



Microbial Enhanced Oil Recovery

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This week [Business Week](#) magazine has a whole special section on oil. Now, I don't usually read magazines like *Business Week* or the *Economist*, but my father tells me that in general, *BW* is a pretty moderate publication. The main article on the issue, "Is there plenty of oil?", is pretty optimistic that there is, but is not entirely dismissive of the idea that there might not be. Of course, then they say something like this, which TOD readers have expressed wariness about before:

But there's little reason to assume that the next five years will simply see a continuation of current trends. Thanks to a combination of higher prices, increased exploration and production spending, and improved technology, oil supplies are poised to grow much faster than they have in recent years. Cambridge Energy Research Associates (CERA), a respected energy consultant, sees 20 or more major new fields coming on line each year through 2010. Altogether those fields could boost worldwide production capacity 15%, from 87.9 million barrels per day to 101.5 million by the end of the decade, CERA estimates. As a result, supply should exceed demand by 7 million bbl. per day, a huge leap from the current cushion of 1 million bbl.

In a companion article called "Tapping Gushers Beneath The Gushers", they run through some methods for recovering oil from mostly depleted wells. These include techniques like supercomputer simulations and CO₂ injections. Then, they mention MEOR: microbial enhanced oil recovery. The online version is subscription only, but here are the relevant paragraphs:

The latest idea is called MEOR, for microbial enhanced oil recovery. Various labs around the world are engineering special bugs that generate CO₂ biologically, along with detergent-like chemicals that help flush oil out of rocks. The microbes can be cultivated underground or in well-side vats. Because they grow explosively, the Energy Dept., which is funding several research projects, says MEOR technology may be the most cost-effective of all tertiary processes.

MEOR is already used in Venezuela, China, Indonesia, and the U.S. to treat deposits of heavy oil -- a molasses-thick form of oil. Researchers at Oak Ridge National Laboratory hope to develop new armies of bioengineered bugs that can infiltrate underground rocks and turn the gunky stuff into the sweet-flowing crude that erupts like the gushers in Hollywood movies.

(A few petroleum companies, universities and governments that also have descriptions of the process: [Cano Petroleum](#), [Mississippi State](#), [Canada](#).)

Anytime I hear about introducing any kind of species--be it bacteria or plant life--into an environment where it didn't exist before, I get uneasy. We all know about [kudzu](#), and perhaps you've heard of the [northern snakehead fish](#) (wow, the government has a whole website called [invasivespecies.gov](#)!). Can it really be beneficial to inject microbes into the ground and let them grow unchecked at a very fast rate?

On the other hand, as the Canadian government website (which also has links in a bibliography) points out (in a section called "Sustainable Development and MEOR"), the use of microbial bacteria may reduce or eliminate the use of chemicals during drilling:

As MEOR reduces or eliminates the need to use harsh chemicals during oil drilling, it is an environmentally compatible method of carrying out tertiary oil recovery. MEOR will become increasingly economically feasible as genetic engineering develops more effective microbial bacteria that may subsist on inexpensive and abundant nutrients.

OK, so far it doesn't sound so bad, aside from my original objection. And in fact it was difficult to find websites listing other environmental drawbacks, but I found these [lecture notes](#) which list the following problems:

A. Subsurface water

- 1. migration of organisms or metabolites into groundwater

B. Wastewater

- 1. spent fluids due to additional drilling
- 2. equipment washing
- 3. brinewater, media, chemicals for pH adjustment

C. Atmospheric Emissions (e.g. H₂S)

D. Solid Wastes

- 1. bacteria in filter solids

So j, what more can you tell us about MEOR?

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