPTION OF TECHNOLOGY

The schematic diagram of a simple version of the Clean Shale Oil Surface Process (**C-SOS**) includes feed shale preparation, grinding and preheating, ore delivery to a horizontal, indirect-fired, rotating kiln of unique design, followed by separation of the shale oil from spent shale and gas. The kiln fuel can be natural gas which might be supplemented with product gases. The oil shale temperatures can be controlled to eliminate otherwise substantial release of carbon dioxide from the high percentages of calcite and dolomite in the inorganic part of the shale feedstock. If further reduction in carbon dioxide emissions is required, the kiln can be fired with hydrogen in place of natural gas. If it is required to upgrade the raw shale oil on site, the shale oil and condensable hydrocarbon gases are separated into fractions (residual gasoil, heavy diesel, diesel, gasoline cuts) and sent to upgrading units for hydrogen-treating, prior to shipment to a refinery for final processing. Upgrading to motor fuels (e.g., gasoline, diesel) can also be completed on site through further hydrogen treatment (hydro-cracking). On-site production of hydrogen can be accomplished through reforming of natural gas or through gasification of coal, which is typically abundant in the regions of oil shale deposits. This patent-pending process offers several alternatives.



Potential advantages of this process include:

- Simple, low capital cost, horizontal design
- Commercially-available components
- Unique high-capacity kiln; processing of fines
- Option for on-site production of motor fuels
- Option for little or no carbon dioxide emissions
- On-site optional hydrogen production
- Projected low process water use
- Minimum shale carbonate decomposition

TYPE / LOCATION OF RESOURCE HOLDINGS

CR, Inc. does not hold leases for oil shale lands. CR seeks to participate with organizations that do.

PROJECT STATUS / STATE OF DEVELOPMENT

CR has demonstrated the process at pilot scale. The rotary kiln part of the pilot plant was completed first and non-reactive tests were completed on inert, pulverized solids feed, kiln burner operation and control and discharge systems. Design and construction of the oil collection portion of the pilot plant was then completed, which includes shale oil condensation, oil/spent shale separation and shale oil separation into residual, diesel and gasoline cuts. Shale ore was obtained from Utah's White River Mine stockpile and ground to minus 3/8 inch. Pilot kiln test variables included shale feed rate (3-6 tpd), kiln tube rotation rate (4-18 rpm), shale average particle size (1.9 mm and 2.4 mm) and kiln fuel firing rate. A kiln computer code, developed as a part of this work, has guided the test program and interpretation of the data. The code has correctly predicted the trends in changes of shale feed rate, kiln tube rotation rate, kiln fuel firing rate and shale particle size. The work has led to optimum performance parameters of the pilot kiln. The kiln code has then been used to predict behavior of a commercial-size kiln being used in the preliminary design of the commercial-scale plant. Tests with longer run times completed pilot testing. CR has also measured oil upgrading requirements (i.e., catalysts, operating conditions, hydrogen requirements) for production of motor fuels through hydro-treating and hydro-cracking of the shale oil fractions.

Front End: Feed, Kiln and Burner System

Separations Unit and Support Stand of the C-SOS Pilot Plant

RELEVANT EXPERIENCE

The CR oil shale team includes five senior professionals, each with two or more decades of technical experience in fossil fuels and all with advanced degrees. This includes decades of experience in large-scale, chemical and fossil fuel plant design, construction and operation. CR has completed two previous DOE contracts on oil shale process development, in addition to the current contract. CR also received a State of Utah Center of Excellence contract which focused on environmental aspects of this process. This work projected process water use of about a half barrel water per barrel of motor fuel product. Laboratory data on spent shale reclamation through natural plant growth in spent shale were promising.

OUTLOOK / FUTURE PLANS

- CR has completed tests with the 5 ton/day pilot plant to demonstrate the process and to obtain optimum performance data. Results have been used in preliminary designs of a commercial-scale plant (6000 bpd) with capital and operating costs, for various **C-SOS** process options. CR is pursuing opportunities for process scale-up and welcomes contact by interested organizations.

Composite Technology Development

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COMPANY DESCRIPTION

Composite Technology Development, Inc. (CTD) is a technology and product-development company located in Lafayette, CO. The company specializes in the development of engineered composites for use in extreme operating conditions, and currently markets products to customers primarily in the Energy, Aerospace, and Defense industries. In addition to its technology offerings, CTD also provides engineering services including low-temperature mechanical testing and thermo-mechanical design.

Since its founding in 1988, CTD has provided highly-reliable solutions to customers around the world. The company's product portfolio includes more than 40 standard products, as well as custom-engineered components that address specific needs within the energy and aerospace markets.

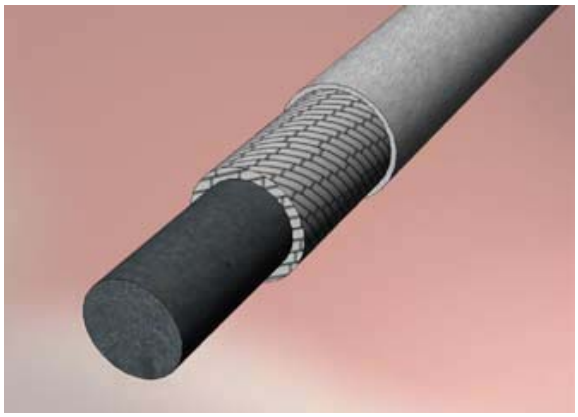
OIL SHALE INDUSTRY ROLE

To support the oil shale industry, CTD developed a new class of advanced electric heaters that utilize the company's patented NANUQ® ceramic composite insulation. This technology is enabling the design and fabrication of custom-engineered downhole heaters that are capable of long-term operation at elevated temperatures.

DESCRIPTION OF TECHNOLOGY

NANUQ® heater technology is based on a CTD patented electrical insulation system. These devices utilize a high-temperature composite insulation that can be applied in a variety of configurations. Thus, these heaters can be designed and manufactured using sizes and geometries that are not possible with Mineral Insulated (MI) cables.

In addition, this technology allows for scalability of power density (conductor diameter) and operating voltage (insulation thickness), while providing superior electrical properties (dielectric strength and leakage current) at temperatures of more than 760°C.



NANUQ® heater with high-temperature electrical insulation and external sheathing.

The advantages of NANUQ® heaters include:

- Stable performance at high temperatures
- No degradation due to moisture
- Numerous combinations of conductor size and geometry can be accommodated
- Insulation thickness is precisely controlled and uniform along the length of the unit
- Heaters of very long continuous length can be fabrications

NANUQ® Insulation Properties at 20˚C			
	Units	**Green State**	**Ceramic State**
Apparent density	g/cm^3	2.1	2.5
Dielectric breakdown strength @ 0.5 mm thickness	kV/mm	19.7	23.5
Dielectric Breakdown Constant	$kV/mm^{1/2}$	15.0	18.0
Compression Strength	MPa	281	> 60.0
Compression Modulus	MPa	2,770	400
Tensile Strength	MPa	224	5.8
Young's Modulus	MPa	65.8	11.7
Apparent Shear Strength	kPa	3058	369
Apparent Flexural Modulus	MPa	356	118

PROJECT STATUS / STATE OF DEVELOPMENT

CTD has demonstrated the long-term, high-temperature performance of these devices and is currently designing and fabricating custom-designed test units for application-specific oil shale recovery processes.

RELEVANT EXPERIENCE

CTD has significant experience in providing high-performance electrical insulations, and associated hardware, for use in harsh operating conditions. This includes the commercialization of materials for use at cryogenic temperatures, in high-radiation environments, and in high-temperature systems. In addition to heaters for oil shale recovery, CTD is also developing technologies for use in high-temperature downhole equipment for the geothermal energy and oil and gas markets including electric motors, power cables, and circuit boards.

OUTLOOK / FUTURE PLANS

CTD is continuing to develop custom-engineered heaters for oil shale recovery, and is also assessing the use of these systems in oil sands and enhanced oil recovery processes.

Manufacture of a NANUQ® heater

NANUQ® insulation can be designed for use at specific operating conditions

Electro Petroleum, Inc.

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COMPANY DESCRIPTION

Electro-Petroleum Inc. (EPI) has proprietary technology for recovery of oil using direct current (DC) technology – EEOR - Electrically Enhanced Oil Recovery [SM]. The company was founded in 1973 but recently obtained funding from several private equity firms and individual.

INDUSTRY ROLE

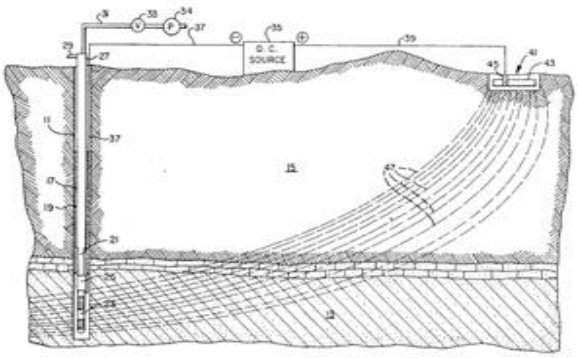
EPI has been focusing its research and technology development on the application of DC to heavy oil recovery. Recently a new patented DC electrochemical process, cold cracking, is being applied to heavy oil. The process also has applicability to oil shale in which water is incorporated into the rock matrix.

DESCRIPTION OF EEOR TECHNOLOGY

EEOR - Electrically Enhanced Oil Recovery [SM] is an emerging technology that could significantly improve heavy oil recovery at costs below other secondary and tertiary oil recovery technologies.

- EEOR involves passing direct current electricity between cathodes (negative electrodes) in producing wells and anodes (positive electrodes) either at the surface or at depth in other wells.
- The passage of the current through the reservoir heats the formation via Joule heating, reducing oil viscosity.
- Short-term EEOP field tests the Santa Maria Basin (CA) and Eastern Alberta show results of up to ten times baseline oil production. The trial resulted in increased oil gravity of produced crude, reduced water cut, increased gas production and energy content, and reduced H_2S.
- Electro-osmosis can enhance the pressure gradient toward the well bore, creating an additional drive mechanism, resulting in increased production.

EEOP Conceptual Diagram



Comparison of Baseline vs. EEOP Production

Item	Baseline	EEOP
Production Rate	5	50
Crude Oil API Gravity	8.1°	9.4°
Water Cut	45%	12%
Gas Production (scf/day)	1,750 to 2,000	3,800
Produced Gas Energy Content (Btu/scf)	1,197	1,730
H_2S Content (ppm)	2,290	4 to 40

- Electro-chemistry has been shown to degrade large molecular-weight hydrocarbons into lighter hydro-carbons, upgrading crude by reducing viscosity.
- Energy efficiency is also significantly improved over the use of conventional Cyclic Steam "huff n puff" approaches.

Energy Efficiency EEOP vs. Steam Flooding

Recovery Method	Btu/Incremental Barrel
EEOP	7,014
"Huff & Puff" Steam Flood	1,300,000
Steam Flood	4,300,000 - 7,600,000

- The technology is cost competitive with steam flooding and has much lower capital costs.
- The technology has no "thief zone" issues, no apparent depth limitations and requires no water supply. It does not use a working fluid.
- The technology is much more environmentally friendly than steam processes, as it uses little or no water and generates no emissions on site.

LOCATION OF RESOURCE HOLDINGS

- EPI has conducting a successful pilot demonstration with Deloro Resources at their Wilkie field, a 63 MM barrel oil in place field in Saskatchewan and now holds a 10% working interest in that field.
- EPI has recently signed agreements with several other oil companies to conduct pilot tests on their fields.
- Electro-Petroleum conducts research at facilities in Coleraine, MN in conjunction with the Natural Resource Research Institute of the University of Minnesota.
- Additional research is being conducted at a major university.

PROJECT STATUS / STATE OF DEVELOPMENT

The technology has been demonstrated to achieve improved production and reduced costs in applications at lab scale and in small field trial demonstrations. The developers are currently in discussions for additional pilots tests.

RELEVANT EXPERIENCE

The technology has been demonstrated to achieve improved production and reduced costs in applications at lab scale and in small field trial demonstrations. The developers are currently in discussions for additional pilots tests.

OUTLOOK / FUTURE PLANS

Electro-Petroleum is well capitalized and plans to continue the development and commercialization of EEOR.

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Eesti Energia AS / Enefit

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COMPANY DESCRIPTION

Enefit American Oil is a wholly owned subsidiary of Eesti Energia (known as Enefit for activities outside of Estonia). Enefit American Oil has acquired one of the largest tracts of privately owned oil shale in the US totaling more than 30,000 acres and containing some 2.1 billion barrels of shale oil in place. Enefit plans to develop a 50,000 bbl/d mining, retorting, and upgrading project for synthetic oil.

OIL SHALE INDUSTRY ROLE

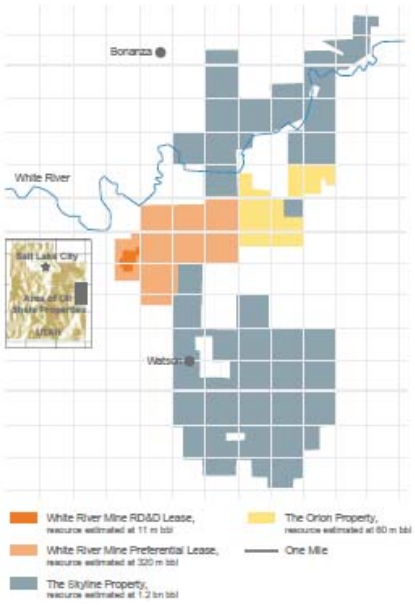
Enefit is considered a world leader in oil shale development. In Estonia, Enefit owns and commercially operates all key steps in the oil shale industry from mining, to power and oil production, and end sales to customers. Internationally, Enefit acts as either a technology-provider, licensing the patented Enefit technology or as a project developer, responsible for development from resource and feasibility assessment through technology provision, construction and operation.

DESCRIPTION OF TECHNOLOGY

Enefit's commercially proven technology allows oil extraction from fine oil shale particles. The base technology, developed by Estonian experts and patented in 2005 has operated continuously in Estonia for more than 30 years. In 2009, Enefit and Outotec formed a joint venture to undertake co-development of a new generation Enefit technology. The new Enefit technology combines Eesti Energia's improved solid heat carrier process and Outotec's Circulating Fluidized Bed technology, increasing efficiency and decreasing environmental emissions. The key benefits for Enefit technology are the following:

- **Proven**: Only operational fines technology. More than 50 years of experience developing the solid heat carrier process and 30 years of operational experience in Estonia.
- **Efficient:** Processes 100% of the mined oil shale. In addition to oil production, waste heat from the process flue gases and ash is utilized for electricity production. High calorific value retort gas as well as ash suitable for recycling for cement and other industrial uses act as additional revenue streams.
- **Clean:** Low air emissions, waste is a stable ash with less than 0.1% of organic content.
    - **CO_2** footprint is largely offset by net power production and ash usage in the cement industry as a substitute for highly CO2 intensive processed raw material, the practice widespread in Europe. Based on the Estonian case and estimations, the overall fuel life cycle carbon footprint of Enefit280 process is similar to oil sands production. Carbon capture capability can be added.
    - The oil extraction process itself is water free, though some water is needed for mining and other general industrial purposes. We support the water estimates that have come from numerous third parties, suggesting that surface retorts will require between 1-3 barrels of water per barrel of oil produced. The actual consumption depends largely on the mining and backfilling conditions, technology details and if there will be additional electricity generation from the processes.
- **Energy Independent**: Enefit is actually a net electricity producer. No external fuel such as natural gas, oil or electricity is needed. Co-produced gas can be used for hydrogen production in the oil upgrading process or for additional power generation.

TYPE / LOCATION OF RESOURCE HOLDINGS



Enefit American Oil has acquired, either directly, by option agreement or lease, a sizable acreage position totaling 30,634 acres in the Uinta Basin in Utah. The three properties are comprised of:

- The White River Mine Property: the only Federal RD&D lease in Utah
- The Skyline Property: mostly private fee title property plus some state leases through SITLA
- The Orion Property: private fee land on option

These properties contain ~2.1 billion BOE of shale oil.

PROJECT STATUS / STATE OF DEVELOPMENT

Enefit American Oil purchased 100% of Oil Shale Exploration Company (OSEC) on March 30, 2011. Enefit is now preparing a detailed plan to develop this resource and expand the RD&D lease area to include the preferential lease area. With Outotec, Enefit has already carried out a conceptual study on the Utah resource. A fresh shale sample will be tested in our R&D center in Germany to optimize the design.

RELEVANT EXPERIENCE

Enefit is the world's largest oil shale miner, producing up to 17 million tons of oil shale per year from underground and surface mines. Enefit owns and operates the world's largest oil shale fired power plants with a total capacity over 2,380 MW. In Estonia, Enefit produces > 1 million barrels of shale oil per year.

Together with Outotec, Enefit owns an advanced surface processing shale oil production technology. Enefit is building a new generation Enefit280 oil plant in Estonia, to be complete by the second half of 2012. The new plant will produce nearly 2 million barrels of oil per year, 75 M m^3/y of retort gas. and a net 35 MWe from excess heat. Construction of at least two additional Enefit280 units and an upgrader is planned to begin in Estonia in 2013, for commissioning in 2016. The upgrader will be capable of producing refinery feedstock and end use motor fuels meeting the diesel Euro 5 specifications. Enefit also has experience evaluating resources and developing green-field shale projects internationally.

OUTLOOK / FUTURE PLANS

- Enefit American Oil is preparing to develop a 50,000 barrel per day shale syncrude project which will entail oil shale mining, oil production and oil upgrading. The annual mine production at full scale is planned for approximately 30 million tons per year. Hydrotreating will be used to produce premium synthetic crude which can be pipelined to Salt Lake City refineries.
- Project development is estimated to take 6 years followed by a 3 year construction period. First oil is planned for 2020.
- The next step is for Enefit to continue the research and demonstration work on the RD&D lease in order to convert this lease to the preferential area for commercial production. This will involve confirming the resource through additional drilling and deposit modeling, developing the mine plan, testing the Utah resource in Enefit's R&D center, carrying out oil upgrading tests, starting design and adapting Enefit technology and the upgrader to the Utah oil shale.
- Enefit is also preparing for the environmental permitting process by starting 1.5 years of baseline data collection and pre-permitting work.

EnShale, Inc.

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COMPANY DESCRIPTION

EnShale, Inc. was formed as a Wyoming corporation in 2005 to pursue oil shale development. Bullion Monarch Mining, Inc. has acquired 80% of EnShale and provides support through the mining experience of its principals and financial resources from gold mining royalties. The company is interested in the business opportunity represented by oil shale in the Western U.S. but also sees oil shale as an important political and economic resource to enable U.S. energy independence.

OIL SHALE INDUSTRY ROLE

EnShale has acquired oil shale mineral rights from the State of Utah and is developing its own proprietary technology for extraction of hydrocarbons from oil shale.

