

## FOREWORD

The 24th Annual Oil Shale Symposium was held at a time when the future of commercial shale oil production was very uncertain. Shortly before the Symposium, Unocal Corporation announced that the Parachute Creek oil shale operation was to cease operation as of July 1, 1991, and the company did not plan to reopen the facility. This effectively closed the only commercial shale oil operation in the United States.

Fred Hartley, former President and Chairman of the Board of Unocal, had been active in oil shale development since World War II, and it was largely through his forcefulness that Unocal built the Parachute facility. After his retirement and death, the Parachute facility was placed on a break-even or better operation and, when it became unprofitable during the 1990 calendar year, the decision was made to close the operation.

Armand Hammer, Chairman of the Board of Occidental Oil Company, strongly believed in the need for the United States to have an alternative liquid-fuel supply source because the demand for transportation fuels was increasing while U.S. production of crude oil had been decreasing every year from 1978 to 1991. Nearly two-thirds of the world's crude oil reserves (600 billion barrels) were in the Middle East, and U.S. dependence on the Middle East was increasing every year. Oil shale deposits in Colorado, Utah, and Wyoming contain an estimated 800 billion barrels of recoverable shale oil. The problem, of course, is to recover this shale oil at a cost competitive with that of conventional crude oil. Mr. Hammer was optimistic that a modified in situ retorting process could be developed by which shale oil could be produced at a competitive cost. He, with the support of western Congressional representatives, obtained government support on a matching basis for a long-term research and development program. As long as he was alive, Occidental Oil Company was committed to developing this process, but, upon his death, his successors terminated the operation because they be-

lieved that the research and development costs of modified in situ processing technology could not be justified under present economic and environmental climate.

Today, government and industrial support of a research and development program for Western oil shale is virtually nonexistent. The major oil companies who own oil shale lands and in the past funded oil shale research and development, now have only skeleton staffs of one or two persons working on oil shale topics, and they generally are involved in readying files for long-term storage. At this time, the future of the shale oil industry appears to be in the far distance.

In spite of the outlook, the papers presented at this 24th Annual Oil Shale Symposium covered the entire range of topics and are of excellent quality. Included in this Proceedings is a paper that inadvertently was omitted from the Proceedings of the 23d Symposium. It is published here to make the record complete, and I apologize to Mr. Ron Cattany for its omission.

This Proceedings once again is being published as a *Colorado School of Mines Quarterly*. During the early years of the symposia, the proceedings were published as *Quarterlies*, but when the sessions grew to the point that the papers given required more than one *Quarterly* per year, the Proceedings were published as separate volumes. Now that the number of papers is smaller and the number of attendees is less than 100, publishing the Proceedings once again as a *Quarterly* will give broader dissemination of the information.

The quality of the Symposium would not have been possible without the support of the authors' and their employers. The Colorado School of Mines and I wish to express our thanks for their continuing support.

James H. Gary  
Director  
24th Annual Oil Shale Symposium