

of us felt that the Department should be condemned or praised for its position on those matters, but that the due procedures should continue.

The second matter emphasized at Rifle was the conservation problem. There was extensive discussion on the need to recognize other values in the areas where oil shale was found. This was of deep concern to all and it appeared in our final report. "Conservation" was a goal with which none disagreed. The exact meaning of the word, however, may not have been the same to all. Because it might offer the greatest possibility of conserving the values other than oil shale, the Board gave a great deal of attention to the extractive process known as *in situ*. This involves retorting the shale in the ground and extracting the liquid at the surface. The problems of disposal of waste, the destruction of the landscape, the filling in of the valleys and all of the related aspects might be avoided by such a process. Two questions would require resolution, however. The first is the economics of the *in situ* process if it is found to be feasible. The second is whether the process would waste any substantial amount of the oil shale by leaving in the ground unrecovered shale oil. If the definition of the word "conservation" includes the avoidance of waste of oil shale itself, then the effort to conserve other values in the area might be outweighed by the need to conserve the oil shale from waste. We never did completely resolve this matter. The details of extraction were far beyond our capacity on the basis of the time and information and training available.

The efforts of every Board member to come to grips with the problem before us was interesting. Continually we by-passed the basic problems and tried to tackle details; continually we had to back up. The question of the method of extraction is one example; the details of leases that might be issued is another; the nature of the research and development that should take place was still another. Incidentally, the term "R & D," meaning research and development, is another example of the need for clear definition. Did the term apply to basic research alone or to applied research as well? Did it cover adopting a tested technique in one area to a new area with varying physical problems? The questions are infinite, even definition may not have resolved them. Some felt "R & D" was a detail; others indicated it might be a goal. Elements of that crept over into our final report.

Another problem continually discussed was concern over whether the federal government should get the maximum return to which it was entitled from the oil shale reserves it owned. This led to one interesting concept of collecting all information that could possibly be obtained before any lease was issued. On this basis the Government could then proceed to issue a lease based upon a fixed number of barrels of oil to be recovered. It took quite a little discussion to get to the heart of this question. It was resolved by pointing out that since no known method of recovery provided 100 per cent efficiency, to issue a lease on the number of barrels would lead to high-grading of the deposit, to the leaving of large amounts of the resource in the ground, to the inability to recover the marginal deposits, and to the destruction of the incentive to the lessee to increase his efficiency and productivity with a resulting increase to the Federal Government of gross receipts from royalties due to a greater recovery of the resource. Perhaps this problem was adequately resolved. Some of us were never sure it had been settled.

The question of who should do research and development continued to flare as an issue throughout all the discussion up to and including the final draft. Some felt that the Government should conduct all the research with its own personnel. Others appeared to feel that it should be done under a Government contract with the results becoming part of the national property to be used by any group that obtained a lease. Others appeared to feel that the Government should concentrate on basic research and leave the applied research to the private segment of our economy. The confusion of terms is obvious. There were heated discussions about the overfocusing of research by having it controlled from one place as contrasted to the greater possibility of a breakthrough by letting everyone have a try by his own method. A tendency to overgeneralize appeared in some of the proposals. The overgeneralization consisted of assuming that all companies were equally advanced or retarded in their development of the art of extracting the oil shale product. Some wondered if those that are behind were not trying to get the resources retained in federal ownership until they could catch up. We never knew. Certainly an overgeneralization was not called for. The companies