DESCRIPTION OF TECHNOLOGY

EnShale's proprietary technology is based on surface retort technology protected by patents it has acquired and by pending patent applications. Key design parameters include:

- Target operating cost of less than $30 per barrel.
- Use of proven technologies rather than experimental methods.
- Use of a low cost external heat source like natural gas.
- Minimized air quality impacts by capturing flue gases for reuse in the process.
- Minimize water use, approximately 3 gallons of water per barrel of oil produced. Water is only used in dust control and cooling of the spent shale which could be recycled and used for power generation.

TYPE / LOCATION OF RESOURCE HOLDINGS

- EnShale has leases on 4,650 acres of Utah State Institutional Trust Land (SITLA) and is working to acquire additional mineral rights through acquisition of other state leases and private lands.

PROJECT STATUS / STATE OF DEVELOPMENT

- EnShale has supplemented its own mining expertise with various chemical engineering consultants including the DOE's Idaho National Laboratory.
- Conceptual design of a commercial facility has been completed with a daily capacity of approximately 21,600 tons of ore per day yielding 17,500 barrels of liquid fuels with the product mix heavily skewed to the production of diesel and jet fuels. A process simulation of this design was completed in early 2008 by INL resulting in significant progress regarding understanding of the interaction of key process blocks. Several optimization scenarios were completed to estimate resource consumption.

- The company has fabricated a pilot plant of key components in the retorting process block of the commercial design. The pilot plant will have a daily capacity of approximately 50 barrels of oil. A test plan includes collecting a number of important parameters that will impact the commercial plant design and operation. EnShale has completed its pilot plant and is currently operating the plant with a goal of confirming the process simulation scenarios. EnShale hopes to take the technology to commercial feasibility in the near future.

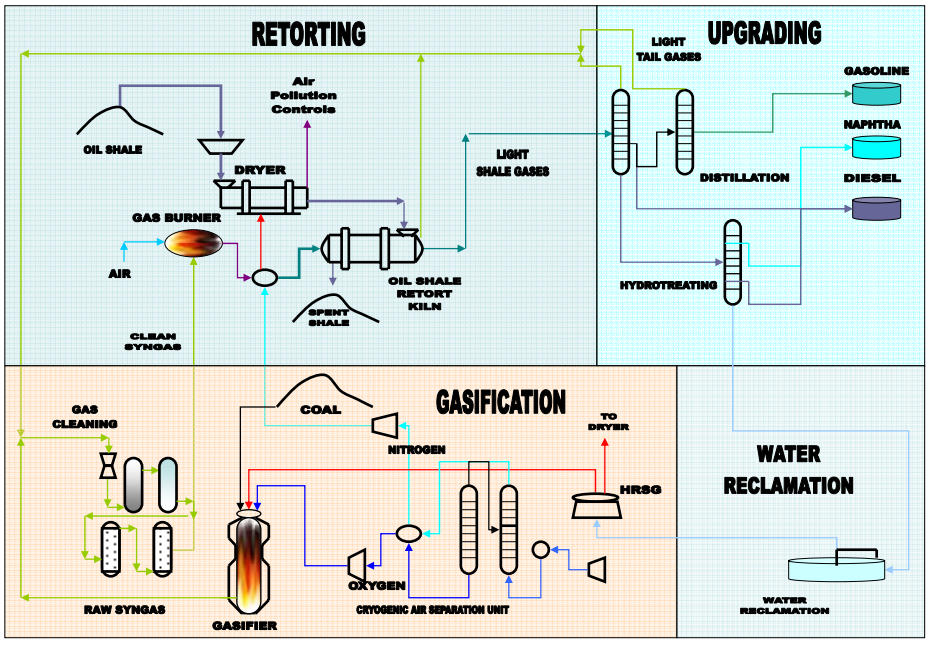
RELEVANT EXPERIENCE

EnShale's principals have extensive experience in geology and mining of precious metals, particularly gold and silver, largely in the Carlin Trend near Elko, Nevada. There is also an abundance of general management experience from a number of different industries. EnShale has supplemented this by engaging consultants experienced technologies critical to its process. Additional detail is available on individuals at its website.

OUTLOOK/ FUTURE PLANS

EnShale expects to develop a commercial facility in cooperation with financial and operating partners that have yet to be identified. Timing will depend on a number of factors including availability of capital, permitting, and contracts to be negotiated.

ENSHALE SHALE OIL PROCESS



ExxonMobil Exploration Company

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COMPANY DESCRIPTION

Exxon Mobil Corporation (ExxonMobil) is a major integrated energy company active in all aspects of oil and gas development. Based in Texas, it has operations all over the world.

OIL SHALE INDUSTRY ROLE

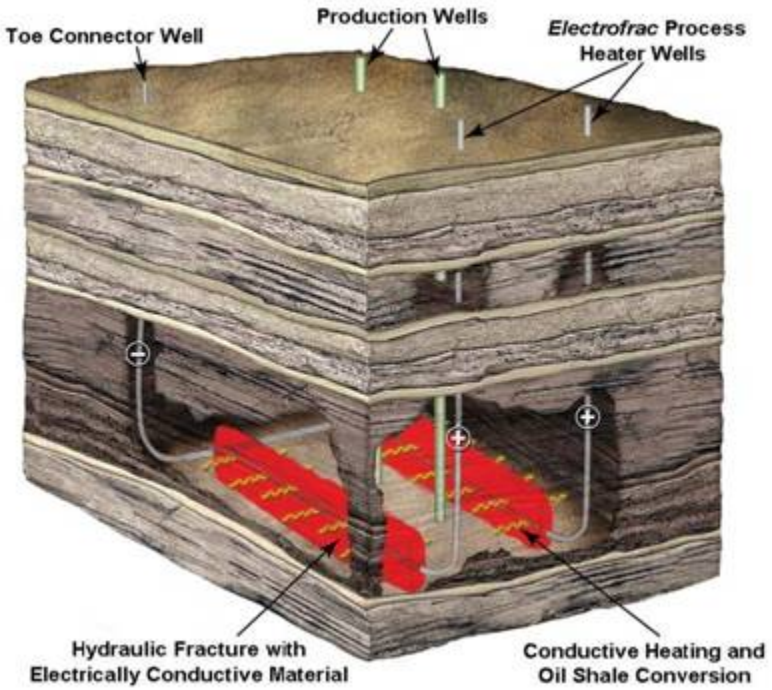
ExxonMobil has been engaged since the 1960s in the oil shale industry as a resource owner, technology developer, and project developer. ExxonMobil is currently focused on the field testing and development of in-situ technologies to produce oil from oil shale. The company also continues to evaluate advanced mining and surface retorting processes, seeking opportunities to reduce costs and environmental impact to enhance commercial feasibility.

DESCRIPTION OF TECHNOLOGY

ExxonMobil is pursuing multiple concepts for commercializing oil shale, and our leading candidate technology is the *Electrofrac*[1] process for in-situ oil shale conversion. This process has the potential to provide cost-effective recovery in deep, thick formations with less surface disturbance than other proposed methods.

The *Electrofrac* process is designed to heat oil shale in-situ by conducting electricity through induced fractures in the shale that have been filled with conductive material to form a resistive heating element. Heat flows from the fracture into the oil shale formation, gradually converting the oil shale's solid organic matter into mobile oil and gas, which can be produced by conventional methods.

***Electrofrac* Process Schematic**

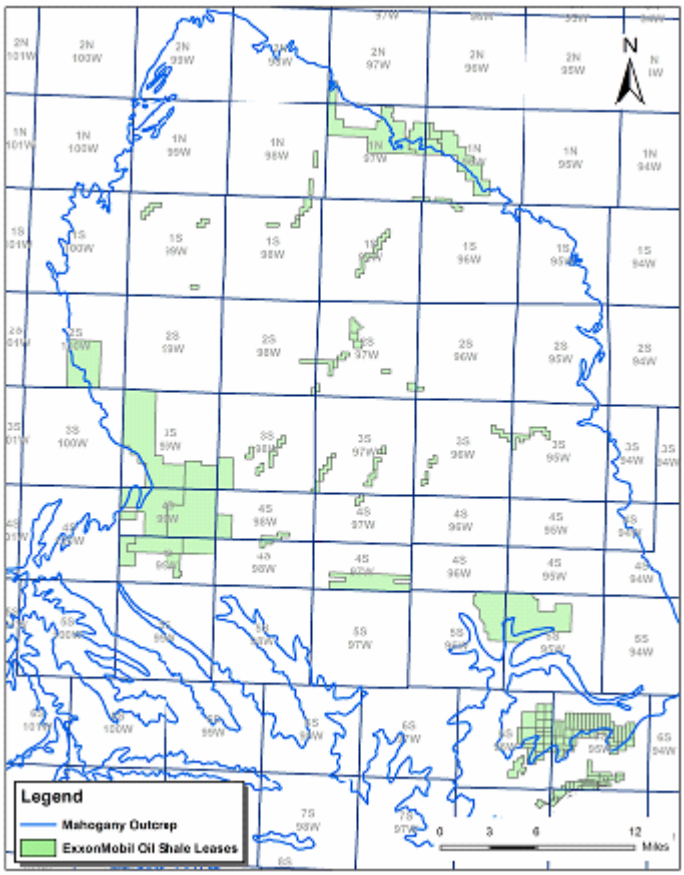


[1]*Electrofrac* is a proprietary process of Exxon Mobil Corporation or its affiliates and is the subject of one or more issued or pending patents.

TYPE / LOCATION OF RESOURCE HOLDINGS

ExxonMobil owns fee lands in the Piceance Basin in Rio Blanco and Garfield counties in Colorado, covering an area greater than 50,000 acres. This acreage was acquired primarily for development by mining and retorting.

ExxonMobil Piceance Basin Oil Shale Holdings



PROJECT STATUS / STATE OF DEVELOPMENT

ExxonMobil's research program has included laboratory work, computer modeling, and field testing of *Electrofrac* process elements at our Colony mining site in Colorado. Recent field experiments have demonstrated that an electrically conductive fracture can be built and operated for several months at low temperature. Many years of research and development will be required to demonstrate the technical, environmental, and economic feasibility of this breakthrough technology.

RELEVANT EXPERIENCE

ExxonMobil has extensive experience in oil shale technology and project development. It was an active participant in oil shale development efforts in western Colorado in the late 1970s and early 1980s. Since the 1990s, ExxonMobil Upstream Research Company has investigated over 30 different technologies to extract oil from oil shale. In addition to oil shale experience, ExxonMobil has extensive experience in developing other unconventional resources, including heavy oil and tight gas. In the Piceance Basin, ExxonMobil has demonstrated best-in-basin tight gas completion technologies to optimize tight gas recoveries.

OUTLOOK / FUTURE PLANS

ExxonMobil plans to continue research and development on the *Electrofrac* process to determine its technical and economic feasibility for commercial scale application. In December 2009, the company submitted a nomination to the BLM for a Research, Development, and Demonstration Lease in the area of the Piceance basin that is best suited to in-situ testing and development. The BLM has advanced the lease nomination to environmental assessment.

Dr. Brent C. Fryer

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COMPANY DESCRIPTION

Dr. Brent C. Fryer is a self-financed entrepreneur and developer of the Black Box Pyrolysis Processes - I & II. Acceptable business terms are being sought for a joint venture with partners capable of providing the mining/spent shale disposal and downstream raw shale oil/gas hydrotreating and processing.

OIL SHALE INDUSTRY ROLE

Dr. Fryer is an oil shale, tar sand, and diatomite/heavy oil technology and project developer.

DESCRIPTION OF TECHNOLOGY

Dr. Fryer is developing two oil/gas extraction processes—Black Box Pyrolysis Processes I & II.

Black Box Pyrolysis Process-I is an above ground process requiring the mining of raw oil shale, tar sand, or diatomite/heavy oil and the disposal or development of beneficial utilization of the de-charred spent residue. The process meets the following critical acceptance criteria.

- Recovery of 100% of both Fischer Assay quantities of raw shale oil and TOSCO Assay of raw shale gas. The raw oil is fractionated by fractional condensation within the process.
- Other than startup, the process is energy self sufficient. There is no other energy input to the Black Box Pyrolysis-I process other than the kerogen/bitumen/heavy-oil contained in the source mineral. All pyrolysis process heat is provided from oxidation of residual char and regenerative heat recovery of stored energy contained within the de-charred spent mineral residue. Surplus steam is also produced which can be used for hydrotreating raw oil, raw gas separations/clean up processing, and electrical power production. Energy efficiency (output/input) and quality of energy out are very high—exceeding any other known process. De-charring the spent shale eliminates the primary environmental impact associated with charred spent shale disposal. Greenhouse gas emissions per unit of raw oil/gas produced are minimized as a result of the high energy efficiency.
- Process-I is inherently simple, with low capital costs, and no moving parts. With the exception of feeding raw mineral and removing de-charred spent residue and product raw oil/gas it requires no operators or operating costs. No water is consumed in the process; however, raw shale connate water will be recovered and treated for use in down stream processing or spent shale disposal.
- A complete engineering and cost mathematical computer model has been developed for the process including all transport phenomena and kinetics. Economic value per unit of raw oil/gas produced is maximized as a result of the combination of maximum energy efficiency, minimum environmental impact, and minimal capital and operating costs.
- Potential Price/Cost uncertainties: (1) market price of energy, particularly crude oil/natural gas; (2) the true costs of mining, spent residue disposal, and reclamation; and (3) the true costs of downstream processing of raw oil and gas to produce refinery acceptable syncrude and pipeline quality gas. This includes hydrotreating of the raw oil to remove nitrogen, sulfur, oxygen, and heavy metals, and processing and separating the raw gases including removal of hydrogen sulfide.

Black Box Pyrolysis-II is less developed. It is an in-situ process with some limited surface disturbance, but requiring no mining. In this process, de-charred spent shale will be left underground, but its ability to contaminate any underground water will be far less than spent shale left with large amounts of residual char. Even then, the potential for groundwater contamination must be thoroughly evaluated.

- This process employs the same mathematical modeling, with modifications for underground characterization, as Process-I. It is capable of the same high energy efficiency and energy self sufficiency and recovers 100% of both Fischer Assay of raw shale oil and TOSCO Assay raw gas.
- Minimum surface disturbance, as compared to other in-situ schemes, will be obtainable. No testing of this concept has been conducted. It is not clear at this time if the required underground rubblization can be attained and the required sealing within the processing zone can be achieved with current technology.

TYPE / LOCATION OF RESOURCE HOLDINGS

Dr. Fryer currently owns no private oil shale, tar sand, or diatomite/heavy oil mineral rights, nor state or Federal leases. His 1st Round BLM RD&D Program lease application was rejected. A 2nd Round BLM RDD Program lease application was completed prior to program termination. No application was made for the Modified 2nd Round BLM RDD Program BLM due to poor lease terms and low probability of lease award to a small business entrepreneur. Three hundred tons of oil shale has been provided by the BLM from material previously moved from the Prototype U-A White River Mine stockpile. This has been combined/partitioned with shale from other developers in a cooperative effort for test purposes. Dr. Fryer may access mined shale made available by OSEC under the terms of its BLM lease to operate the White River Mine.

PROJECT STATUS / STATE OF DEVELOPMENT

- All fundamental aspects of the Black Box Pyrolysis–I technological concept have been demonstrated and refinements are underway. Phase 1 field tested a first of a kind 2 ton/day unit and produced 2 barrels of raw shale oil but without removal of spent shale char. Phase 2 field tested a smaller unit on Green River oil shale, Australian oil shale, and California Diatomite/Heavy oil producing raw oil and gas, de-charred spent shale and diatomite. Energy self sufficiency was achieved utilizing oxidation of the residual char. Phase 3, completed in 2010, involved an even smaller scale unit but resulted in failure due to overheating, no char combustion, and spent shale particle carryover. Phase 4 design is expected to resolve the Phase 3 failures experienced and is expected to commence late summer of 2011. These small scale tests are director towards demonstrating long reliable run times and refined measurements of Fischer and TOSCO assay recoveries on raw oil and gas. The Phase 3/4 equipment design scale has been reduced to the minimum possible size to facilitate transport to demonstration sites and to conduct on site mineral hydrocarbon assays—yet still capturing all concept features and principles. Phase 5 will demonstrate larger units up to a maximized economy of scale unit of 1000 tons (barrels)/day.
- No testing has been conducted on the Black Box Pyrolysis II technology. It is not yet clear if the required underground rubblization can be attained and the required sealing within the processing zone can be achieved with current technology.

RELEVANT EXPERIENCE

Dr. Fryer is a Mechanical Engineer (Sc.D. from MIT) with 50 years of experience in energy/process/water conservation industries. He has worked on almost all aspects of all known energy conversion processes. He was lead mechanical engineer on the TOSCO pyrolysis unit for Exxon USA's $6 billion Colony Oil Shale Project.

OUTLOOK / FUTURE PLANS

Further tests with the more refined and optimized Black Box Pyrolysis Process-I design and operating conditions are planned. The Phase 4 is currently completing fabrication and testing and unit testing will follow shortly. Joint venture opportunities continue to be pursued.

General Synfuels International

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COMPANY DESCRIPTION

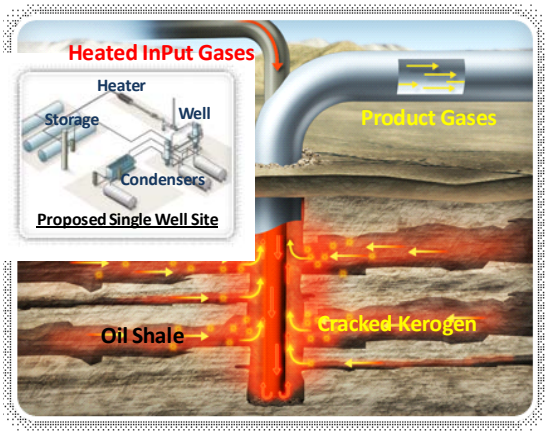
General Synfuels International, Inc. (GSI) – a subsidiary of Earth Search Sciences, Inc. – is dedicated to delivering a green transformation to fossil fuels development. The company has developed a patented, environmentally-friendly, energy self-sustainable and economically-viable, zero-footprint process to recover oil and gas products from oil shale, oil sands and heavy oil.

OIL SHALE INDUSTRY ROLE

GSI is engaged in technology development and intends to pursue project development to produce oil and gas products from domestic oil shale and oil sands resources.

DESCRIPTION OF TECHNOLOGY

GSI has developed a breakthrough *in-situ* gasification technology for recovering oil and gas products from oil shale and oil sands deposits in an environmentally friendly, energy self-sustainable and economically viable manner. Differentiators from other processes include heating and recovery from the same well with a negative pressure effluent system (thermal vacuum process), transportable infrastructure and extraction independent of "Mahogany Zones." Upgraded products are produced, no external energy is required and all gases, including CO_2, are recovered.



The high temperature and reduced oxidative environment will leave the oil shale bearing layer with expanded high surface area charred pores and increased permeability making it an excellent location for enhanced geological CO_2 sequestration.

