28th Annual Oil Shale Symposium

The 28th Oil Shale Symposium hosted by the Colorado School of Mines in Golden, Colorado this October was very successful judged by the number of attendees and the response to questions by those that attended. Participants from some 15 international countries and 28 states made up the over 350 that attended three days of technical and policy sessions.

OPENING PLENARY

Governor John Huntsman of Utah was the keynote speaker. He emphasized the importance of oil shale in Utah in a “complex mix of energy sources”, and the need for liquid fuels in our society. He related the need for “clean oil shale development” that included a diversified portfolio of affordability, independence and sustainability.

Within the realm of sustainability Governor Huntsman stressed the need for study of the level of land use, water usage, air emissions, carbon capture and sequestration, infrastructure and socioeconomic needs, and cost. The governor urged the participants to “Think Bigger and Bolder”. He applauded the efforts of two Utah firms Red Leaf and OSEC and urged support for USTAR.

Harris Sherman, the Director of Natural Resources for the State of Colorado was the next presenter. He gave the views of Governor Ritter which emphasized caution in the development of oil shale in his state. Mr. Sherman stressed the need to see the results of oil shale research and development before moving ahead with commercial development. He indicated there had been no progress on the five BLM R,D&D leases, and that development should not go ahead until we have all the answers (others disputed this).

Mr Sherman’s address then focused upon the challenges facing oil shale development in Colorado, including water supply, water quality, wildlife issues, energy requirements, cumulative impacts, and community challenges.


He further gave the status of development of proposed regulations to set out policies and procedures for the implementation of a commercial leasing program for oil shale. Draft regulations are currently under review. He said he believed developers needed to have the regulations so they could make informed decisions about proceeding with R,D&D projects.

Pending the outcome of congressional action, the regulations should be issued very soon, according to Dr. Wade.

International Oil Shale Projects

The Oil Shale Symposium highlighted oil shale projects around the world. Significant progress was reported in China, Estonia, Brazil, Australia, Morocco and Jordan. Many other countries were represented at the conference indicating the increasing international interest in oil shale.

Of particular interest is the ongoing progress in Estonia where “Eesti Energia (EE) is the leading energy utility in the Baltic States as well as the biggest oil shale utilizing company worldwide.” “Most of the oil shale mined in Estonia today is utilized as a feedstock for the production of electricity. Approximately 20% of the oil shale is used for shale oil production.” The Narva Oil Plant operates two unique solid heat carrier installations—the only functioning plants of their kind in the world.”
Carbon Management and CO₂ Sequestration

Alan Burnham of American Oil Shale LLC (AMSO) presented a paper titled CO₂ Sequestration in Spent Oil Shale Retorts at the 28th Oil Shale Symposium in Golden, CO.

The paper indicated the three possible ways of reducing CO₂ emissions for in situ oil shale projects:  
- Disposal in deep geologic formations  
- Sale for enhanced oil recovery  
- Mineralization in spent retorts

The presentation then focused on the last of the three options, and indicated that spent retorts might be able to store all the CO₂ produced from in situ retorting, because:

- There is enough porosity
- There are brines available in the area from natural gas wells and onsite aquifers—one might concentrate them with distillation or ROM
- High residual temperatures will enhance mineralization kinetics

The presentation then went into the calculation of available porosity in retorted in situ oil shale retorts. It concluded that for a 27 gal/ton oil shale carbonate mineralization would take about half of the available porosity.

Thus all of the produced CO₂ could be disposed of in a spent in situ oil shale retort.

According to Dr Burnham there is work to be done to confirm these initial findings:

- Determine whether thermodynamic and kinetic conditions make CO₂ mineralization in spent retorts a viable option
- Field test opportunities exist in late 2010 (end of AMSO pilot test) and 2014 (end of AMSO semi-works test)
- AMSO will examine the availability of nearby markets for the use of CO₂—EOR
- If neither of these options appear viable, seek a deep injection sequestration option.

Kevin Bacon of SI-International presented a paper Oil Shale Sourced CO₂ Sequestration Options in the Uinta & Piceance Basins—Utah and Colorado.

The presentation outlines a data base that compiled data from 23,000 oil and gas wells. From these data a suit of maps was prepared that identify basin wide geologic formations most suitable for CO₂ sequestration.

This work is a preliminary assessment of the viability of sequestration of CO₂ in the formations underlying oil shales in Colorado and Utah. The work focused on the area surrounding the White River oil shale mine in Utah.

And the work was offered as a guide for application to other geologic formations for future geosequestration projects related to oil shale, and other industries that produce CO₂ such as refineries and thermo-electric power plants near the Uinta and Piceance Basins of Colorado and Utah.

Oil Shale Exploration Company (OSEC) Update

The following are excerpts from the OSEC publication American Energy Independence Through Global Innovation.

