of those reserves are of an attractive grade which may ultimately be brought to the surface of the ground. I do not know, but I suspect that, in arriving at the estimates that are available today, it results largely from the view as to the utilizability with present or foreseeable technology. My company has looked into this in a preliminary engineering way without field work, and studied the feasibility of deep shaft mining of the reserves or what are usually meant by reserves. And our estimates about it are based on the conclusions that we reached from that necessarily preliminary study.

We do have those reserve figures which are in excess of our access and recovery by conventional mining methods, and therefore tend to include them in estimates of economically interesting number of barrels in the ground. It is certainly an ample basis for others to disagree or to apply lower potentials.

There are an estimated 480 billion barrels of reserves, which is a number we think is sound. That is an extremely large number. The number will remain extremely large, even if it were reduced to 150 billion barrels, or increased to 750 billion barrels.

My principal concern about the reserves is the probable rate of production from them. As I have said, much of these reserves are deep. They also exist, even when not deep, under very difficult conditions of access, often restricted geographical areas, and the question of the disposal of waste, difficult operating problems at various altitudes, all combine to make us conclude that it is most unlikely, at any time that we can foresee, that more than 2.5 million daily barrels of production simultaneously could be expected from the entire mass reserves of the basin.

We do think that 50,000 barrels could come onstream in 1970, and 100,000 barrels a day every year thereafter until 1980. That is a lot, when the capital investments or estimates are in the neighborhood of $130 million as the initial cost for approximately 50,000 daily barrels. Even at that rate, shale oil in 1980 would be supplying less than 6 percent of the estimated 17 million daily barrels of demand of petroleum liquid, and less than 20 percent of the increase in demand for petroleum liquids between now and 1980.

These facts, we think, make it plain that two comments often voiced in recent months are without any substantial foundation. First, there is no basis for the statement that shale oil may at any time inundate markets and, secondly the suggestion that the value of the reserves could retire the national debt, and pay a substantial cash bonus to all of us who are citizens and would be delighted to receive it, is without foundation.

At the rate of production that we can foresee, and the reserves that we can analyze as utilizable, and any conceivable evaluation of the final crude oil product, and any royalty rate that has been mentioned yet in hearings here, the revenues from maximum production would not suffice to even pay the interest on the national debt.

We began with the question, whether the commencement of shale oil production is desirable. We think it is, beyond any question; that it is not merely one of degree or of timing by a couple of years, but that it indicates unequivocally that new liquid sources are necessary and that, therefore, shale oil is a likely and needed substance.