The GSI process is a conceptually simple system. Gases are superheated in a burner system on the surface, the oxygen content carefully controlled to prevent sub-surface combustion. The superheated gases travel down the well and interact with the kerogen to crack it and to bring hydrocarbon products to the surface in the form of hot gases. The gases are then condensed to yield light hydrocarbon liquids and gaseous products.

Environmentally Friendly: The GSI's process offers minimal environmental impact: 1) The GSI process does not consume any water in the process of gasification. Water is only used for cooling of the condensers and with reduced evaporative losses water consumption is at a minimum. 2) Inherent in the GSI negative pressure extraction process is a low risk of ground-water contamination. Where potential groundwater contamination is possible GSI has patented new groundwater isolation and if needed aquifer remediation capabilities, 3) Recycled and recovered air emissions result in a reduced carbon footprint. 4) No mining is involved with this technology, no tailings, no waste, 5) All surface components are built on skids and surface planking to minimize soil damage, reduce footprint and enhance transportability, no

concrete pads etc. 6) GSI is aggressively implementing a range of avoidance and other mitigation and wildlife support efforts to minimize any potential wildlife (animal and/or plant) impacts.

Energy Self-Sustainable: The process uses its own products as fuel feed stock to generate perpetual heating, making it energy self-sustainable with an excellent net-energy balance.

Market Ready Products: The process performs some upgrading as a function of the system, thus generating market ready products, which include high API light and medium crudes, hydrocarbon gases, hydrogen, CO_2, nitrogen, and water.

Expanded Recovery: The GSI process is not limited to extracting products only from the "Mahogany Zone" but allows for recovery from the entire well cross-section, making possible cost-effective recovery from many areas not useable by other processes. The GSI heating and recovery systems are also well suited for product recovery from oil sands deposits. The GSI *in-situ* gasification technology can gasify and recover products from oil shale and oil sand deposits as deep as 3,000-plus feet.

CO_2 Geo-Sequestration Capabilities: The GSI process *post* recovery leaves behind a unique sub-surface environment. Where kerogen was cracked and products removed a matrix of permeable charred pores now remain – providing incredibly high surface area environments for geological CO_2 sequestration by adsorption with low pressure injection. This affords a very secure environment for CO_2 geo-sequestration. Potential CO_2 geo-sequestration volumes should exceed recovered product volumes by two to three times, making the depleted GSI wells excellent receptacles for CO_2.

LOCATION OF RESOURCE HOLDINGS

GSI has secured test sites in private holdings near Rock Springs, Wyoming and access to additional lands in the Piceance Basin in Colorado. GSI is currently pursuing additional oil shale mineral rights. Opportunities have been identified near Vernal, UT, Rock Springs, WY and; Rifle, CO.

PROJECT STATUS

GSI has completing initial site exploration efforts and is completing the engineering design for a single well R&D pilot plant. The R&D pilot plant fabrication is nearing completion.

RELEVANT EXPERIENCE

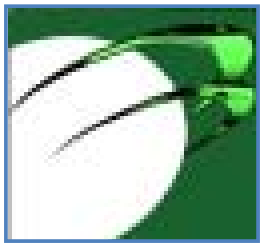
GSI has assembled a multi-skilled team of professionals to further the understanding of the sciencc and engineering behind the process during the pilot phase and subsequent development phases. GSI has assembled a distinguished Advisory Board of North American energy industry and environmental professionals GSI has also initiated partnerships with industry and academia to strengthen critical areas.

OUTLOOK / FUTURE PLANS

It is GSI's intent to develop a fully viable technology and production capability. After successful completion of field testing including groundwater and wildlife protection strategies, GSI intends to continue design and implementation of commercial prototype immediately thereafter. Long term plans include the commercial scale production in the land resources currently available.

GSI intends to pursue development efforts for CO_2 algae remediation processes, CO_2 geo-sequestration potentials, heat and hydrogen co-generation, and wind and solar plant supporting energies. In addition, future R&D efforts will expand the application of the GSI *in-situ* gasification process beyond the Green River Formation to look at developing oil shale, oil sands and eventually coal resources around the country/world.

Preliminary analysis indicates that the development of production facilities using the GSI technology will help attain the Administration's objective of creating jobs and becoming an energy independent nation.



Heliosat, Inc.

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COMPANY DESCRIPTION

Heliosat specializes in low cost, space based solar power access to space solutions, a key element of enabling low-cost space-based solar power systems. Heliosat performed broad systems analysis on Energy Independence and Security Act of 2007 (EISA) - compliant, cost-effective methods for extracting oil from shale with a matrix employing space-solar power. Heliosat teamed with the University of Texas Dallas, and other aerospace industry members.

OIL SHALE INDUSTRY ROLE

Heliosat works with team members to provide electrical power using a radio frequency – critical fluidized extraction process. This process employs a carbon-emission-free source of energy for an in-situ extraction process. This enables a cost-effective source of electrical power for extractive processes.

DESCRIPTION OF TECHNOLOGY

Heliosat's technology is a low-cost space access system employing hybrid lift technology that solves key cost-reduction features for a space based solar power system capable of supplying large-scale power needs to achieve energy independence.

TYPE / LOCATION OF RESOURCE HOLDINGS

- Heliosat has no resource holdings.

PROJECT STATUS / STATE OF DEVELOPMENT

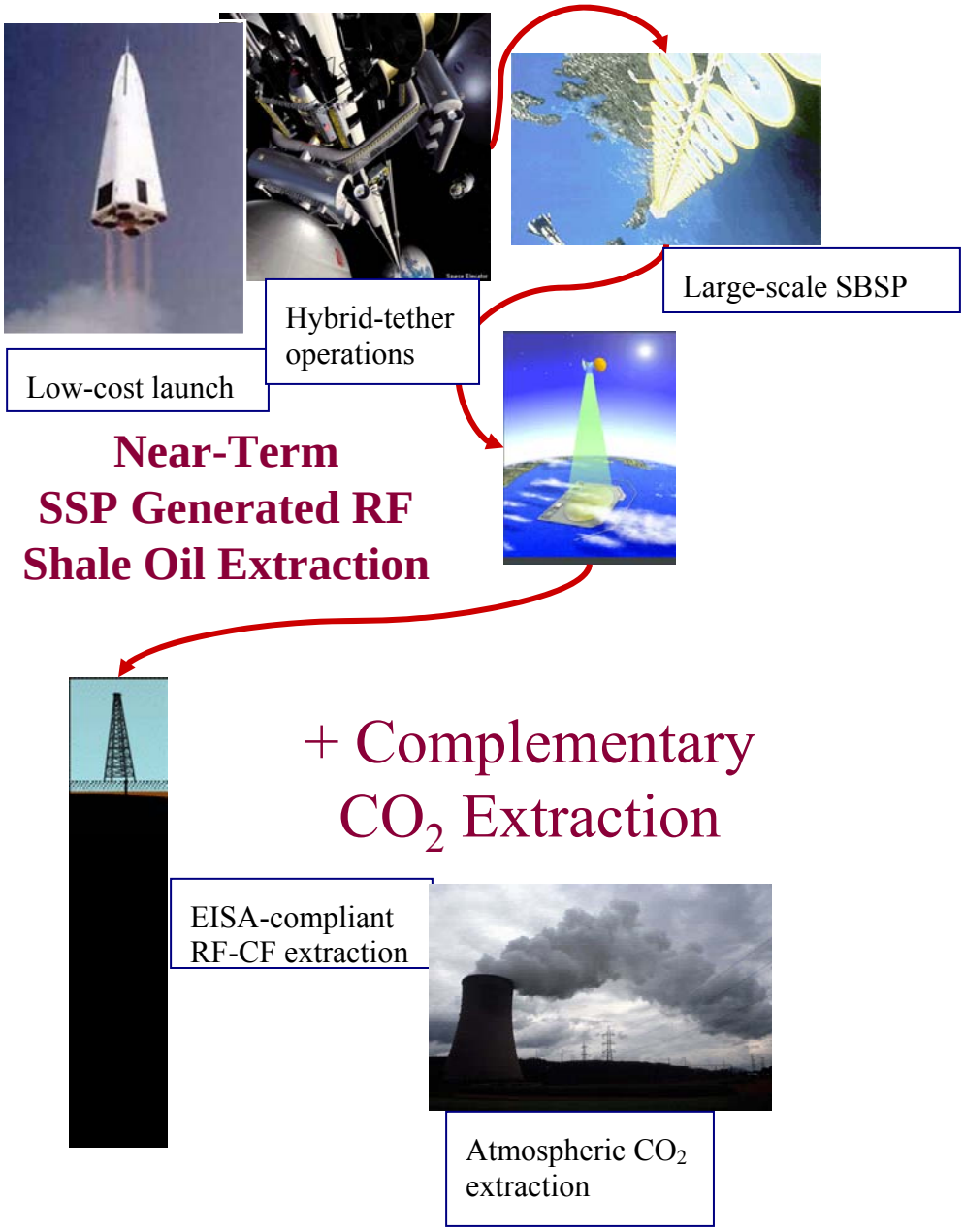
- Conceptual design of a reusable space vehicle has been completed.

RELEVANT EXPERIENCE

Heliosat includes team members with 30+ years of aerospace experience and has teamed with several universities. In addition, they are also forming partnerships with relevant players in space solar power community.

OUTLOOK / FUTURE PLANS

Future plans include performing a launch architecture systems design study and generating development plans. The company will also work with partners on space solar power development projects and initiate systems design/development with partners.



HELIOSAT AND ITS PARTNERS PROVIDE AN END-TO-END SOLUTION TO PROVIDING A SOURCE THAT PROVIDES FOR *COST-EFFECTIVE* GREEN ENERGY THAT ENABLES EISA-2007 COMPLIANT EXTRACTION OF OIL SHALE.

Imperial Petroleum Recovery Corp

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COMPANY DESCRIPTION

Imperial Petroleum Recovery Corporation (IPRC) is a Dayton, Texas based public company that has developed a unique patented Microwave Separation Technology (MST) to recover oil from emulsions found in upstream, downstream, maritime, maritime (bilge) and renewable energy (biodiesel/ethanol) operations. Since their inception the crude oil production and refining industries have been forced to deal with emulsions that inhibit throughput and cause a wide range of maintenance concerns as they pass through the refinery. Eventually these emulsions form waste sludge that tie-up valuable tank capacity and create costly tank cleaning and other environmental liabilities. MST is designed to address these problems by providing an effective and economic way to handle emulsions on a continuous basis before these liabilities are incurred without the use of chemicals. Handling these emulsions with microwave energy has been demonstrated to generate a sizable increase in throughput at the refinery.

OIL SHALE/TAR SANDS INDUSTRY ROLE

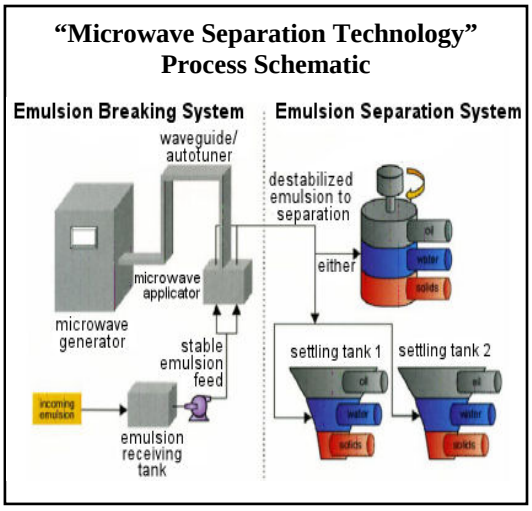
IPRC's goal is to become a leader in developing and marketing innovative commercial radio frequency energy applications for use within the petroleum and associated industries to treat emulsions containing oil, water, and solids. MST may be added to existing technology to enhance production processes. Units can process from 150 barrels per day (bpd) up to 5000 bpd on a continuous basis.

The emerging oil shale industries have challenges similar to those in the crude production industry, compounded by additional water-intensive separations processes. MST helps to eliminate bottlenecks, increase production, reduce energy requirements, and reduce waste generation, storage and treatment costs. As a technology developer, Imperial may devise other products that can enhance oil shale production in terms of effectiveness, efficiency and by implementing environmentally sound practices.

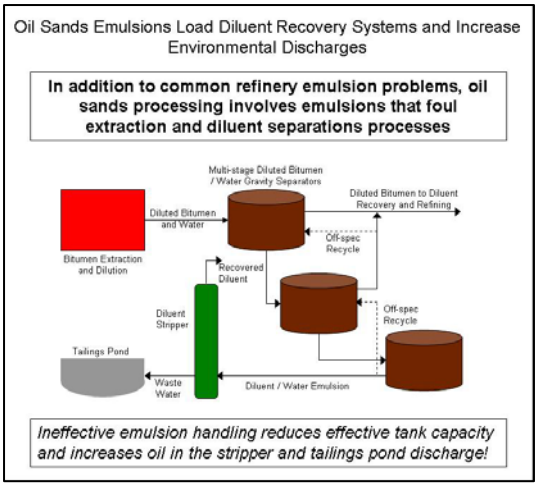
DESCRIPTION OF TECHNOLOGY

The company utilizes a proprietary, patented process using high-energy microwaves called Microwave Separation Technology ("MST") for efficiently breaking emulsions found in refineries, oil production fields, renewable energy plants, shale oil and tar sands production sites and bilge from various ships with minute traces of oil. The process works without the use of chemicals which reduces cost, recapture and disposal issues.

- Industrial emulsions are stable, undesirable byproduct mixtures of oil, water and solids that occur in many industries and cause a broad range of operating inefficiencies that limit production capacities, increase operating costs and result in the production of environmental wastes.



- MST is a simple add-on system that will facilitate the continuous, automated separation of these emulsions into usable products that will result in reduced environmental wastes and increased production from existing plants.
- MST increases the throughput capacity of equipment, reduces maintenance and environmental costs, and increases useful byproducts available for sale or other uses.
- MST is a simple and automated add-on system that exploits microwave energy to selectively destabilize the polar and charged molecules that cause most waste emulsions to form.



TYPE/LOCATION OF RESOURCE HOLDINGS

- Imperial is a technology developer working to market its product, the company does not have resource holdings but is open to licensing and marketing agreements with other industry partners.

PROJECT STATUS / STATE OF DEVELOPMENT

Imperial has developed a commercial scale 150 Bbl/D mobile unit that contains power generation, centrifuge separators, water cooling capability and a laboratory for emulsion analysis and available for self-contained field trials both in a refinery, production field or other suitable research location.

RELEVANT EXPERIENCE

Imperial treated heavy California crude oil for three years at the ExxonMobil refinery in Torrance, CA without the use of chemicals and avoided chemical-related liabilities. The technology eliminates the need to adjust chemical dosages as the emulsion composition varies by providing robust emulsion breaking on a wide range of emulsions. The MST System is a continuous, automated and unattended real-time operation which makes proactive low-cost emulsion breaking and instantaneous phase separation possible into water, solids and usable oil.

Imperial found the benefits of the MST project at Torrance to be impressive: The overall capacity of the crude complex increased from 135K bpd to 155 bpd with MST contributing to this increase in throughput; desalter stability increased and heavier crude streams were able to be processed. BS&W in the recovered oil was reduced to <2% resulting in increased preflash temperatures and decreased pressure in the crude unit. Significantly less water traffic was experienced in the atmospheric tower and its overhead system resulting in decreased pressure at the top of the tower leading to increased production and a reduction in operating costs. Users of MST can anticipate a reduction in corrosion, erosion and fouling in the crude complex and increased flexibility in the daily running of the units. A subsequent unit was sold to Esso for use at their production fields at a project in Chad.

OUTLOOK / FUTURE PLANS

I two-year test of the technology began at a refinery location in May 2010 with a major multi-national oil company; to be followed with a second phase test at an off-shore platform location. Interest has been generated for utilizing MST within the Marine industry to reduce the volumes of marine-generated bilge and tank/tanker heel wastes requiring offsite remediation and discussions continue with another major oil company at their processing facilities in SE Asia. IPRC is currently evaluating participation in a test using MST in the production of Algae for the production of an aviation blended biodiesel at a test program in Texas.

Independent Energy Partners

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COMPANY DESCRIPTION

Based in Denver Colorado, Independent Energy Partners, Inc. (IEP) is pursuing the development of unconventional hydrocarbon resources, including oil shale resources already under its control utilizing patented breakthrough in-situ production technology. IEP owns the exclusive rights to a broad, patented Geothermic Fuel Cell™(GFC™) technology that can dramatically lower the cost of oil and gas recovery from oil shale, coal, tar sands and heavy oil deposits while producing "green" electricity as a byproduct; all with minimal environmental impact and small carbon footprint.

INDUSTRY ROLE

IEP is engaged in the oil shale industry as a resource owner, technology developer and project developer. IEP is actively pursuing mineral interests and JV relationships in oil shale and coal deposits in Colorado, Utah, Wyoming and locations in Canada on which to deploy its proprietary GFC technology to produce oil, other hydrocarbons and electricity.

DESCRIPTION OF TECHNOLOGY: IN–SITU GEOTHERMIC HYDROCARBON RECOVERY

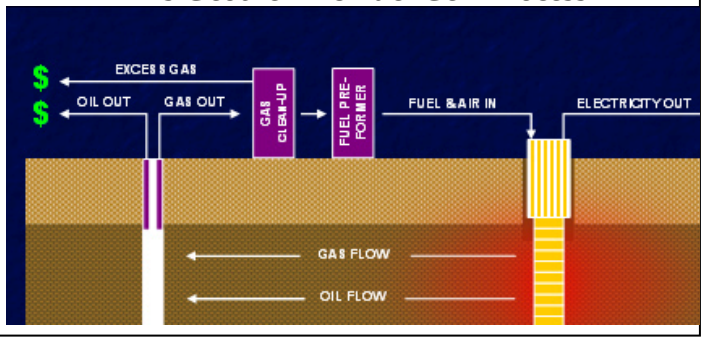
Geothermics: The application of heat to the ground has a long history. Originated in Sweden during World War II to produce oil from oil shale, the use of Geothermics has since expanded to applications to remove toxic wastes and to produce fuels from heavy oil, tar sands and other resources.

Heating: In the IEP application, rather than a burner or electric heater, a high-temperature fuel cell stack is placed in the formation to heat the ground. As the ground is heated, hydrocarbon liquids and gases are released from the resource into production wells. A portion of the gases are processed and returned to the fuel cell stack with the balance available for sale. After start up, the application becomes self-fueling from a portion of the gases produced during the process. The GFC will have a net energy ratio of 18 (approximately 18 units of energy produced per unit of input) when primary recovery is combined with residual char gasification and resulting syntheses gas.

Uniform Heating: Geothermic fuel cells heat formations by solid-to-solid conduction more efficiently than non-conductive applications. GFCs produce heat at a uniform rate along its length heating the formation uniformly from top to bottom resulting in far greater yields and simplified production cycles.

