ENHANCED OIL RECOVERY

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ABSTRACT

In the United States we have about 300 billion bbls of oil in known fields but which will not be recovered because of economic and technological limitations. This oil is the target of Enhanced Oil Recovery (EOR).

But, even given reasonable improvements in oil price policy and process technology, the success of EOR projects is not guaranteed. The high cost of the injected materials and the necessity of maintaining certain critical conditions at the injection front will require much more geological assistance to the reservoir engineers than has been the case for conventional recovery processes.

This paper provides an overview of the technological and economic aspects of EOR and a discussion of the type of geological assistance which will be needed in evaluation and implementation of EOR projects.

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NUCLEAR POWER AND THE GEOLOGY OF URANIUM

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ABSTRACT

Nuclear and coal-fueled power plants are the only economically viable large-scale sources of new electrical energy available to man in the next several decades. Even without the ERA-required "best-available technology" of stack-gas scrubbers for coal-fired power plants, the total cost to produce electricity from nuclear power plants is clearly less expensive than from coal-fired power plants at most locations in the United States. Current "economic equivalency" of electrical-generating costs between coal and nuclear would support a nuclear fuel cost of approximately $100 per pound of U_3O_8 (the 1979 price is $43/lb of U_3O_8).

The present domestic and worldwide supply-demand relationships indicate a continued and strong need for successful uranium exploration and development programs throughout the next several decades. The economic realities would cause the price of uranium to rise to permit the development of low grade uranium resources (100-500 ppm U_3O_8) competitively with coal should the discoveries of higher grade uranium resources be insufficient to fulfill the increased demand.

Historically (1950's to 1978) the bulk of the world's uranium has been produced from:

1) lower Proterozoic uraninite placer deposits in quartz-pebble conglomerates of braided-river systems;
2) epigenetic uranium deposits in sandstones located at or near ground-water oxidation-reduction interfaces, commonly in close association with organic material in fluvial sandstones; and
3) hydrothermal vein uranium deposits.

These three distinctly different geologic environments continue to be important exploration targets in the search for new uranium deposits.

Exploration for economic uranium deposits has been expanded to many geologic environments which have generally been overlooked in the past. Most notable among these are:

1) granitic uranium deposits (commonly anatectic);
2) alkalic igneous-hydrothermal uraniferous environments;
3) altered acidic or alkalic volcanic ash, ash flow, or volcaniclastic environments;
4) metamorphic-hosted uranium deposits, variously interpreted as a metamorphic-hydrothermal or unconformity-related environment;
5) calcrete uranium deposits in evaporative, desert ground-water environments; and
6) unconformity-related environments.

Significant uranium deposits have been discovered in each of these geologic environments in the 1970's.

The expanded search for economically viable uranium resources and the improved market and technology factors have caused exploration and development efforts to advance far in recent years. Low-grade uranium resources that have been long known and ignored, such as uraniferous, black, organic-rich shales and marine phosphorites, are currently being developed for uranium production. *In situ* solution-mining activities have permitted economic exploration of uranium deposits that heretofore have been uneconomic because of their small size, low grade, or depth. Exploration drilling and development activities are expanding to greater depths.

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