"After careful study, OSEC currently intends to use the Petrosix Process (a patented retort process) as the technology to process the mined oil shale into shale oil at its Utah properties.

The Petrosix process has been under development since the 1950’s and is one of the few retorting processes in the world that can show significant production of shale oil and effective on-stream factors. The world’s largest operational surface oil shale pyrolysis reactor is the Petrosix thirty-six foot vertical shaft kiln which is located in Sao Mateus, Brazil. This retort processes 260 tons of oil shale per hour and produces over 3,800 barrels per day of shale oil. Oil shale from the White River Mine, located in Northeast Utah, was tested during the mid 1980’s using the Petrosix process in Brazil. The test results were positive."

Dan Elcans of OSEC states, "The Petrosix retort technology is owned by Petrobras and has been operational in Brazil since 1992."
Colorado Water District issues water study

The Colorado Water Conservation District has recently issued a report titled "Energy Development Water Needs Assessment (Phase I Report)". URS Corporation prepared the report for the District with the assistance of an advisory group from industry, government, and private citizens. The report covers the needs for water in North Western Colorado through 2050 for natural gas, coal, uranium, oil shale and electricity generation. The study estimated the direct demands as well as the water requirements for communities. Phase II will estimate water availability.

Western Energy Corridor Initiative

The Western Energy Corridor, which extends from Alaska through western Canada and the United States, contains some of the world’s richest deposits of hydrocarbons and energy minerals, including trillions of barrels of oil equivalent in place (BOE) of conventional oil, natural gas, coal, oil shale, oil sands, heavy oil and uranium. Development of the world-class unconventional hydrocarbon resources within this corridor, could help alleviate U.S. energy supply vulnerability, providing a strategic source of energy, including liquids fuels and other products far into the future.

Concurrent development of unconventional fuels and other energy and mineral resources will create increasing competition for limited resources of water, and impacts to air, habitat, and wildlife in the region. Local communities, infrastructures, and economies will face increasing demand for roads, electricity, law enforcement, labor and other services as a result of this development.

Therefore, this initiative is focused upon an effort to coordinate, integrate, and organize the scientific and engineering efforts required to conclusively evaluate the potential impacts of this potentially large development activity.

Entities from government, industry, national laboratories and educational institutions are investigating how to proceed with this initiative.

Programmatic EIS and Regulations for Oil Shale Leasing

The Proposed Oil Shale and Tar Sands Programmatic Environmental Impact Statement was issued in final form in September 2008. BLM selected Alternative B as the Proposed Plan Amendment. Alternative B makes 1,991,222 acres of oil shale lands available for commercial leasing in Colorado, Utah and Wyoming. One million acres of these designated lands are in Wyoming, 631,000 acres in Utah, and 360,000 acres in Colorado. "Additional NEPA Analyses will be required before leases will be issued for commercial development."

Draft regulations to establish a commercial oil shale leasing program were issued and comments sought from the public by BLM. As of the writing of this report final regulations had not been issued.

A Congressional moratorium prohibiting BLM from competing the PEIS and regulations was allowed to expire September 30, 2008. No other Congressional action has been taken to date.
Innovative Technologies and Ideas

A partial list of projects receiving attention during this period follows:

**Shell Mahogany Project**
Electric heated in-situ process pilot tested in the field. Freeze wall test in progress on private land.

**Chevron**
CO2 injected in-situ process planned for testing at its RD&D lease in Colorado.

**AMSO**
Indirect heated in-situ process with a unique ground water protection strategy planned for testing at its RD&D lease in Colorado.

**OSEC**
Surface retorting and underground mining project in Utah with mine opening planned in the near term. See more information on page 2.

**ExxonMobil**
In-situ Electrofrac process under development with field tests planned in the future.

**Raytheon/Schlumberger**
Microwave in-situ technology tested at laboratory scale with field tests in the planning stage.

**EcoShale**
Modified insitu retorting process being tested in Utah

**Shale Technology International**
Paraho surface retorting technology with pilot plant in Colorado.

**Independent Energy Partners**
Geothermic fuel cell process with work being conducted at PNNL.

**PyroPhase**
Radio frequency insitu process

**Monarch Mining**
Surface retorting process using proven mining methods and surface retort. Work conducted at Idaho National Laboratory.

**University of North Dakota**
Process uses water and ethyl alcohol in a surface reactor to recover shale oil.

**CRE Energy**
Process uses a rotary kiln fired with hydrogen to reduce CO2 emissions.

**QER Australia**
Surface mine and retort evaluating future commercialization approach at Stuart plant near Gladstone.

For more information see links page on [www.oilshaleassoc.org](http://www.oilshaleassoc.org) and individual project web sites.