Energy Efficiency: Unlike other conductive approaches, geothermic fuel cells do not consume vast amounts of energy. Instead of consuming hundreds of kilowatt hours (Kwh) of electricity, geothermic fuel cells would yield approximately 260 Kwh per barrel of oil recovered as a by-product of the process.

IEP's Geothermic Fuel Cell Process



Economics: The operating costs of a GFC system are projected to be significantly lower than other heating approaches. Capital and operating costs are estimated to be approximately $40 per barrel, decreasing to as low as $20 per barrel when offset by revenues from the sale of surplus gases and electricity.

Environmental Benefits: The 'Cleantech' advantages of an in-situ GFC closed-loop system include minimal environmental impact and small carbon footprint.

- GFCs produce minimal air emissions. With no combustion – fuel cells produce electricity through an electrochemical reaction – there is negligible production of NOx, SO_2, particulate or toxic emissions.
- GFCs are essentially self-sufficient in process water. They produce steam in the exhaust, which is re-circulated through fuel pre-reformers, obviating most if not all needs for outside process water.
- GFCs produce minimal surface impact compared to mining and retorting operations that create large quantities of waste "tailings" and dust. Since GFCs utilize a true "in-situ" approach, with the ore body left in place relatively undisturbed, waste disposal problems are eliminated

IEP's GFC technology is expected to be well received by those who seek to balance the growing demand for energy with environmentally friendly processes.

TYPE / LOCATION OF RESOURCE HOLDINGS

IEP has secured mineral lease agreements with private land owners for the exclusive right to develop oil shale resources on property located in Rio Blanco County near the richest part of the Piceance Creek Basin. The properties contain an estimated 1.9 billion barrels of oil and oil equivalents. An additional 2.1 billion barrels of oil shale resource are under negotiation on private lands in Colorado.

PROJECT STATUS / STATE OF DEVELOPMENT

During 2008, IEP entered into an agreement with TOTAL Petroleum. This strategic relationship includes both financial and technical support. IEP engaged Battelle, operator of DOE's Pacific Northwest National Lab to complete designing, engineering, analysis and modeling towards commercialization of the GFC technology and related applications. Initial work has been completed with GFC design ready for prototype fabrication, lab, bench and field tests. TOTAL has exercised its option under current agreements to participate in on-going funding of commercialization efforts. IEP and Uintah Resources Inc. have formed a joint venture in connection with the Uintah Gateway project. The new JV provides for the development of oil shale resources and includes mid-stream upgrader/refinery and pipeline to market for oil production from IEP's leases in Colorado. Patents have been issued on IEP's GFC technology and applications in both the United States and Canada.

RELEVANT EXPERIENCE

IEP's management team has broad entrepreneurial, technology and project development experience in the energy industry. President and CEO, Alan K. Forbes, has launched and grown energy ventures that include advanced power generation systems and control systems. He has held senior level management positions with leading engineering firms and has led major energy projects. Marshall T. Savage, Vice President is the inventor of Geothermic Fuel Cell. He has technology development responsibility, including ongoing patent applications, design refinement and prototype development. IEP is also working with industry partners who are leaders in their respective fields.

OUTLOOK / FUTURE PLANS

IEP's development plan estimates prototype development and testing of the GFCs for commercialization to be achieved within 24-30 months.

James Q. Maguire, Inc.

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COMPANY DESCRIPTION

James Q. Maguire, Inc. is a small independent oil and gas development company located in Norman, Oklahoma. It is primarily engaged in oil and gas production and in drilling operations.

OIL SHALE INDUSTRY ROLE

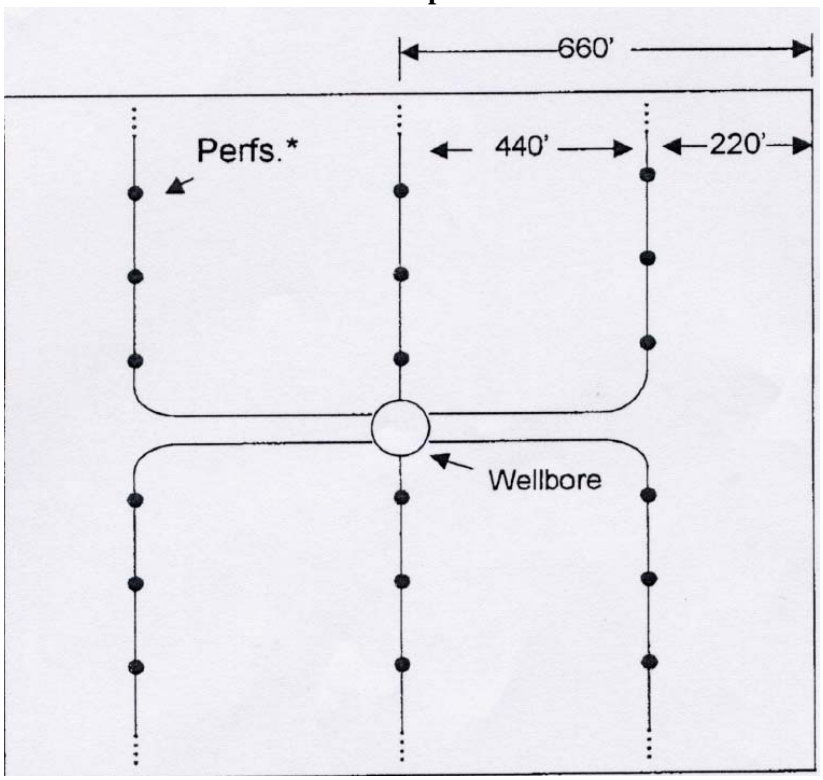
James Q. Maguire Inc. is involved in the oil shale industry as a technology developer with a patent pending. The firm has a patent pending operation which it believes is superior to any described in-situ method to date and which he believes will be a "showstopper" solution to a successful and economical oil shale in-situ production operation. He owns no shale oil acreage, but is looking for financial participants to develop his patent pending method.

DESCRIPTION OF TECHNOLOGY

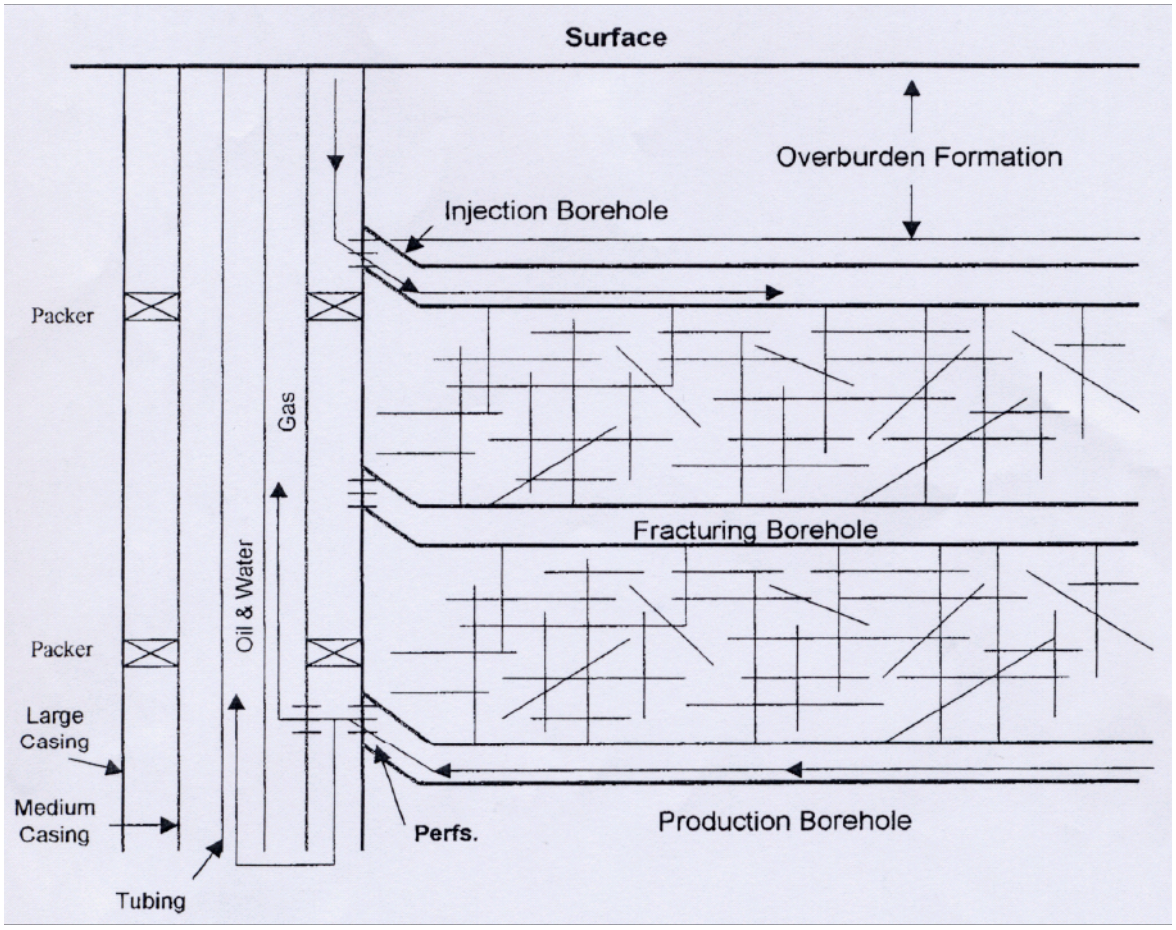
Maguire's patent pending in-situ process for the production of shale oil:

- Involves drilling a "motherbore" vertical well bore and from it six horizontal fracturing boreholes and six injection boreholes above the fracturing boreholes and six production boreholes below.
- The crux of the "Maguire Process" is a fracturing method, which will end up creating a "spider web" fracture system so that a very large area is created to apply heat to the oil shale reservoir.
- This fracturing process consists of injecting very large amount of liquid nitrogen at very high rates into the horizontal fracturing boreholes.
- If its volume is confirmed, liquid nitrogen will build up to pressures in excess of 12,000 psi. In fracturing, the volumes will expand but if the volume of injected liquid nitrogen and the very fast injection rate exceeds the volume of propagating fractures, then pressures two to three times the propagation fracture pressure will result in perpendicular fractures, which in turn will have perpendicular fractures so that a "spider web" fracture system is created.

Areal Perspective



Cross-Section View



James W. Bunger Associates, Inc.

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COMPANY DESCRIPTION

JWBA provides technology, design, engineering, and product development services to the petroleum, chemical and environmental industries. The Company specializes in design of processes for recovery and upgrading unconventional resources; oil shale, tar sands and coal. The Company's Z-BaSIC™ analytical method and software, provides molecular level information for first-principle modeling of separation and conversion processes. Dr. Bunger and his staff have designed, constructed and operated more than a dozen process development units for recovery, extraction and upgrading of products from unconventional resources.

OIL SHALE INDUSTRY ROLE

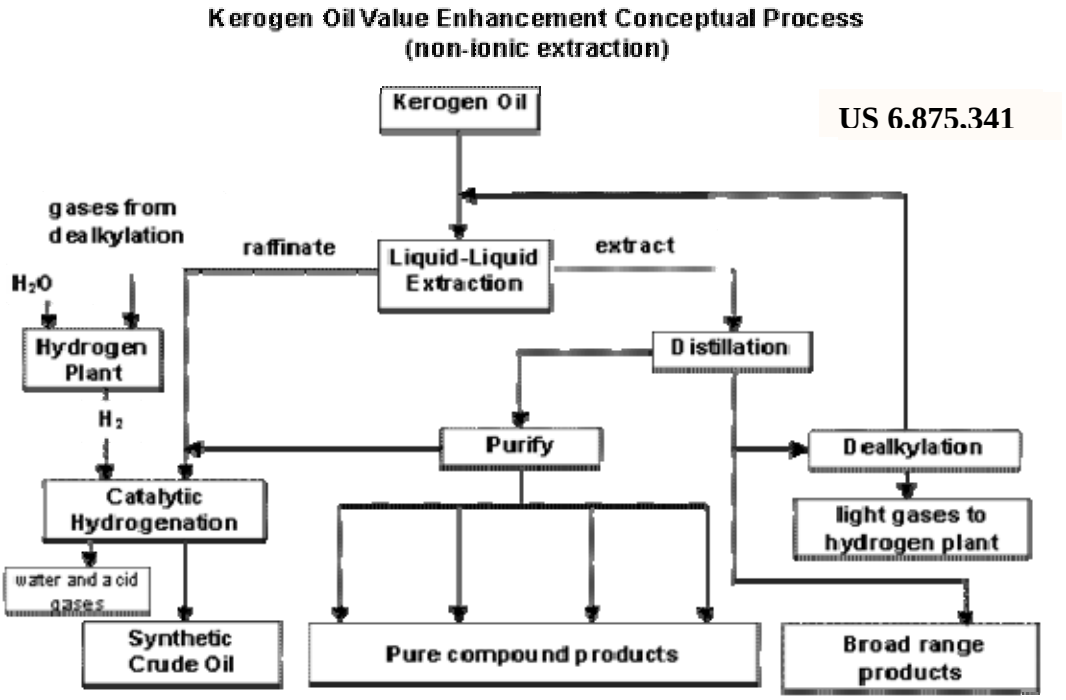
JWBA has developed Value-Enhancement Process (VEP) technology concepts for upgrading of shale oil to a petroleum refinery feedstock, commodity products and specialty chemicals. The concepts have been proven at the semicontinuous and batch process levels. The Company and its principals have been active in oil shale and tar sand development for more than 40 years and serve as consultants in this field to both government and industry. JWBA holds a dozen patents and other intellectual property in the field and is actively marketing licenses for project development.

DESCRIPTION OF TECHNOLOGY

Value Enhancement Processing: The essential feature of the company's patented VEP technology is the highly selective extraction of nitrogen heterocyclic compounds from raw shale oil. This extraction results in a heteroatom-rich extract and a heteroatom-lean raffinate. The extraction step, a simple adaptation of commercial lube-oil extraction, upgrades the economic value of both sides of the separation.

- The extract is refined to produce commodity products and specialty chemicals.
- The raffinate, combined with miscellaneous streams from refining of the extract, are catalytically hydrotreated to obtain a premium refinery feedstock. By first extracting the majority of heteroatoms, the hydrotreating step is relatively easy and inexpensive. The resulting oil is high in mid-distillate yield, bottomless, and low in sulfur and nitrogen content.
- The key to project viability is the discovery of high-value products contained in raw shale oil and a process sequence that focuses on a few, high-volume specialty and commodity products. As the technology matures, additional specialty products may be developed from the heteroatom-rich shale oil.

Z-BaSIC™: Supporting its process and product development activities, the Company has developed a proprietary Z-BaSIC™ methodology for digitizing molecular composition of oils and end-use products and for estimating properties of these materials for application to process optimization.



TYPE / LOCATION OF RESOURCE HOLDINGS

The Company believes that near-surface processing will provide the highest yield and afford the lowest economic and environmental risk for recovery of oil from oil shale. The Company has pursued control of resources that are amendable to surface mining.

Examples of Hydrotreated Raffinate and Light Extract from Value Enhancement Process

PROJECT STATUS / STATE OF DEVELOPMENT

- The Value-Enhancement Process technology is at the stage where pilot plant verification of the commercial design basis is warranted.
- The Z-BaSIC™ methodology is functional and available to support these developments.

OUTLOOK / FUTURE PLANS

JWBA is continuing research, development, and demonstration efforts on its VEP technology. The Company is looking to other developers (for example Red Leaf Resources) for the production of the raw shale oil. The Company is marketing an exclusive license for VEP to potential refiners of raw shale oil. JWBA believes that the first refiner to offer low-cost nitrogen-based commodities from shale oil will capture worldwide markets and create an inherent barrier to entry for others that may attempt to follow.

MCW Energy Group

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(Formerly listed under FirsTech Investments Ltd.)

COMPANY DESCRIPTION

MCW Energy Group is a Canadian holding company involved in oil production/distribution and oil sands recovery technology. Its two principal portfolio companies include; MCW Oil Sands Recovery, LLC, an oil sands production company with an oil sands lease and proprietary oil sands extraction technology, based in Utah. The second company is the California-based McWhirter Distribution Company, established in 1938, a leading, independent distributor of branded and unbranded gasoline and diesel products throughout western United States.

Utah contains over 32 billion barrels of oil throughout the state in 7 major deposits. The deposits pictured here are located in the prolific Asphalt Ridge Region, the state's third largest deposit totaling over 1 billion barrels of oil. (Source: USDOE and several subsequent studies available to the public.)

DESCRIPTION OF TECHNOLOGY

After reviewing several oil sands technologies at several generational stages, MCW has developed its own proprietary technology with improved hydrocarbon extraction levels, utilizing benign solvents within a closed-loop system, resulting in no greenhouse gases and oil extraction at commercially viable production costs. The oil from oil sands extraction is derived from a continuous flow/feed system. The technology requires no water during the process. No high temperatures or high pressures are needed. It has been proven to be economically viable and is capable of extraction up to 98% of hydrocarbons. MCW's technology is scalable and extremely mobile, an important factor for lease geology where site preparation techniques will vary based on volumes of

near-surface and below-surface hydrocarbon-bearing oil sands. Set-up times are estimated to be less than two days per location.

LOCATION OF RESOURCE HOLDINGS

MCW's 1138 acre oil sands lease is located within the Uintah Basin, in the heart of the Asphalt Ridge Region, where oil and gas development has been an on-and-off resource activity since the mid-1970's largely dependent on the fluctuating prices of oil in world markets. The lease contains an estimated proven/probable resource of 50+ million barrels of oil (USDOE Study and a recent independent consultant's report). The deposits, mostly close-to-surface, are conducive to the type of oil extraction process that MCW plans to deploy. (Deposits range from surface to 20 feet to 600 feet. Porosity: 27%, Richness varies from 100 to 300 barrels of oil per acre/foot. Previous infield testing yielded 1.3 bbl. oil per ton of oil sands materials. API ranges are excellent from 14 API to 19 API.)

PROJECT STATUS / STATE OF DEVELOPMENT

MCW has recently appointed its extraction unit fabricators and suppliers. Purchase orders have been signed and the major components will be manufactured in accordance with MCW's proprietary design elements and shipped to Utah starting in September, 2011 in preparation for production and assembly. The Company expects that its first extraction unit will be ready for assembly onsite in late October or November, weather permitting. For further progress during 2011-2012, please contact MCW.

In order to streamline the various approval processes, the Company has appointed a geologic team based in Utah which will provide consulting services with the compilation of geologic information and will identify existing resources and their specific developmental areas. They will provide a base map outlining land status and 'best parcel' identification for extraction purposes and oil extraction plant sites. MCW has also appointed a Utah-based environmental consulting group which will provide counsel for all facets of resource development, including regulatory compliance, permitting, ecological baseline studies, environmental due diligence, audits and mine permitting.

