The Oil Drum
DISCUSSIONS ABOUT ENERGY AND OUR FUTURE

More on oil shale

Posted by Heading Out on July 5, 2006 - 11:23am
Topic: Supply/Production
Tags: colorado, gassbuggy, oil shale, project plowshare, rio blanco, rulison [list all tags]

Hmmm! Well the tone of some the comments on my last post -dealing with nuclear development of oil shale, helps illustrate one of the points that I want to make in this, a continuation in the posts on oil shale. The tone was quite negative, in general, with a number of folk being disturbed at my even bringing it up. It points to the fact that, as a political reality (bearing in mind that I tried to stick to technical matters) the use of nuclear adjustment to the local geology is not likely going to be popular. As tstreet noted, there is an article in the Colorado Constitution (article XXVI) that he helped put in there.

> Section 1. Nuclear detonations prohibited exceptions. No nuclear explosive device may be detonated or placed in the ground for the purpose of detonation in this state except in accordance with this article. (Adopted by the People, November 5, 1974 Effective upon proclamation of the Governor, December 20, 1974.)
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> Section 2. Election required. Before the emplacement of any nuclear explosive device in the ground in this state, the detonation of that device shall first have been approved by the voters through enactment of an initiated or referred measure authorizing that detonation, such measure having been ordered, proposed, submitted to the voters, and approved as provided in section 1 of article V of this constitution. (Adopted by the People, November 5, 1974 Effective upon proclamation of the Governor, December 20, 1974.)

While I did not know about that as I initially planned this series, I had intended just to point out that the unhappiness of just one Senator with a nuclear program (and I was thinking of Senator Reid and Yucca Mountain) can delay its implementation potentially for decades. In this case it is likely that there would be at least eight, and I think the point is made. However, since I do think it is useful for folk to know these things, I thought I would continue with the rest of the story from a technical point of view.

Following the debates about the potential benefits that might occur from the use of nuclear explosives it was decided to see if it would work in three test detonations, that were given the names Gasbuggy ; Rulison and Rio Blanco.

The Gasbuggy shot, in 1967 used a 29 KT device at a depth of a 4,240 ft deep shaft, and created a cavity that was 80 ft wide and 335 ft tall, when one included the chimney. It also fractured the light shale around the opening. Anticipated dimensions were 165 ft with a 350 ft chimney.

The Rulison shot, in 1969, used a 43 KT device at a depth of 8,426 ft. it produced a cavity that

was 152 ft wide, with a fracture zone that extends some 200 ft into the surrounding sandstone. (Predicted size was 160 ft with a 300 ft chimney). It is interesting to note that contractors now are seeking to drill near that shot, in order to extract gas from the shale. They have been restricted to drilling no closer than half a mile. And, lest there be some concern, let me quote from the article.

> All the gas freed by the nuclear blast was produced and burned off at the surface, Bennetts said. The radioactivity at the site wasn't high to begin with, and since has decreased to below background levels, he said.
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> The blast formed a sealed cavity underground, according to state and federal authorities. "Even if you drilled a well into that cavity again, there's very little radioactivity remaining to be produced," Bennetts said.
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> But authorities say drilling limits will prevent the cavity from being touched. COGCC director Brian Macke said the COGCC was "very careful" in its decision governing drilling in the area, and will require strict conditions such as reports from Presco showing tracking of directional drilling to make sure the cavity isn't disturbed . . . . . Though it's not required, Presco will have gas from the well tested for radioactivity, he said..

There was some measure of the gas produced

> Following the blast, in 1970 and 1971, the companies burned off, or "flared," 430 million cubic feet of gas into the open sky. The commission said that the level of radioactivity in the air surrounding the site did not exceed normal background levels.

Rio Blanco, shot in 1973, was made up of a series of 3 30-KT devices stacked up the shaft, at a depth of 7,000 ft, with the devices actually at 1780, 1899 and 2039 m. Each device created a cavity that was some 120 ft in diameter, and about 250 ft high. (Against predictions of a 140 ft diameter with a 300 ft chimney.) Fractures from the explosions extended about 200 ft into the rock around the shaft.

The production of gas from the shots was reported to be less than had been anticipated and the levels of radiation higher, so that while the volume of gas that could have been collected "would have been commercially viable," that only held true had the gas been uncontaminated. It was not.

Interestingly there have also been tests of this technology in the Former Soviet Union, one of which is reported to have increased the gas flow by a factor of 20 However our purpose is to look at the development of reserves and their contribution to the marketplace within the foreseeable future. Particularly within the next fifteen years, when we can assume that the shortages of supply will become evident, it can, I think, be realistically assumed that there can be no use of nuclear devices to enhance oil shale recovery out West.

At the same time, the toughness of the rock its strength and behavior under mechanical attack make machine mining of the shale a likely impracticality on a sufficient scale to produce perhaps much more than 100,000 barrels a day within that time frame. That judgment on my part is based also on the need to regenerate the capital for the program, reconstruct the facilities and get through all the necessary paperwork.

There are alternate methods for mining the material, including those that are used in conventional metal mining of large-scale underground deposits. However, the mining of something that can generate high levels of potentially explosive gases, if very large scale fracturing and blasting is undertaken, creates levels of risk that will make development of such plans a lengthy process. The mining of Gilsonite for example, was only realistically achieved when the hydrocarbon was mined using high pressure waterjets. But the strength of the oil shale makes the conventional use of that technique impractical - even if it were allowable, which is conjectural.

With these prospects being diminished, the only likely potential for oil shale to have a significant impact in the next fifteen years is likely to be through some smaller scale in-situ retorting. There are techniques such as THAI being tested in the oil sands of Alberta, and the in-situ retorting that Shell is currently evaluating. My intent is to discuss these in the next, and final post in this series.

The series also includes:
Where it is
Mining the shale
and the nuclear option