

You may proceed.

Mr. KELLY. I have a prepared statement which I will read if that is appropriate.

Senator Moss. All right; if you wish to.

Mr. KELLY. Mr. Chairman, I am happy to appear before this committee today with respect to the Department of the Interior's five point oil shale development program announced by Secretary Udall on January 27, 1967. As you know, point four of that program involves the cooperation of the Atomic Energy Commission in research and development activities designed to investigate the capability of underground nuclear explosions to break oil shale for subsequent retorting in place. The AEC will be glad to continue its cooperation with the Department of the Interior in this very worthwhile undertaking.

The AEC has been working for a number of years with agencies of the Department of the Interior, primarily the U.S. Bureau of Mines, on studies and proposed applications of nuclear explosives for peaceful purposes as part of our Plowshare program.

These joint cooperative studies have been concerned with the potential of our developing Plowshare technology for utilization in increasing the recovery of this Nation's natural resources. We have been particularly concerned about such resources as oil, natural gas, and copper, which occur under conditions where conventional recovery methods are not economical or do not exist. One aspect of the jointly funded AEC-Interior research effort, which began in 1963, involves an attempt to determine whether nuclear explosives can be used to advantage in breaking up oil shale followed by restoring the broken shale in place. Results of these experiments are encouraging and lead us to believe that the use of nuclear explosives may provide an economical, efficient, and practical means for recovering and utilizing our vast, though latent, oil shale resources. These experiments have primarily involved aboveground retorting of suitable size material by the U.S. Bureau of Mines and site investigation and definition activities of the oil shale deposits with the U.S. Geological Survey and the U.S. Bureau of Mines. I will defer to the Department of the Interior as to the significance of the results of this work to date.

As you will recognize, the role of nuclear explosives in the development of a technology for the recovery of oil from shale is related to the ability to break and fracture large masses of rock. In short, the nuclear explosion acts as an underground rock crusher after which we hope that in-place retorting techniques can be applied and the resultant liquid oil pumped to the surface.

A nuclear explosion initially generates a shock wave, heat, and pressure which vaporize the rock to form a cavity that grows until the pressure inside the cavity equals that of the surrounding material. As the cavity growth stops and begins to cool, pressure inside the cavity decreases and the fractured rock, in most cases, begins to fall to the floor from the ceiling and walls, resulting first in the formation of a crudely hemispheric room. However, this spallation or collapse of the fractured rock continues progressively upward until a stable configuration is reached, usually in the form of a tall cylinder or chimney of broken rock.

I have a chart attached to this statement which illustrates these steps.

(Chart 1 follows:)