OUTLOOK / FUTURE PLANS

Once MCW has completed the assembly of its initial extraction unit onsite in Asphalt Ridge, the Company expects to generate revenue within two months of the unit's setup and satisfactory operation, subject to government approvals and permit stages. At the outset, production is expected to generate a minimum of 250 barrels per day. MCW will then complete a feasibility study on the numbers of extraction units required on its initial oil sands lease. Additional units will be fabricated to meet production targets, as well as added units for other new leases as they are acquired. The Company's processing costs are within an excellent range of $ 30.00 to $40.00 per barrel, which ensures a profitable return to MCW, even if oil prices slip below their current high levels.

Cleaned sand, before and after MCW's proprietary, environmentally-friendly oil sands extraction process. These sands may be replaced back where they were situated or sold as clean sand materials. Over 98% of hydrocarbons have been removed

Mountain West Energy

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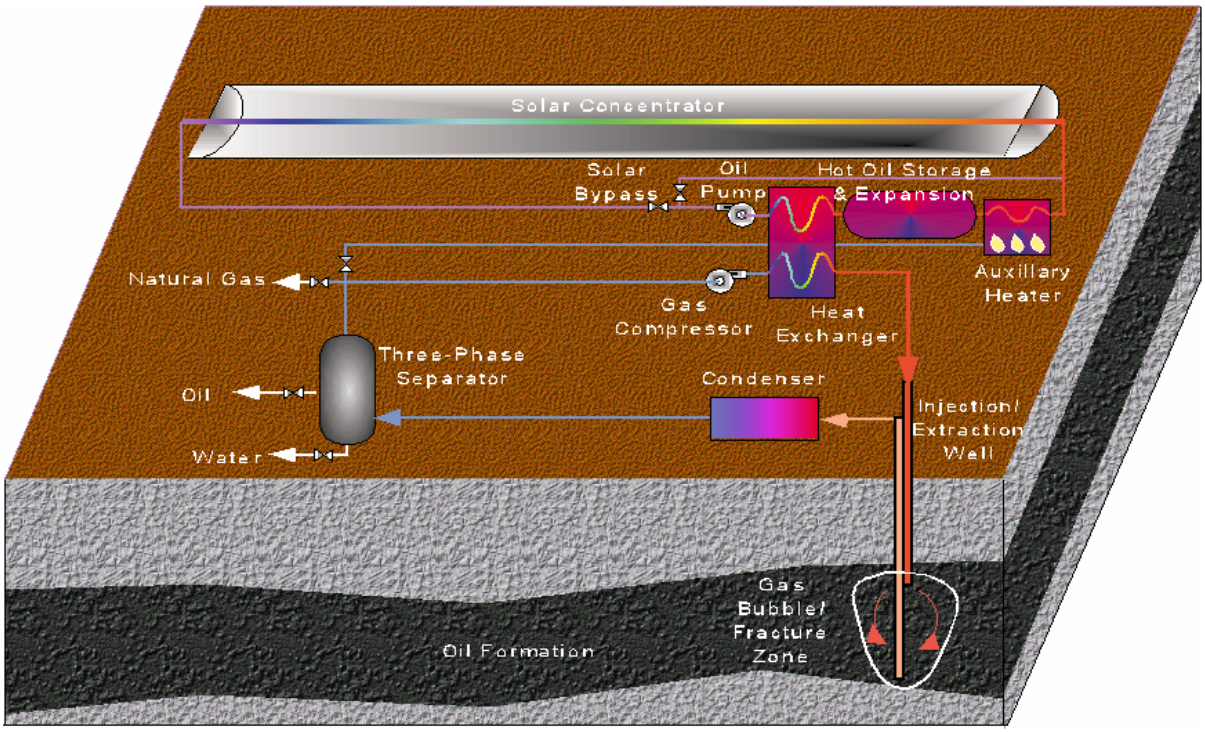
COMPANY DESCRIPTION

Mountain West Energy (MWE) has developed in-situ vapor extraction (IVE), a low-cost, scalable, low-impact, oil recovery process to produce oil from oil shale, oil sands, and heavy oil. MWE has demonstrated IVE in the laboratory, completed Phase 1 computer reservoir simulation, and completed Phase 1 field testing at the DOE's Rocky Mountain Oilfield Testing Center (RMOTC). MWE's technology is innovative in that after achieving hot gas break-through at the production well, vaporized oil is swept to the surface as a gas, instead of a liquid.

OIL SHALE INDUSTRY ROLE

MWE is focused on developing the vast unconventional oil resources of the U.S and World through implementation of its IVE process. MWE, in collaboration with industry partners, is working to achieve over 1 million barrel per day production from oil shale, oil sands, and/or heavy oil by 2020.



DESCRIPTION OF TECHNOLOGY

- MWE's IVE process uses a hot carrier gas injected directly into the target hydrocarbon formation to heat and vaporize the oil. Direct injection results in convective heating, which requires lower temperatures than indirect heating by conduction.

- The carrier gas sweeps the oil vapor toward the production well, where the oil is pumped to the surface. After hot gas breaks-through at the production well, vaporized oil is swept to the surface as a gas, instead of a liquid. The carrier gas is re- circulated in a closed-loop.
- One implementation of IVE uses a single, vertical or horizontal, well-within-a-well configuration (shown), which reduces costs, improves profitability, and minimizes environmental impact. The properties of the target formation determine whether a well-within-a-well configuration is used or a more conventional inverted five-spot configuration where one gas injection well is surrounded by four production wells.
- Since IVE uses a carrier gas heated at the surface, solar concentrators can be used as the source of thermal energy. This "green" implementation of IVE results in zero green house gas emissions from the oil extraction process, making it the most environmentally friendly process currently available.

TYPE / LOCATION OF RESOURCE HOLDINGS

- MWE has obtained oil shale leases on 880 acres of Utah Trust lands in the Uintah Basin, Uintah County, Utah, which it plans to develop in the future.
- Each IVE well-within-a-well configuration covers approximately 3 acres and should produce over 140,000 barrels of oil during a five year project.
- IVE is capable of cost effectively recovering oil at any depth from 300 ft to 6,000 ft, which makes unconventional oil extraction technically and economically feasible for a large number of hydrocarbon resources.

PROJECT STATUS / STATE OF DEVELOPMENT

MWE's IVE technology has been successfully demonstrated on oil shale and conventional oil in a bench-scale system at the company's laboratory. In addition, MWE has completed Phase 1 computer reservoir simulations of IVE with Dr. Milind Deo of the Petroleum Research Center at the University of Utah. MWE has also completed partial field testing of its IVE technology for EOR in cooperation with RMOTC. The project successfully demonstrated oil production from the Shannon formation of the Teapot Dome oil field, which is part of the former Naval Petroleum Reserve #3 (NPR-3). MWE showed that gas injection over approximately 30 days with its well-within-a-well configuration produced a gas bubble around the well approximately 600 ft in diameter. This confirmed predictions from the computer reservoir simulation. A gas bubble of this size assures profitable IVE oil recovery. MWE is one of only a few companies testing unconventional oil recovery in the field.

RELEVANT EXPERIENCE

MWE's team has extensive experience in technology development. MWE has assembled professionals from heavy oil, financing, government, operations, and R&D to build a successful unconventional oil production company. MWE is also collaborating with industry experts at the Petroleum Research Center at the University of Utah, the DOE's Rocky Mountain Oilfield Testing Center.

OUTLOOK / FUTURE PLANS

MWE will continue its efforts to develop unconventional oil resources with IVE. The company will demonstrate profitable oil recovery from oil shale, oil sands, and heavy oil over the next two years. With its partners, MWE plans to produce commercial quantities of oil from unconventional sources by 2015.

Natural Soda, Inc.

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COMPANY DESCRIPTION

Natural Soda is currently engaged in solution mining sodium bicarbonate in the Piceance Creek Basin. The company's 9,543 acres of leased land contains not only sodium salts, but also significant Green River Formation oil shale deposits, which are underlain by natural gas resources. The company also holds senior water rights in the Colorado River basin. The principal shareholder in the company that owns Natural Soda is The Sentient Group who invest solely in natural resource projects around the world. Sentient is an active investor in oil shale as an alternative source of liquid hydrocarbons.

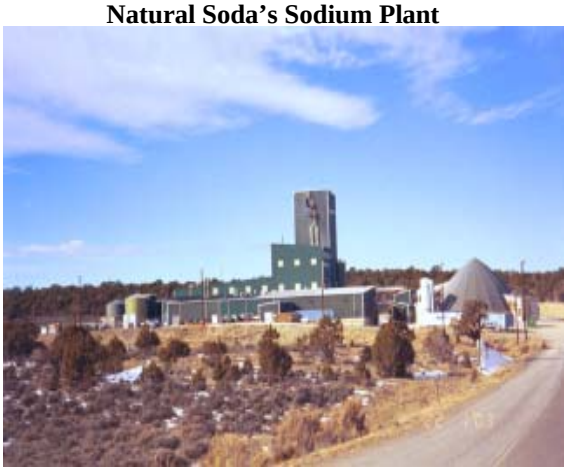
OIL SHALE INDUSTRY ROLE

Natural Soda is engaged in the oil shale industry primarily as a potential project developer. The company is researching a specific technology to produce oil from the shale resources that are contained within the area of its sodium leases. Natural Soda has applied to the BLM for a Research, Development and Demonstration Lease to further develop its production technology.

DESCRIPTION OF TECHNOLOGY

- Natural Soda and Sentient are developing a new technology for in-situ oil shale development, building on lessons from past oil shale efforts and experience with other technologies.
- The company is researching its specific technology for developing oil shale resources efficiently, while protecting the environment and the sodium resources. These investigations focus on in-situ technologies as well as other liquefaction approaches.
- Natural Soda has extensive experience with directional and horizontal drilling and development resulting from its soda operations. Natural Soda's horizontal well experience, in combination with another demonstrated technology, may result in a low cost horizontal heating process that could include in-situ stabilization of the product stream.

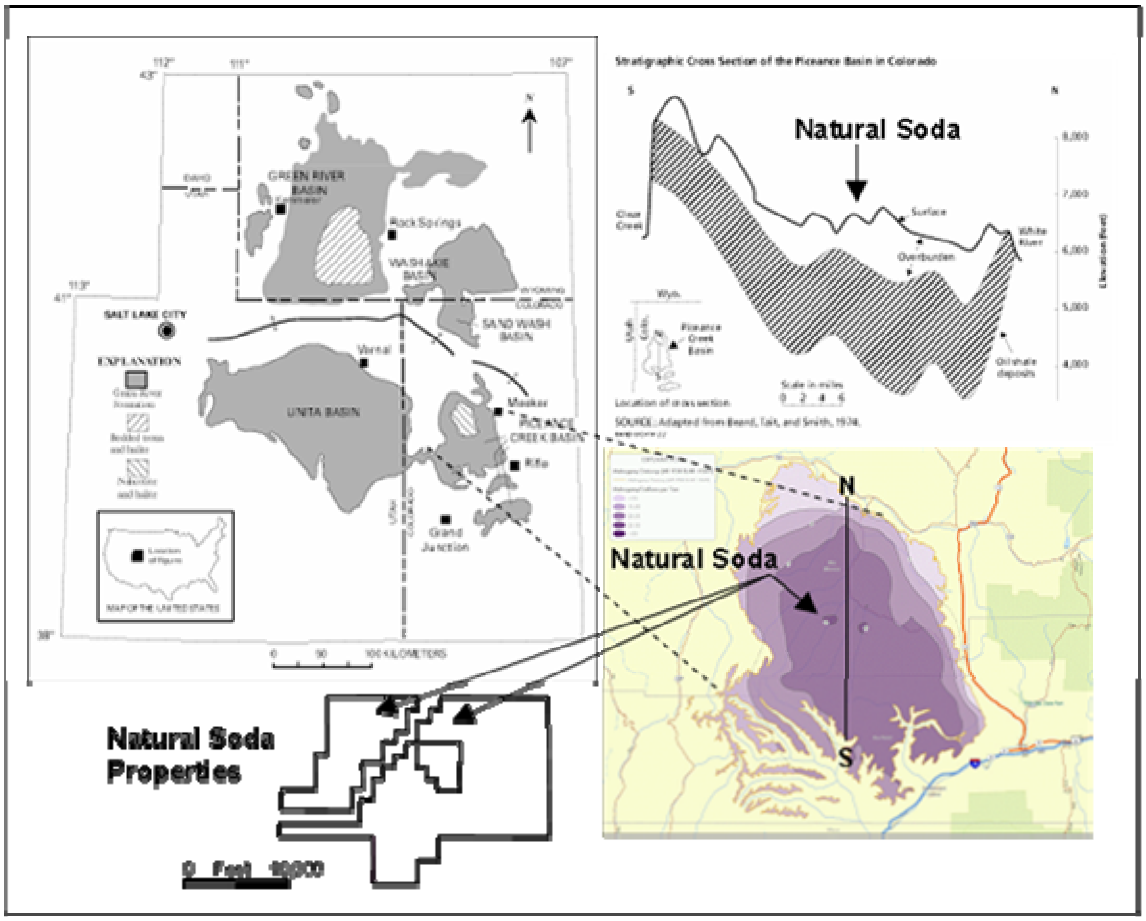
Natural Soda's Sodium Plant



TYPE / LOCATION OF RESOURCE HOLDINGS

Natural Soda holds long-term leases on private lands that contain not only nahcolite, but also significant Green River Formation oil shale deposits. These resources are underlain by producible commercial natural gas resources. The leases are adjacent to Shell and near Chevron's oil shale leases and

property holdings. Natural Soda also has significant water rights in the district that are sufficient to meet the requirements of an in-situ shale oil production program as envisioned by the authorities.



PROJECT STATUS / STATE OF DEVELOPMENT

Natural Soda and Sentient have compiled a comprehensive study of the resources and have commenced a drilling program of the resource that will deliver fresh material for bench-scale concept testing. A research program is in progress at an internationally recognized university with an experienced synthetic fuel research laboratory. In December 2009 an application for a Research Development and Demonstration ("RD&D") lease for the purpose of investigating the recovery of oil from oil shale was filed with the BLM. In October 2010 the BLM advanced the nomination and requested its Colorado office to conduct a review of the project in accordance with the National Environmental Policy Act ("NEPA"). Natural Soda's nomination will be reviewed by a third party consultant who will report its assessment to the BLM. Natural Soda submitted a comprehensive Plan of Operation in March 2011.

RELEVANT EXPERIENCE

Members of the Natural Soda / Sentient team have significant experience in synthetic fuel research, including coal liquefaction technology that may be applicable and extendable to oil shale development.

OUTLOOK / FUTURE PLANS

Natural Soda and Sentient are considering other partners to participate in development of the oil shale and gas resources on their leases. They will continue to pursue development, testing, and demonstration of an in-situ technology for maximizing recovery of the oil shale and nahcolite resources while protecting the environment.

Phoenix Wyoming LLC

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COMPANY DESCRIPTION

Phoenix Wyoming LLC is a Colorado Limited Liability Company with offices in metro Denver, Colorado. The company is focused on the development of hydrocarbon resources in the Rocky Mountain region of the U.S. Its main interest, at present, is oil shale / tar sands / heavy oil development with borehole microwave.

OIL SHALE INDUSTRY ROLE

Phoenix wishes to help develop oil shale using its own advanced in-situ technology. Phoenix Wyoming LLC and its partners are now seeking leases on 100,000 acres of oil shale in the US that is estimated to contain at least 100 billion barrels of recoverable oil. Phoenix is also examining other opportunities regarding development of oil shale, oil sands and heavy oil in other areas of the world.

DESCRIPTION OF TECHNOLOGY

Borehole microwave technology has the potential for in-situ development of oil shale, tar sands and heavy oil. In-situ technology allows development of these resources in a much more environmentally-friendly manner. It is no longer necessary to go through the costly and environmentally-degrading process of excavating immense quantities of rock and then the very expensive process of filling in and reclaiming the land afterwards.

It now appears that it may be possible to economically produce oil shale / oil sands / heavy oil resources in a very environmentally-friendly way. In-situ production avoids the surface disturbance of the ground.

Phoenix Wyoming LLC has borehole microwave technology that may result in the economic and environmentally-friendly production of some of the vast oil shale / oil sands / heavy oil reserves in the US, which may greatly lessen the costly and dangerous US dependency on imported oil.

Phoenix would prefer that the energy for the borehole microwave technology come from electricity generated by renewable sources, such as solar, wind or geothermal. Phoenix management played a role in the discovery and subsequent development of geothermal energy in the US, Philippines and Japan. In many oil shale areas, wind turbines could be a very viable source of power for borehole microwave. In contrast with many other applications of electricity, heating the ground does not have to be a completely smooth, continuous process.

TYPE / LOCATION OF RESOURCE HOLDINGS

- Phoenix Wyoming LLC and its partners are now seeking leases on 100,000 acres of oil shale that is estimated to contain at least 100 billion barrels of recoverable oil. In addition, Phoenix is closely examining oil sands / heavy oil opportunities.

PROJECT STATUS / STATE OF DEVELOPMENT

- Successful tests have been conducted with high power microwave on tons of earth material in the laboratory. Very rapid heating of tons of earth material has been achieved.

- Successful field tests have been conducted transmitting microwaves down boreholes to thaw permafrost. The tests showed that microwave heating technology is capable of thawing ground 50 times faster than electric heating rods.

Time Required to Thaw Gravel to a One Meter Depth	
Thawing Type	**Hours**
Coal and Straw Fire	39.5
Propane Heater	32.5
Electrical Resistance Rods	76.5
Borehole Microwave Heater	1.5

RELEVANT EXPERIENCE

The management of Phoenix has founded and built three successful high-technology companies in three different countries – each with world-leading technology. These companies specialized in electrical geophysics – in particular, the transmission of electrical power into the ground, and in the imaging of the ground using electromagnetic waves, similar to a cat scan, but with lower frequencies, and thus able to image tens of miles into the earth (www.phoenix-geophysics.com). The main purchasers of the equipment and exploration services were various government geological surveys, mining companies, geothermal resource companies, and major oil and gas companies including BP, ExxonMobil, Shell, ChevronTexaco, ConocoPhillips and many others. These companies funded Phoenix management to conduct research, design, build and manufacture new electronic equipment, and then conduct surveys with this equipment all over the world, including even the headwaters of the Amazon and the highlands of Papua-New Guinea. Phoenix management conducted surveys for mineral deposits, geothermal energy, oil and gas, hazardous waste, nuclear waste disposal sites, and even conducted the measurements that helped AT&T determine the electromagnetic interference of nuclear warfare on Trans-Atlantic telecommunications.

The management of Phoenix is very familiar with thinking outside the box, long workdays, getting the job done right, yet extremely quickly. All of that was absolutely necessary for the survival of a small company supplying advanced technology to the world's energy industry – and it is the reason why a small company will be the first to develop new technology to commercialize oil shale. It must do it quickly and correctly in order to survive. The opposite mentality is true of a large energy company. It really does not make that much difference to a very large company if a small in-house R&D program succeeds or fails, or finishes now or 25 years from now.

