

Oil From Shale?

Extraction hurdles are high

by **Randy Udall**
and **Steve Andrews**

Buried underground in western Colorado is a trillion tons of oil shale. For a century, men have tried and tried again to unlock this energy source. But the rocks have proved stubborn, promising much, delivering little.

Recently, the U.S. Department of Energy published a new report on oil shale. It claimed that the nation could wring “200,000 barrels a day from oil shale by 2011, 2 million barrels a day by 2020, and ultimately 10 million barrels a day” from fields in Colorado, Utah and Wyoming. These predictions both the production target and their timing are preposterous, as some industry experts admit.

But hyping oil shale is nothing new. As geologist Walter Youngquist once wrote, “Bankers won’t invest a dime in ‘organic marlstone,’ the shale’s proper name, but ‘oil shale’ is another matter.”

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California Rep. Richard Pombo and Utah Sen. Orrin Hatch are spearheading efforts to jumpstart the industry. “I find it disturbing that Utah imports oil from Canadian tar sands, even though our oil shale resource remains undeveloped,” says Hatch.

In truth, oil shale presents a paradox. If these rocks are, as some claim, the richest fossil fuel resource on Earth, why has it been so difficult to unlock them?

The primary explanation is that oil shale is not a very practical fuel. Compared to the coal that launched the Industrial Revolution or the oil that sustains the world today, oil shale is the dregs. Coal seams a few feet thick are worth mining because coal contains lots of energy. If coal is good, oil is even better. And oil shale? Per pound, it contains one-tenth the energy of crude oil, one-sixth that of coal.

Searching for appropriate analogies, we enter the realm of Weight Watchers. Oil shale is said to be “rich” when a ton yields 30 gallons of oil. An equal weight of granola contains three times more energy. America’s “vast,” “immense” deposits of shale have the energy density of a baked potato. Oil shale has one-third the energy density of Cap’n Crunch, but no one is counting on the Quaker Oats Company to become

a major energy producer soon.

Historically, oil shale has been mined, crushed and roasted in large kilns, or “retorts.” The slag, swollen in volume and contaminated with arsenic, must then be disposed. The process is so costly, laborious and polluting that global output has never exceeded 25,000 barrels a day, compared to 84 million barrels of conventional oil production.

In the last 150 years, humans have used 1 trillion barrels of conventional oil. The second trillion will be consumed in the next 30 years. Given projected demand for fuel, Royal/Dutch Shell has been experimenting with a new way to produce shale oil, a way that is, at first glance, more promising.

Humor columnist Dave Barry once demonstrated that if you put a “strawberry Pop-Tart in a toaster for five minutes and 50 seconds, it will turn into a snack-pastry blowtorch, shooting flames up to 30 inches high.” Putting a chunk of oil shale into your toaster would not offer similar excitement, but in a strange way, Shell’s fascinating experiments near Rangely resemble something Barry might attempt if he had the money to build the world’s largest underground toaster oven.

The plan is audacious: Shell proposes to heat a 1,000-foot-thick section of shale to 700

degrees, and then keep it that hot for three years. Beam me up, Scotty, but first share some details. Imagine a 100-acre production plot. Inside that area, the company would drill as many as 1,000 wells. Next, long electric heaters would be inserted in preparation for a multi-year bake. It's a high-stakes gamble, but if it works, a six-mile by six-mile area could, over the coming century, produce 20 million barrels, roughly equal to remaining reserves in the lower 48 states.

Although Shell's method avoids the need to mine shale, it requires a mind-boggling amount of electricity. To produce 100,000 barrels per day, the company would need to construct the largest power plant in Colorado history. Costing about \$3 billion, it would consume 5 million tons of coal each year, producing 10 million tons of greenhouse gases. (The company's annual electric bill would be about \$500 million.) To double production, you'd need two power plants. One million barrels a day would require 10 new power plants, and five new coal mines. And 10 million barrels a day, as proposed by some, would necessitate 100 power plants.

How soon will we know whether Shell's technology is economic? The company plans to do more experiments, before making a final decision by 2010. If it pulls the trigger, it would be at least three or four years before the first oil would flow, perhaps at a rate of 10,000 barrels a day. That's less than one-tenth of 1

percent of current U.S. consumption. But if it turns out that Shell needs more energy to produce a barrel of oil than a barrel contains, all bets are off. That's the equivalent of burning the furniture to keep the house warm. Energy is the original currency, electricity its most

"Americans love panaceas."

valuable form. Using coal-fired electricity to wring oil out of rocks is like feeding steak to the dog and eating his Alpo.

In a ham-and-egg breakfast, the chicken is involved but the pig is committed. With half the world's oil shale resources located here, our region is committed. Another recent report by the RAND Corp. warned that if oil shale developers "overstress the environmental carrying capacity of the area, we may never see more than a few hundred thousand barrels per day of production."

Large-scale development of the kind proposed by the U.S. Department of Energy and Pombo would be a disaster. The Department of Energy casually dedicates all of western Colorado's surplus water to oil shale, proposes enormous open-pit mines 2,000 feet deep, and advocates retorting up to 6 billion tons of shale each year. That's twice the tonnage of all coal mined in the U.S. and China. This is not a vision, it's a nightmare.

Americans love panaceas. We want thinner thighs in 30 days, a pill to cure baldness, an ultrasonic carburetor that will double our mileage. A magic wand would be nice, because the nation faces serious energy challenges. Since domestic oil production peaked 30 years ago, the need for energy efficiency, conservation and renewable energy has been obvious. Instead, like an addict on a binge, we continue to pursue a policy of "strength through exhaustion." Drilling the Arctic National Wildlife Refuge before improving our woeful vehicle efficiency is one example of this brain-dead approach.

What contribution can oil shale make to energy security? Producing 100,000 barrels per day of shale oil does not violate the laws of physics. But the nation currently consumes that much oil every seven minutes. Improving the efficiency of our automobiles by 2 miles per gallon would save 20 times as much fuel, saving consumers \$100 billion at the pump. The National Academy of Sciences has stated that cars, trucks and SUVs that get 30, 40 or 50 miles per gallon are possible. An aggressive national commitment to fuel efficiency is not optional, it's inevitable. In time, a more efficient fleet could save 20 times as much petroleum as oil shale is likely to ever provide.

All hype aside, oil shale is the poorest of the fossil fuels, containing far less energy than crude oil, much less even than hog manure, peat moss or Cap'n Crunch. A meager amount of

energy, tightly bound up in an enormous volume of rock, oil shale seems destined to remain an elusive bonanza, the petroleum equivalent of fool's gold. ■