OUTLOOK / FUTURE PLANS

Phoenix Wyoming LLC is seeking $15 million to build a pilot plant to show the commercial application of borehole microwave for the development of oil shale / oil sands / heavy oil. It is planned that this initial pilot plant will be profitable, and that commercialization may proceed very quickly thereafter.

Pyrophase

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COMPANY DESCRIPTION

Pyrophase was formed in 2006 to commercialize novel technologies to produce oil from oil shale and tar sands, especially the Radio Frequency (RF) heating technology which PyroPhase founders developed, patented and tested in field pilot projects in earlier years at IIT Research Institute. The goal is to make massive use of wind power viable by storing wind electric energy as heat in underground unconventional heavy oil resources, converting these resources to liquid wind clean fuels. This can stabilize the electric grid by adjusting the heating load to track variations in wind, according to Pyrophase patent No. 7484561.

OIL SHALE INDUSTRY ROLE

Pyrophase is engaged in the oil shale industry as a technology and project developer.

DESCRIPTION OF TECHNOLOGY

The Pyrophase process emplaces electrodes in rows in the resource, volumetrically heating the resource in the space between the rows. Oil flows by gravity down to collection sumps where it is pumped up to be processed on the surface. The second figure shows our previous tar sands pilot site, where we have shown that in-situ radio-frequency heating works to store energy as heat. The heat stays in place because of the poor thermal conductivity of rock, and it gradually liberates oil from tar sands and oil shale. Fuel recovery times are months, not years as in processes that rely on thermal conduction. This in-situ process does not use water and avoids surface disruption.

Wind power presently supplies a tiny fraction of U.S. energy. The main problem is the variability of wind, and the lack of practical energy storage means. RF heating can store massive amounts of wind power as heat in the resource when it is available. This can stabilize the electric grid by adjusting the heating load to track variations in wind, according to our patent No. 7484561.

Wide adoption of in-situ RF technology, when combined with wind power storage, could extract wind-clean fuels with little CO_2 emissions, and replace foreign oil imports. Eliminating combustion as a source of extraction energy would reduce the CO_2 associated with motor fuel use by one third. Costly sequestering of CO_2 would not be needed.

TYPE / LOCATION OF RESOURCE HOLDINGS

PyroPhase has no holdings, but the company intends to work with oil companies to apply the technology to U.S. oil shale and tar sands deposits.

PROJECT STATUS / STATE OF DEVELOPMENT

PyroPhase has conducted a definitive engineering study to scale up the technology first in U.S. tar sands, which require a lower temperature than oil shale. Cost studies show the process is economic with oil at $40/bbl. What is learned in tar sands can then be applied to oil shale. A computer simulation technology was developed to optimize heating geometry and predict oil production by gravity flow using reservoir engineering. There is a detailed work plan for pilot development and scale up to a commercial size module, and a first 10,000 bbl/day tar sands bitumen plant. These show that commercial size operations can be implemented in 4 to 5 years.

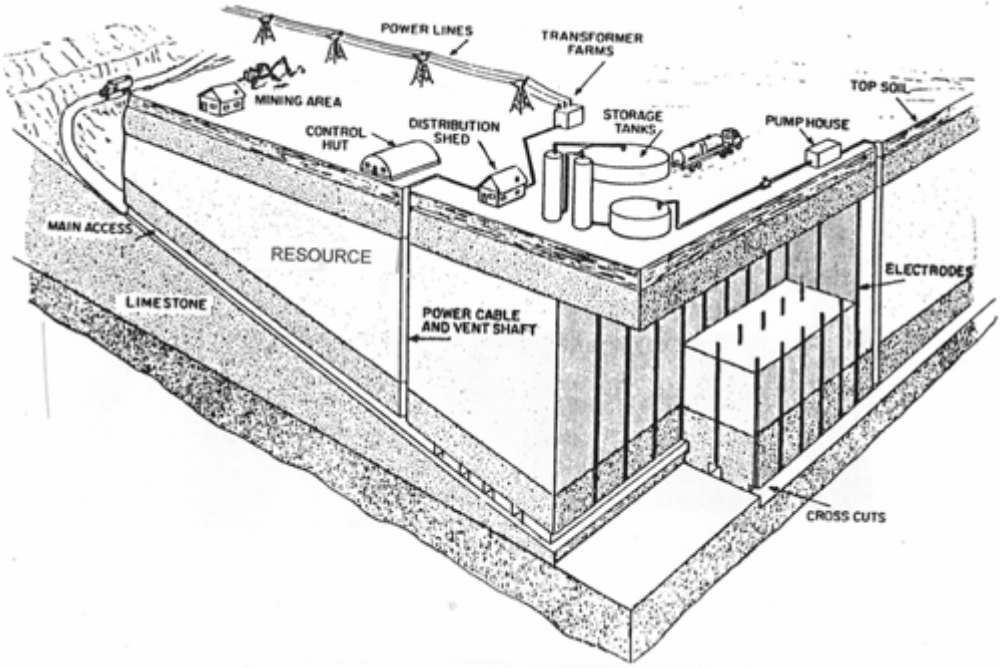
RELEVANT EXPERIENCE

PyroPhase founders were responsible for invention and pilot development of the RF technology at IIT Research Institute. Dr. Snow is the former director of the National Institute for Petroleum & Energy Research at Bartlesville OK, a chemical engineer with numerous publications, and a manager of technology development projects. Mr. Jack Bridges is an honored electrical engineer and a prolific inventor with 75 patents and 100 publications. Mr. Jeff Presley, the company president, is an entrepreneur of software startups. Mr. C. Dino Pappas is an oil industry investor and a technology developer.

OUTLOOK / FUTURE PLANS

PyroPhase is seeking funding of $20 million to develop and commercialize the technology for tar sands, with application to oil shale later. For more information, visit: www.pyrophase.com.

Process Diagram Showing Emplacement of Electrode Rows in a 10,000 Bbl/Day RF Plant



Tar Sands RF Pilot, Asphalt Ridge, Utah

Quasar Energy LLC

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COMPANY DESCRIPTION

Quasar Energy, LLC introduces cost-efficient, practical, and environmentally friendly hydrocarbon *in situ* heating technologies. These patented innovations provide discriminate *in situ* temperature increases of targeted constituents and/or controlled heating of unconventional oil reservoirs at long distances with even heating gradients.

OIL SHALE INDUSTRY ROLE

Quasar Energy LLC operations focuses on the ability to characterize hydrocarbon dielectric properties of a specific resource, then developing an electromagnetic RF *in situ* heating solution, and providing a full service turnkey solution to internal and joint-venture operations.

DESCRIPTION OF TECHNOLOGY

Heavy-oils, tar sands, and highly viscous petroleum require heat to enable their movement through an earthen formation so they can be extracted. Heat can gasify hydrocarbons in coal and lignite as well as convert organic matter known as kerogen, most often found in shale, into a hydrocarbonaceous gas or liquid. The problem with thermal conduction in an earthen formation is the very slow rate of heat transfer, which can take several years for high temperatures to move 25-feet from an underground heater.

Radio Frequency (RF) energy, like ultraviolet energy, visible light, microwaves, and infrared radiation, is a form of electromagnetic energy. Molecules with dipoles (polar) absorb RF energy while bypassing chemically similar molecules that lack dipoles. Electromagnetic RF penetrates into many materials very deeply, transforming its energy directly into heat by exciting molecules into rapid oscillatory motion. The ability of a material to absorb or not absorb radio frequency energy is determined by the dielectric properties of the material and of the frequency of RF energy applied. With such unique attributes, RF offers several practical advantages over conventional heating methods, including reduced thermal gradients, selective heating, rapid energy deposition, and acceleration of certain chemical reactions.

Because hydrocarbon molecules have dipoles, electromagnetic RF *in-situ* heating can radiate up to hundreds of meters in a hydrocarbon formation, resulting in instant molecule excitement and subsequent heating. Many non-hydrocarbon compositions, such as rock, do not have dipoles so they are by-passed resulting in efficient heat transfer directly to the hydrocarbons.

In situ heat generated for upwards of several hundred meters from instant RF excitement of hydrocarbon molecules is highly efficient and very competitive compared to slow thermal convection technologies such as in-ground heaters, chemical conversion processes, and steam. The following are a few notable advantages of RF compared to conventional systems:

- All expensive equipment is located above ground
- High-energy conversion
- Instant heat generation

- Selective heating of the targeted constituents
- Robust heating controls and even heating gradient
- Long distances and large volumes can be rapidly heated
- Environmentally friendly (GH gases are left in their original subterranean environment)
- Minimal disturbance to the ground surface and wildlife

Quasar Energy LLC has a unique position with four *in situ* radio frequency heating method patents that each individually contributes an important technological improvement. In various combinations, these technologies complement each other to maximize energy transfer.

- Automatic impedance matching,
- Impedance matching based upon temperature,
- Impedance matching with variable frequency, and
- Variable frequency based upon temperature

TYPE / LOCATION OF RESOURCE HOLDINGS

Quasar Energy has teamed up with a Rocky Mountain-based energy company that has 19,000 acres containing over 2 billion barrels of oil in tar sands that require heat to mobilize the oil. This shallow Utah tar sand deposit that has been core drilled and fully characterized is perfectly suited for RF heating because it is oil wet and water-dry.

PROJECT STATUS / STATE OF DEVELOPMENT

Characterization of the resources, issuance of RD&D permits, intellectual property development, and team formation have all been accomplished. Phase I will be devoted to dielectric characterization, numeric simulations, downhole tool development, a portable RF generator, vertical well tests, and implementation of a horizontal gravity drainage demonstration facility.

Phase II provides for the installation of a 1,000-barrel per day production facility, and the objective of Phase III is 10,000-barrels per day. The goal of Phase IV is 100,000-barrels per day, a production volume this property can sustain for at least 15 years at a 25% rate of recovery.

RELEVANT EXPERIENCE

The team is well qualified for success consisting of experienced oilmen, expertise in dielectric characterization, and radio frequency technology. The Rocky Mountain based energy company has been in business for over 40 years and currently manages just over 400 conventional oil wells. Its experienced staff is very capable of administering the venture finances, as well as managing oil production, operations, and marketing of the oil and gas.

Red Leaf Resources, Inc.

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COMPANY DESCRIPTION

Red Leaf Resources, Inc. ("Red Leaf") was founded in 2006 and is headquartered in Salt Lake City, Utah. Red Leaf is an innovative technology company focused on unconventional fuels development. With a patent pending technology and IP portfolio, Red Leaf is poised to deliver exceptional value through project development and licensing. The Company's management team is comprised of leading experts in unconventional resources. Red Leaf's new and pioneering technology creates global opportunities for oil shale development.

OIL SHALE INDUSTRY ROLE

Red Leaf has developed the EcoShale™ In-Capsule Technology to economically and environmentally extract high quality liquid transportation fuels from oil shale, oil sands, coal, lignite, and bio-mass. This revolutionary technology does not require process water.

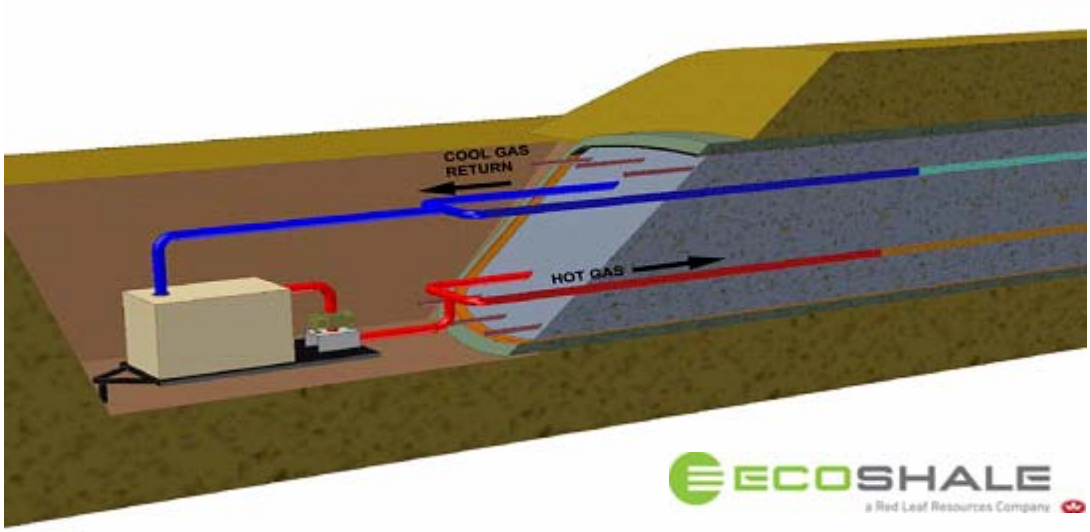
DESCRIPTION OF TECHNOLOGY

Red Leaf has developed a proprietary and patent-pending surface extraction method known as the EcoShale™ In-Capsule Technology. Additionally, the EcoShale™ In-Capsule Technology protects groundwater and vegetation, allows for rapid and simultaneous site reclamation, and supports a favorable emissions profile.

The EcoShale™ In-Capsule Technology uses low temperature heating which produces a high quality feedstock with an average 34 gravity API and contains no fines or bottoms. The process also produces synthetic natural gas, which allows for energy self-sufficiency.

- The EcoShale™ In-Capsule Technology employs a low cost, earthen impoundment structure to contain a treatment zone where the shale is roasted to extract the kerogen.
- Once filled with mined oil shale, the capsule is heated using pipes that circulate hot gases derived from burning natural gas, coal bed methane or its own recycled gases.
- Placement of the shale into impoundments that are engineered with an impermeable barrier inherently sequesters depleted shale and protects ground water.
- Rapid (simultaneous) reclamation occurs as the process advances.
- The process heat used in one capsule can be recovered by circulating ambient temperature air, which transfers remaining heat into adjacent capsules.
- The EcoShale In-Capsule Technology allows the energy, the mining, the extraction and the environmental reclamation to advance together as the mine face advances.
- The environmental benefits of the technology include: extraction without using water, rapid reclamation of mining, impoundment of depleted shale, protection of surface and ground water, avoidance of aquifer interaction, reduction of CO_2 emissions, potential for carbon capture and sequestration, and approximate topographical restoration.

EcoShale™ In-Capsule Technology Schematic



- The economic benefits of the technology result from the avoidance of large steel construction, avoidance of long construction lead time process compents, the utilization of standard mining equipment, project scalability, integrated and simultaneous reclamation, and the production of a very high quality oil/refinery feedstock.

TYPE / LOCATION OF RESOURCE HOLDINGS

- Red Leaf controls oil shale leases on approximately 17,000 acres on Utah state lands. The properties represent about 1.5 billion barrels of oil-in-place, much of which is available by surface mining.

PROJECT STATUS / STATE OF DEVELOPMENT

- Red Leaf Resources has performed extensive simulation and mathematical modeling for its Ecoshale™ In-Capsule Technology and has confirmed results with bench testing and external lab analysis of its produced hydrocarbon products.
- Red Leaf Resources has completed a field pilot test of the Ecoshale™ In-Capsule Technology The field pilot was carried out in the Uintah Basin in Utah. The field pilot validated the technology modeling and most commercial engineering design aspects. The process produces a very light, high quality product. A prompt (liquid) oil was produced that was approximately 29 API gravity, about 65% paraffin + naptha, and about 12.6% hydrogen. A condensate liquid was also produced with an approximate 39 API gravity, about 55% paraffin + naptha, and about 12.9% hydrogen. Sulfur content was approximately 2,200 ppm and nitrogen content was about 1 – 1.2 wt%. The oil produced contained no entrained solid fines from the shale ore. The EcoShale™ In-Capsule Technology is scalable, is quick to production, and allows for commercial levels of oil production.

RELEVANT EXPERIENCE

Red Leaf Resources, Inc. was formed in 2006 and is focused on a model for the economic and environmentally sustainable production of liquid fuels from oil shale resources. The Red Leaf executive management team consists of many seasoned oil shale industry veterans and is rounded out by professionals in the fields of finance, law, and petroleum engineering.

SASOR

Shale and Sands Oil Recovery LLC

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COMPANY DESCRIPTION

SASOR has been at the forefront of deploying nuclear technology to the sand and shale oil recovery industry since its inception in 2004.

During this time we have been studying the concept of deploying small modular nuclear power plants at the North American oil sands production sites, developing a plan for the development of oil sands production projects utilizing the 4S or other small modular reactors, and assembling a world-class team that covers the full scope of the design, engineering, licensing, procurement, construction, operations, and fuel handling for a small nuclear reactor in this application.

- In support of the Canadian Nuclear Society's 30th Annual CNS Conference, SASOR provided a presentation on economic case studies for the application of the 4S reactor to Oil Sands recovery in Canada.
- In preparation for this presentation, SASOR conferred with 17 different oil producers, completed an extensive literature analysis on the technical requirements of unconventional oil recovery, and conducted studies to determine which small modular reactor is ready to deploy in oil sands service.

DESCRIPTION OF TECHNOLOGY

SASOR holds two fully granted patents on the use of nuclear energy technologies for the extraction of useable oil from oil shale and oil sands deposits. We believe that the use of nuclear energy technologies will be unavoidable given the substantial energy requirements of oil shale production and concerns over environmental and climate impacts of using fossil fuels.

- A patent was granted in the US and through the Patent Cooperation Treaty (PCT) it covers over 95% of the known oil shale deposits in the world.
- Another patent was granted which covers the use of nuclear energy in the oil sands deposits throughout the US and Canada.
- The holder of the patents will be able to collect licensing and royalty fees from any party that ultimately uses nuclear energy technologies to exploit oil shale deposits in every other country with substantial oil shale reserves. As such when large scale production of oil from oil shale deposits becomes wide spread the patent will be worth a substantial amount in fees and royalties.
- It also explicitly covers all known commercial oil shale production technologies including Royal Dutch Shell's, ELG's, Chevron's, Schlumberger's and Ecoshale's among others.
- It also covers the use of supercritical material to fracture oil shale formations which will result in substantially increased permeability and therefore substantially increased oil production.
- With the announcement of the establishment of the Regional Oil Shale Centre in Amman it appears that there is an increased interest in promoting oil shale production around the world. As we understand it the Centre's focus will be on research, cooperation, information exchange, policy and investment promotion. SASOR personnel visited Amman last summer to present to a gathering of international oil shale production companies sponsored by the Jordanian Natural Resources Authority.

TYPE / LOCATION OF RESOURCE HOLDINGS

SASOR does not currently hold any assets or resources other than its patents.

PROJECT STATUS / STATE OF DEVELOPMENT

SASOR is working with entities to capitalize on our patent position.

RELEVANT EXPERIENCE

SASOR's personnel have many years of experience in the energy business.

Schlumberger-Doll Research

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COMPANY DESCRIPTION

Schlumberger is the world's leading oilfield services company. It employs about 100,000 people, representing 140 nationalities, working in approximately 80 countries. Schlumberger supplies a wide range of products and services including seismic acquisition and processing; drilling; formation evaluation and testing; completions, cementing, stimulation and artificial lift; and consulting, software, and information management.

OIL SHALE INDUSTRY ROLE

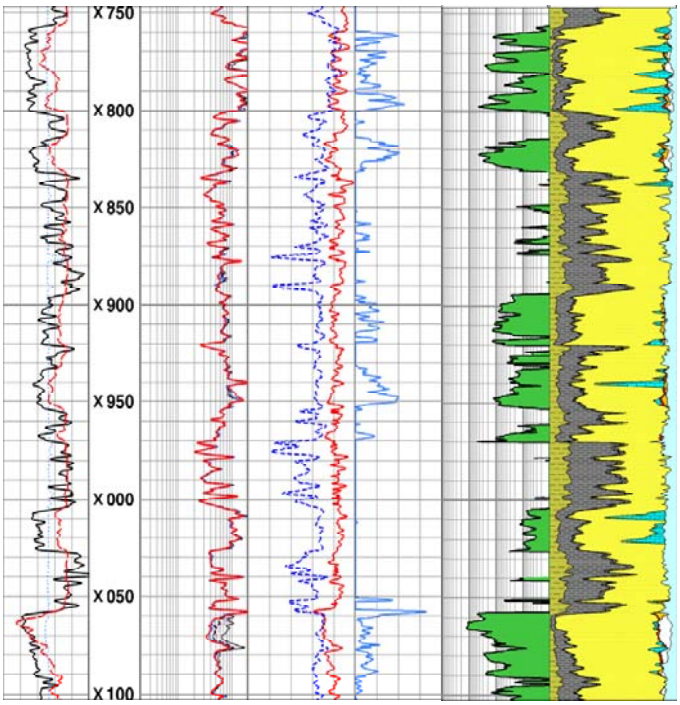
Schlumberger provides reservoir characterization and monitoring services, enabling resource holders to plan and optimize production processes. It develops and deploys wireline well logging tools, logging-while-drilling tools, and cross-well arrays. Schlumberger utilizes a full spectrum of measurement technologies, including gamma ray spectroscopy, sonic waveform analysis, electrical measurements from DC to microwave, and magnetic resonance measurements. It also provides drilling, stimulation, and completion services.

DESCRIPTION OF TECHNOLOGY

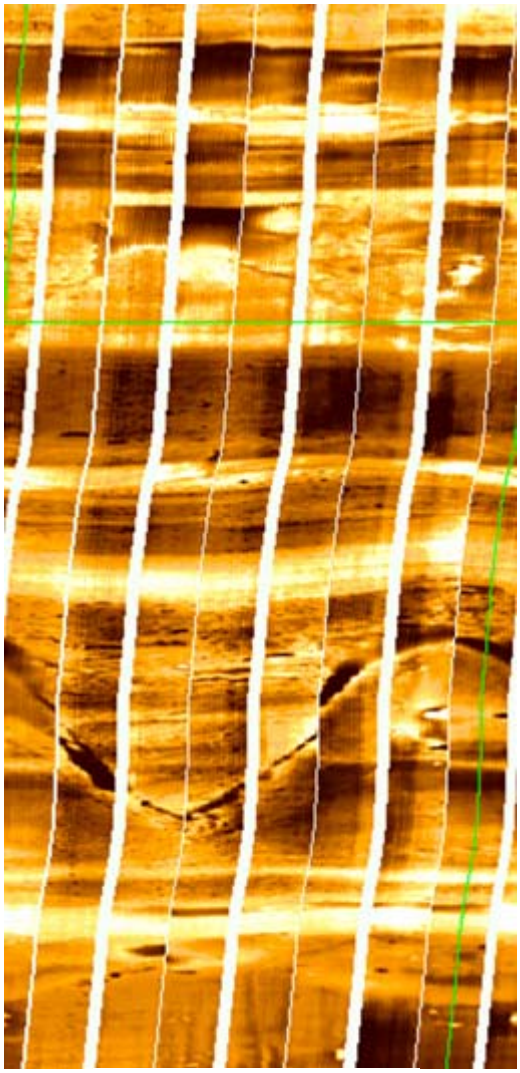
A modern formation evaluation program for oil shale includes the following logging tools:

- *Platform Express (PEx)*: Density porosity, neutron porosity, and resistivity. Combined with CMR and ECS to measure kerogen content, and water saturation and salinity.
- *Combinable Magnetic Resonance Tool (CMR)*: Water saturation and salinity, and continuous Fischer Assay log.
- *Dielectric Dispersion Logging Tool (Dielectric Scanner)*: Water saturation where salinity is low or unknown.
- *Elemental Capture Spectroscopy Sonde (ECS)*: Quantitative elemental analysis and interpreted mineralogy assay, including minerals peculiar to the Green River formation.

Comprehensive Reservoir Characterization



- *Reservoir Saturation Tool (RST)*: Combined with ECS to give total organic carbon.
- *Sonic Scanner*: Formation stress anisotropy, and acoustic properties for correlation with geophysical measurements.
- *Formation MicroImager (FMI)*: Image of the borehole wall, coded by resistivity, with resolution better than 1 cm. Net-to-gross determination, high resolution stratigraphy, and detection of fractures, vugs and nodules.
- *Distributed Temperature Sensing (DTS)*: Measures wellbore temperature during pyrolysis.
- *Cross-Well Electromagnetics and Acoustics*: Delineates dewatered and coked zones during pyrolysis.



FMI Image of Borehole

TYPE / LOCATION OF RESOURCE HOLDINGS

Schlumberger does not own or control resources. It is a provider of technologies and services.

PROJECT STATUS / STATE OF DEVELOPMENT

- Customization and calibration of well log interpretation for oil shale formations.
- Laboratory measurements relating well log responses to pyrolysis outcomes.
- Improving the temperature range and lifetime of fiber optic distributed temperature sensing systems.
- Customization and calibration of single-well and cross-well monitoring of in-situ oil shale pyrolysis.

RELEVANT EXPERIENCE

Schlumberger's research and engineering budget approximates the total R&E spending of all its competitors combined. As a result, it has always been a leader in solving difficult and novel oilfield service problems. Technology that Schlumberger has deployed for unconventional resources such as heavy oil, gas shale, and gas hydrate, is being brought to bear on oil shale.

OUTLOOK / FUTURE PLANS

Schlumberger has acquired significant measurement experience in Green River oil shale, and is able to customize its service offerings to address the needs of a variety of clients.

Shale Tech International

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Website: www.shaletechinternational.com

COMPANY DESCRIPTION

Shale Tech International (STI) is an independent oil shale technology development and management company. STI was founded in 2006 and owns all rights to the Paraho® Technology. STI also operates a pilot plant facility in Rifle, Colorado.

OIL SHALE INDUSTRY ROLE

STI is committed to developing and licensing the original Paraho and second generation Paraho II™ Technologies in addition to providing a range of engineering and consulting services to oil shale project developers.

STATE OF DEVELOPMENT

T he Paraho process was originally developed in the 1970s by the Paraho Development Corporation and was funded by a consortium of 17 companies (12 major oil companies) and the U.S. Federal Government. The technology was successfully demonstrated at the pilot (1 ton per hour) and semi-works scale (10 tons per hour). In 1979, the U.S. Navy contracted with Paraho to produce 110,000 barrels of shale oil, which was refined, tested, and certified for military use by the Navy. Subsequent testing programs confirmed Paraho as a suitable extraction technology for a wide range of oil shale types. STI was formed in 2006 as the owner and manager of the Paraho technology and resumed its development. STI continues to build on Paraho's prior success with ongoing advancement of the technology.

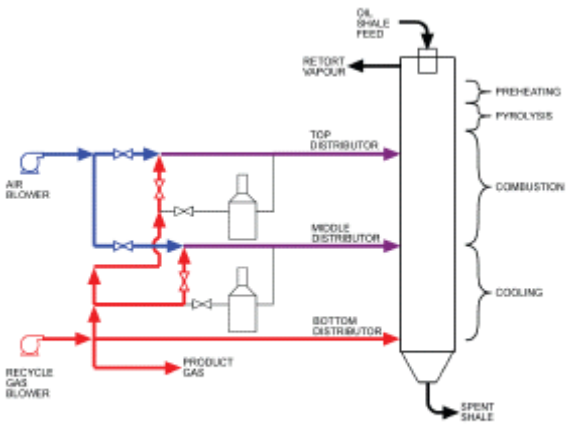
Currently, Queensland Energy Resources (QER) is nearing completion of the construction and commissioning of an end-to-end oil shale technology demonstration plant featuring the Paraho II™ technology. The plant is being constructed at the QER site located to the north of the town of Gladstone in Queensland Australia, along with a Visitor Centre that was opened in June 2011.

Paraho Pilot Plant Today, Rifle, CO

Paraho Pilot Plant (1 ton/hr), ca. 1980

Paraho Semi-Works Plant (10 tons/hr), ca. 1980

DESCRIPTION OF TECHNOLOGY



The Paraho and Paraho II processes incorporate a gravity fed, vertical shaft retort. Crushed, sized ore moves through the retort in plug fashion by force of gravity. The ore is progressively heated as it descends through the retort until it reaches retorting temperatures when the ore releases product oil and gas. Product oil is removed from the retort, cleaned, and prepared for external processing. Product gas is recycled through the system, used for heat transfer, and as a source of fuel for the external process operations. As the hot processed shale gradually cools, it acts as a heat source to countercurrent flowing gases used to heat unprocessed ore. The retort can be operated in a direct heat, indirect heat, or combination mode, which optimizes operating conditions. The upgraded shale oil product leaving the process is a light, sweet, refinery-ready synthetic crude oil. The Paraho II process incorporates additional energy efficiency, safety and environmental performance enhancements.

Key Benefits of the Paraho II Technology

- **Availability:** Mechanical simplicity translates into minimal downtimes and reliable operation
- **Adaptability:** Multiple modes of operation provide a broad range of flexibility, allowing for high yields over a wide variety shale types.
- **Energy efficiency:** Improved capture and reuse of generated process heat increases efficiency and reduces operating costs
- **Safety:** Low pressure, thermally encapsulated retorting process with few moving parts reduces operational hazards
- **Environment:** Extraction process generates typical waste streams that are easily manageable with current control technologies

Pilot Plant Facilities: STI owns and operates a fully equipped pilot plant and analytical laboratory located in Rifle, Colorado. The pilot plant is heavily instrumented and equipped with modern control equipment and data collection capabilities and is designed to test a wide range of oil shale types. Combined with its on-site analytical laboratory, the STI pilot plant facilities provide an exceptional test bed for developing optimal operational conditions and engineering design inputs for commercial scale development.

RELEVANT EXPERIENCE

In addition to complete pilot testing and laboratory facilities, STI can provide a range of engineering and consulting services to prospective developers. STI's core technical team has over 150 years worth of direct experience designing, testing and operating oil shale facilities and together with its strategic partners can provide engineering and consulting services ranging from design and execution of pilot plant programs to design assistance for scaled up commercial facilities.

REFERENCES

Secure Fuels from Domestic Resources: The Continuing Evolution of America's Oil Shale and Tar Sands Industries. U.S. Department of Energy, 2007.

Shell Exploration & Production Co.

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COMPANY DESCRIPTION

Shell Oil Company, including its consolidated companies and its share in equity companies, is one of America's leading energy companies with major businesses in oil and natural gas production, natural gas marketing, gasoline marketing, petrochemical manufacturing, wind, and biofuels. Shell, a leading oil and gas producer in the deepwater Gulf of Mexico, is a recognized pioneer in oil and gas exploration and production technology. Shell Oil Company is an affiliate of the global Royal Dutch Shell Group of energy and petrochemical companies, employs approximately 93,000 people, and operates in over 90 countries and territories.

OIL SHALE INDUSTRY ROLE

For over a quarter of a century, Shell has conducted research on its innovative In-situ (in-ground) Conversion Process (ICP) to responsibly recover oil and gas from oil shale in Colorado. In an effort to help meet the energy challenge, Shell is exploring ways to recover oil and gas from oil shale in ways that are economically viable, environmentally responsible and socially sustainable. The Bureau of Land Management granted approval of Shell's three, 160-acre oil shale research, development, and demonstration leases.

DESCRIPTION OF TECHNOLOGY

Shell's innovative In-situ Conversion Process (ICP) does not involve surface mining and instead inserts heaters underground to convert kerogen in oil shale into high quality transportation fuels.

How the process works:

- Electric heaters gradually heat shale beneath surface.
- Target depth zone typically from 1,000 to 2,000 feet.
- Rock formation heated slowly over time to 650 to 700° F.
- Heat changes kerogen in oil shale into oil and gas.
- Products are pumped to surface using conventional methods.
- Produces approximately 1/3 gas and 2/3 light oil.
- Fewer processing steps are required to produce high quality transportation fuels.

TYPE / LOCATION OF RESOURCE HOLDINGS

The Bureau of Land Management granted Shell three, 160-acre oil shale research, development and demonstration leases. Research activities are intended to include an advanced heater test, a multi-mineral test and a demonstration project to mature a potential commercial design.

PROJECT STATUS/ STATE OF DEVELOPMENT

On its private property in Rio Blanco County, Shell is currently concluding the successful Freeze Wall Test, an environmental study to mature the technology designed to keep groundwater out of subsurface production areas using a frozen, underground barrier. In this test, Shell proved the ability to: 1) isolate an area to be heated, 2) protect surrounding groundwater, and 3) constantly monitor and verify freeze wall integrity.

RELEVANT EXPERIENCE

Shell has been conducting research for more than a quarter of a century to ensure oil shale can be done the right way, meaning it is done in an economically viable, environmentally responsible and socially sustainable manner. A sequence of several pilot projects has lead to proof that ICP works. On only a 30'x40' testing area, Shell successfully recovered 1,700 barrels of high quality light oil plus associated gas from a short interval of shallow, low-concentration oil shale layers.

OUTLOOK / FUTURE PLANS

Shell is moving forward developing plans for pilot projects on its BLM Research, Development and Demonstration (RD&D) leases. All major permit applications for a multi-mineral RD&D pilot project were submitted in late 2010 and early 2011. Permit approvals are anticipated in late 2011, as is project construction commencing in early 2012.

Shell will continue to set a high industry standard for public participation, environmental protection and community enhancement in an effort to ensure oil shale is done the right way. Any future Shell commercial development in Colorado will depend on the economic viability and environmental sustainability of the In-situ Conversion Process. Shell hopes to make a decision on a commercial project within the next decade.

Standard American Oil Company

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(Formerly American Resource Petroleum Corporation)

COMPANY DESCRIPTION

Standard American Oil Company [formerly American Resource Petroleum Corporation] believes in protecting and enhancing our national interests. SAOC intends to help minimize foreign influences on the flow of oil in North America by developing oil sands and oil shale resources in the United States. Standard American Oil Company dedicates its efforts to "Sustainable Energy Security".

OIL SHALE INDUSTRY ROLE

Standard American Oil Company (SAOC) is the only company in North America dedicated to producing high quality, environmentally friendly, alternative petroleum-based feedstock for refineries and also Bio-Based fuel blends to meet America's mandated 21st century renewable energy requirements. Bio-Based fuel blends are a combination of renewable fuels and specially formulated petroleum-based feedstock that are blended to create a more efficient, profitable, environmentally friendly, economically attractive and cost effective energy resource.

Utilizing advanced technologies, SAOC will be profitably producing petroleum-based feedstock for refineries by developing the vast petroleum reserves locked in the tar sands and oil shale deposits of the United States. With Federal and state governments and the private sector, demanding an immediate response to the rapidly increasing demand for environmentally friendly and cost effective energy, SAOC is at the front of an emerging unconventional fuel industry to meet this demand. SAOC is well-positioned to produce cost-effective Bio-Based energy and transportation fuels for today's market.

DESCRIPTION OF TECHNOLOGY

SAOC employs a unique Pyrolitic Hydrocarbon Reactor process which is a proven manufacturing approach that converts hydrocarbons including coal, petroleum coke (petcoke), and biomass to a syngas (synthetic gas), which can be further processed to produce chemicals, fertilizers, liquid fuels, hydrogen, and electricity. The Pyrolitic Hydrocarbon Reactor is not a combustion process. It is a flexible, commercially-proven and efficient technology that produces the building blocks for a wide range of high value products from many kinds of low-value feed stocks.

A hydrocarbon feedstock such as Tar Sands or Oil Shale are introduced with limited oxygen into a high temperature SAOC reactor until the chemical bonds of the feedstock are broken down.

The resulting reaction produces syngas which is then cleansed to remove impurities such as sulfur, mercury, other particulates, and trace minerals. Carbon dioxide can also be removed at this stage. Purified syngas is utilized to make many different products, including crude oil, asphalt products and transportation fuels. The Pyrolitic Hydrocarbon Reactor is a reliable and clean energy technology.

This process uses no water and does not release any harmful gases into the atmosphere. It converts a variety of low-cost feedstocks into high-value products while helping to reduce U.S. dependence on foreign oil and natural gas. It can also provide a clean, alternative source of base load electricity, fertilizers, fuels, and chemicals.

This manufacturing process can translate any material containing carbon such as coal, petcoke, or biomass into syngas. The syngas can be burned to produce electricity, or further processed to manufacture chemicals, fertilizers, liquid fuels, substitute natural gas (SNG), or hydrogen.

Standard American Oil Co.'s Pyrolitic Hydrocarbon Reactor

Standard American Oil Company has introduced it new formulation for the recovery of heavy oil from oil sands deposits. Syntroleum is a non-carcinogenic and environmentally green formulation and can be also used for in-situ recovery of heavy oil in oil sands.

SAOC's SYNTROLEUM FORMULATION

Temple Mountain Energy, Inc.

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COMPANY DESCRIPTION

Temple Mountain Energy, Inc. (TME) is active in all aspects of oil/tar sands development and production business (mining the ore, processing the ore and logistics (storage, transportation and sales)). TME has accomplished all of these business segments. Based in Minnesota, it has an entity in Utah. TME is presently concentrating all its efforts on its oil/tar sands ore processing pilot plant in Utah. The pilot plant was commissioned in September 2007. See generalized process below. This plant is built and operational. TME next stage is to go into the commercialization with production modules to build volume to meet the demand for the TME oil sand products.

OIL/TAR SANDS INDUSTRY ROLE

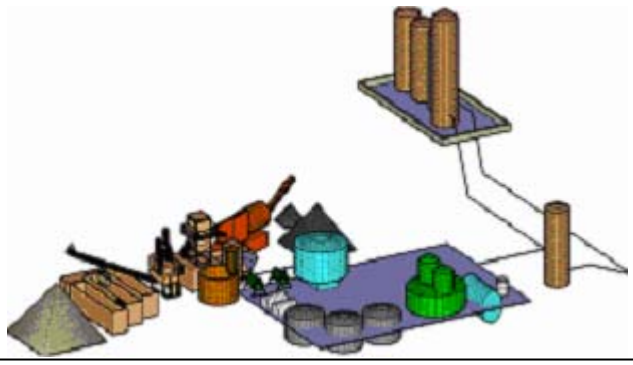
TME is engaged in the oil/tar sands industry as a resource owner, technology/process developer, and project developer/operator. The company has developed a very environmentally friendly, economical mining and ore process on privately held lands, expanding to commercial scale production within a year depending on the economic feasibility, volume scaling of the pilot process and other investment criteria. TME is presently the only company in production and sales of oil sands products in the U.S.

DESCRIPTION OF TECHNOLOGY

TME has developed a new process for the economical processing of mined oil/tar sands.

- The TME process involves the use of proven surface-mining coupled with TME's advanced sand cleaning/remediation process using very little energy being powered by electricity not carbon fuel. The process uses water as a motive force.
- The approach allows faster throughput of oil sands separation at low temperatures, achieving more efficient energy usage and greater product yields, while not creating carbon dioxide and other emissions.
- The process applies advances from the soil remediation industry in Europe who are at least 10 years ahead of the U.S.A. in process design.
- The processes' improved water management and re-use technologies also reduce process requirements and reclaims and recycles the water at about 93% recovery.

Temple Mountain Energy Process Diagram



TYPE / LOCATION OF RESOURCE HOLDINGS

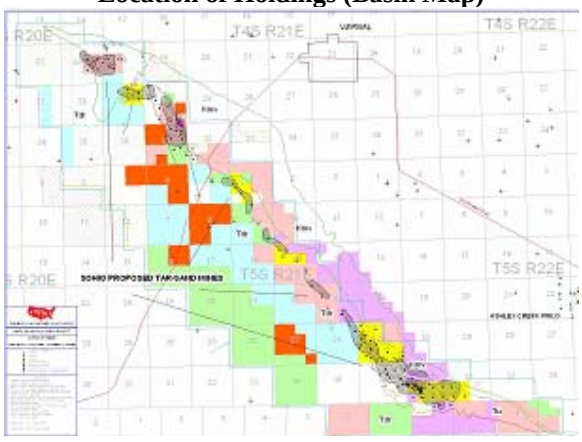
- TME owns fee lands in Uintah County in Vernal Utah, on the Asphalt Ridge covering an area of 1280 acres (See yellow on map below)

- The properties have over 80 million barrels of surface mineable oil with another 70 million barrels of in-situ oil. This is per a 100 plus core drillings database obtained from SOHIO.

- The large mine permit has been recently approved by the State of Utah. This is a 124 acre mine site. Two 5 acres sites were previously being mined that have surface outcroppings and little overburden.

- Mining has been initiated on the fee lands with 80,000 tons stockpiled for the pilot plant. Another 95,000 tons has been mined and sold for road asphalt use.

Location of Holdings (Basin Map)



PROJECT STATUS / STATE OF DEVELOPMENT

To date, TME's process has been tested at bench-scale, and also in small-scale internal demonstration, with positive results enough to move to the pilot plant stage. The pilot plant was commissioned in September 2007. Design, engineering and economic evaluation are currently underway, leading to construction of the first pre-production module (250 tons / hour) on the site beginning in mid-2012. After commissioning the first module, the plan is to build a production module every six months into a 4 module pod, capable of processing 1000 tons per hour 20 hour days with 4 hours of maintenance time.

COMPANY OUTLOOK / FUTURE PLANS

The TME Operational Oil Sands Pilot Plant (100 tph)

The company has the process operational to produce bitumen oil from the oil/tar sands in the pilot stage and is in the design stage to go to commercialization within the next year. The mining, processing and logistics areas to make this an economical and viable business are in place. The properties have proven resource reserves in place to extract quality ore, and the overburden ratios are very economical. TME runs the pilot plant at a rate of 100 TPH which makes it economical to continue its production while staging the commercial systems builds and commissioning. TME has sold oil sands products (asphalt) and demand is growing for these products. Commercialization is very important to meeting this demand. Due to the U.S. economic situation, funding in 2010-11 has been the largest issue in moving forward with the commercialization.

U.S. Oil Sands

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(Formerly Earth Energy Resources Inc.)

COMPANY DESCRIPTION

US Oil Sands Inc. (formerly Earth Energy Resources Inc.) is headquartered in Calgary, Alberta, Canada, with its technical development facility located in Grande Prairie, Alberta. The company completed a major financing and going public transaction in April 2011. The Company is now traded on the Toronto Stock Venture Exchange under the symbol TSXV: USO.V and well underway to commercialize the company's mineable oil sand project in NE Utah. Today, US Oil Sands is poised with a shovel-ready oil sand mine and modular bitumen extraction plant, utilizing the environmentally responsible Ophus Process.

OIL SAND INDUSTRY ROLE

US Oil Sands is the leader in the Utah oil sand extraction industry as a resource owner and technology developer. Having been granted its Large Mine Permit from the Utah Division of Oil, Gas and Mining in September 2009, and with all other required environmental permitting in place, the Company is positioned to begin development of its surface-mineable property in the Uinta Basin.

DESCRIPTION OF TECHNOLOGY

The Company has developed an evolution of the Clark Process, the industry standard for North American mineable oil sands extraction. The shortcomings of the Clark Process, namely: high water usage, inability to efficiently extract bitumen from oil-wet sands, and oily middlings discharge to tailings ponds that take decades to settle and longer to reclaim; have all been overcome by US Oil Sands. The patent-pending Ophus Process is an elegant solution that allows for plant scalability, low water usage, elimination of tailings ponds, and processibility of both oil-wet and water-wet oil sand ores.

Modular plant specifications and process outcomes:

- 2,000 barrel per day (bbl/d) modular process trains with production expansion achievable through addition of process trains and/or scaling up overall plant configuration.
- Applicable to surface-mineable oil sand deposits throughout the world.
- Indifferent to connate water content (works equally well with both oil-wet and water-wet ores; pilot plant has successfully operated with ores from Utah and Athabasca).
- Water based slurry, similar in concept to the Clark Process used in Athabasca.
- Environmentally friendly extraction chemical replaces Clark's requirement for high mechanical energy input and caustic process solutions.

- Clean, "damp dry" stackable tailings; 14% residual moisture = 1.5 bbls H_20 per bbl bitumen.
- High bitumen extraction rates, typically in 96-97.5% range
- Compact overall footprint = reduced environmental impact.
- Tailings ponds not required = concurrent mine reclamation.
- Energy and water efficient = robust economics.

TYPE / LOCATION OF RESOURCE HOLDINGS

US Oil Sands owns a 100% interest in nearly 32,000 acres under lease from the State of Utah, School and Institutional Trust Lands Administration ("SITLA") in the PR Spring Designated Tar Sand Area. The Company has completed internally estimates on 5,930 acres of this land holding and as of December 31, 2010, it has 177.8 MMbbl of of low sulphur, asphaltic bitumen which is classified as Discovered Bitumen Initially-In-Place. The company is planning additional resource assessment on the remaining acreage.

PROJECT STATUS / STATE OF DEVELOPMENT

Following a successful on-site "proof-of-concept" production test in Q3, 2005, the Company designed and fabricated a fully instrumented, PLC-controlled pilot plant/demonstration unit that has been used to assemble an extensive database of operating metrics and engineering design parameters. This development prototype has further served as the Company's demonstration plant for regulators, investors and other industry stakeholders. Having substantially de-risked the project in completion of key technological, resource delineation, regulatory milestones, and having closed stage 1 financing, the Company is now completing mine planning activities, an independent resource assessment and production plant procurement and fabrication.

RELEVANT EXPERIENCE

US Oil Sands is led by an experienced Board of Directors and management team that have significant conventional, heavy oil and oil sands experience. The Company has engaged leading industry consultants to support internal initiatives including regulatory permitting, engineering and process design, and resource delineation. Technical development alliances with world-class industry partners have effectively supported the Company's multi-disciplined in-house management and operations teams.

OUTLOOK / FUTURE PLANS

US Oil Sands' PR Spring oil sand mine and bitumen extraction facility is a shovel-ready project, poised to bring much needed employment to the Uinta Basin and technological leadership to the embryonic oil sand industry in Utah. Unlocking the substantial oil sand resource in Utah will ultimately make a significant reduction of the nation's dependence on imported sources of fossil fuel energy.

Western Energy Partners, LLC

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COMPANY DESCRIPTION

Western Energy Partners, LLC (WEP – a wholly owned subsidiary of Endeavor Capital Group, LLC) is an energy development company with direct and affiliate interests in oil and gas drilling, tar sands mining and extraction, oil shale and alternative fuels/renewable energy development & technologies. Based in Salt Lake City, Utah, WEP is involved in diverse energy projects worldwide.

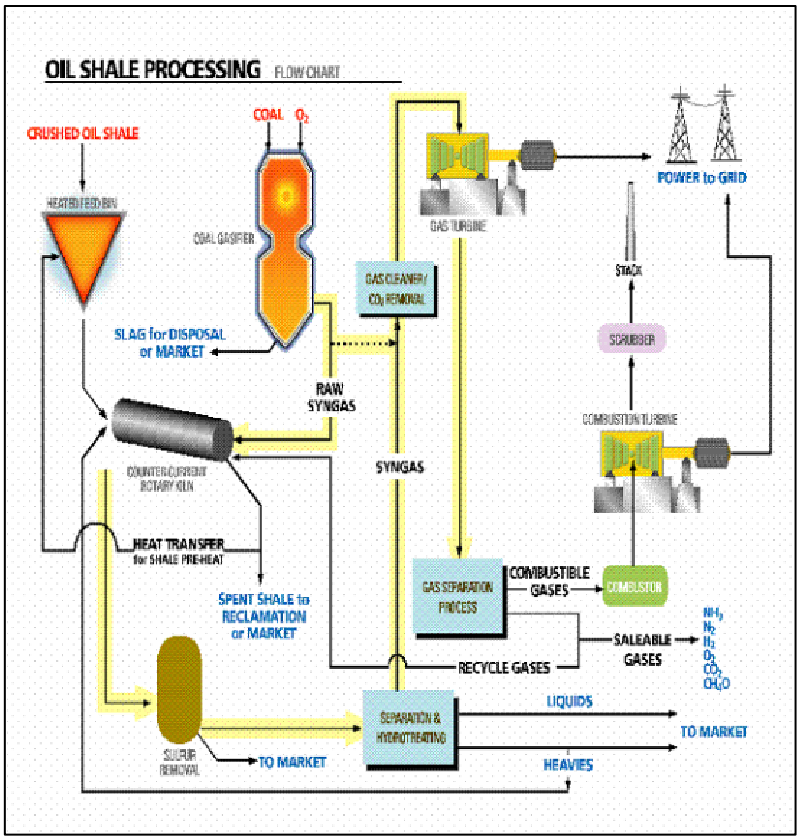
OIL SHALE INDUSTRY ROLE

WEP is a proponent for further development and implementation of certain retorting technologies that it believes can be employed for commercial production. It is interested in furthering the demonstrated technologies and developing projects in the oil shale industry as a resource owner / developer / facilitator.

DESCRIPTION OF TECHNOLOGY

This process for extraction of hydrocarbons from oil shale involves bringing together a number of established industry technologies resulting in a number of positive, commercially viable outcomes.

- The core technology utilizes inexpensive, abundant coal, which is gasified to produce a hot, hydrogen-rich "syngas" as process "sweep gas" which is introduced into a rotating kiln containing crushed oil shale.
- Under tightly controlled conditions, the hydrocarbons are extracted from the shale in a continuous pyrolysis process.
- The enriched hydrocarbon vapors are removed from the kiln, separated from the syngas and upgraded (also using established technologies) into high quality petroleum/ petrochemical feedstocks.
- The remaining hot, hydrogen-rich syngas is utilized to create added process revenues including the cogeneration of electricity and/or production of valuable chemical byproducts - an effectual "polygeneration" of clean energy efficiency.



TYPE / LOCATION OF RESOURCE HOLDINGS

- **Tar Sands**: Owner of 760 permitted acres (private, fee-simple land) with 50mm bbls+ core-drilled surface minable reserves and a nearly completed 2,500 bbl/day dry froth/bitumen extraction plant & facility on the northern end of Asphalt Ridge formation near Vernal, Uintah County, Utah.
- **Oil Shale**: No holdings the present.

PROJECT STATUS / STATE OF OIL SHALE DEVELOPMENT

In 2004, a third party commissioned a study under the auspices of the Department of Chemistry and Fuels Engineering of the University of Utah. That study applied the above referenced oil shale extraction technology to shales originating in the same formation as those of interest to this project. The publicly released Executive Summary of that study listed among its conclusions:

- The recovery of hydrocarbon values from mined and crushed shale can be accomplished in a rotary kiln in a synthesis gas environment, with liquid yields in excess of 25 gallons per ton could be achieved under optimum operating conditions; and
- The produced oil shale derived liquid would be an acceptable hydrogen refinery feedstock; however, the produced liquids could be transformed into high quality synthetic crude if the upgrading technology employed at the Canadian Oil Sands Bi-Provincial Upgrader were applied to the derived liquid.

The study also noted that:

- The overall product distribution yields were encouraging in that rotary kiln pyrolysis of oil shale in a synthesis gas environment is feasible
- (The technology) may be a preferred process for the recovery of hydrocarbon values from mined oil shale, and
- There remain opportunities for experimental design for the optimization of the rotary kiln oil shale pyrolysis process.

RELEVANT EXPERIENCE

A finalist in the Department of the Interior / Bureau of Land Management's Oil Shale Research, Development and Demonstration (R, D & D) Program, Western Energy Partners, LLC, its affiliates and advisors have experience in oil shale/tar sands development, enhanced oil recovery, combined heat & power / cogen / polygen technologies and projects.

OUTLOOK / FUTURE PLANS

Working synergistically with its affiliates, strategic partners, Western Energy Partners, LLC will continue its efforts in advancing oil shale/tar sands extraction technologies and projects with the goal of the realization of large-scale commercial production; this within the larger vision of our nation achieving a greater degree of energy independence.

Great Western Energy, LLC

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COMPANY DESCRIPTION

- Great Western Energy (GWE) is a privately held company devoted primarily to the acquisition and development of shale resources. Corporate headquarters are in Northern Virginia and operations primarily in Utah.

OIL SHALE INDUSTRY ROLE

- GWE's role in the shale industry is to control, lease, own and assemble land packages of realistic size and with sufficient and accessible resource appropriate for development. Operations and acquisitions have been primarily in the Uinta Basin of Utah.

TYPE / LOCATION OF RESOURCE HOLDINGS

- GWE owns, controls, or has interests in oil shale resources in the western United States.

RELEVANT EXPERIENCE

- GWE, through its members, has extensive experience in oil shale resource evaluation, oil recovery technology and project and product development. Its principals were active participants in the oil shale development efforts in Utah and Colorado during the late 70's and early 80's and have been continuously active in the scientific, geologic, mining and processing aspects of oil shale utilization and development.

SUGGESTED READING

OIL SHALE

"America's Strategic Unconventional Fuels: Volume I: Preparation Strategy, Plan, and Recommendations": Task Force on Strategic Unconventional Fuels: Washington, D.C. September, 2007. http://unconventionalfuels.org/publications/reports/Volume_I_IntegratedPlan(Final).pdf

"America's Strategic Unconventional Fuels: Volume II: Resource-Specific and Cross-Cut Plans" Task Force on Strategic Unconventional Fuels: Washington, D.C. September, 2007. http://unconventionalfuels.org/publications/reports/Volume_II_ResourceCrossCutPlans(Final).pdf

"America's Strategic Unconventional Fuels: Volume II: Resource and Technology Profiles" Task Force on Strategic Unconventional Fuels: Washington, D.C. September, 2007. http://unconventionalfuels.org/publications/reports/Volume_III_ResourceTechProfiles(Final).pdf

"Development of America's Strategic Unconventional Fuels Resources: Initial Report to the President and the Congress of the United States" Task Force on Strategic Unconventional Fuels: Washington, D.C. September, 2006. http://unconventionalfuels.org/publications/reports/sec369h_report_epact.pdf

"Oil Shale Management – General; Proposed Rule", Department of the Interior, Bureau of Land Management, July 23, 2008. http://edocket.access.gpo.gov/2008/pdf/E8-16275.pdf

"America's Oil Shale; A Roadmap for Federal Decision Making", Department of Energy Office of Naval and Oil Shale Reserves, December 2004.

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"Presentation to National Academy of Sciences Workshop on Unconventional Fuels" Heinemann, Robert April 2005.

"Shale Oil, Tapping the Treasure", Loucks, Robert Alden, Xlibris Corporation, 2002. www.xlibris.com

"Strategic Significance of America's Oil Shale Resource, Volume I – Oil Shale Resources Technology and Economics", Department of Energy, Office of Naval Petroleum and Oil Shale Reserves, March 2004.

"Strategic Significance of America's Oil Shale Resource, Volume II – Assessment of Strategic Issues", Department of Energy, Office of Naval Petroleum and Oil Shale Reserves, March 2004.

"Testimony on Peak Oil before the House Subcommittee on Energy and Air Quality", Aleklett, Kjell.December 7, 2005, p. 5. <http://www.cleanpeace.org/images/Aleklet.pdf>

TAR SANDS

"International Centre for Heavy Hydrocarbons, 1993 U.S. Bitumen Database", <http://www.oildrop.org>

"Major Tar Sand and Heavy Oil Deposits of the United States", Lewin and Associates, Inc. Interstate Oil and Gas Compact Commission, July 1983 – as reported by the U.S. Department of Energy, Office of Oil and Gas, February 2006.

"Natural Bitumen Resources of the United States" (U.S.G.S. National Assessment of Oil and Gas Fact Sheet), U.S. Department of the Interior, U.S. Geological Survey, Fact Sheet 2010-3010, May 2010.

SELECTED INTERNET WEBSITE LINKS

U.S. Department of the Interior, Bureau of Land Management

- Oil Shale Programmatic Impact Statement (http://ostseis.anl.gov/)
- Final Oil Shale Commercial Leasing Regulation (http://frwebgate6.access.gpo.gov/cgi-bin/PDFgate.cgi?WAISdocID=345772480153+0+2+0&WAISaction=retrieve)

U.S. Geological Survey (http://www.usgs.gov/)

U.S. Department of Energy, Office of Petroleum Reserves

- Office of Oil and Natural Gas (http://fossil.energy.gov/programs/reserves/index.html)
- Naval Petroleum and Oil Shale Reserves (http://fossil.energy.gov/programs/reserves/npr/npr_oil_shale_program.html)

Task Force on Strategic Unconventional Fuels (http://www.unconventionalfuels.org)

National Oil Shale Association (http://www.oilshaleassoc.org)

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