

actly this kind of a site where you do have underground waters of considerable volume, and I just want to raise these questions because other people will ask them.

Have you given consideration as to what might happen when you expose a large amount of oil shale to heats of several million degrees, whether it is Farenheit or Centigrade, containing a large amount of hydrogen, as to what effect this would have upon the force of your explosion?

Mr. KELLY. Yes, sir. This has been considered and in fact we did an experiment on our test site, the Handcar experiment in November of 1964, and our carbonaceous rock with some of those kinds of elements just to make sure that there were no extraneous effects such as a hydrogen explosion.

I might point out that the very intense temperatures only occur in a very small zone, the inner circle on this upper left hand figure of my chart 1, which only extends out for a few meters.

Senator ALLOTT. In your dolomite explosion, using that as an example, on chart 2, what was roughly the cross section of your rubble structure? What would be the diameter of it?

Mr. KELLY. This is Project Handcar. Its dimensions across are roughly 140 or 150 feet and its height is roughly twice that.

Senator ALLOTT. Now, moving on to your third chart which very graphically displays the method your propose to utilize—your multiple array with your various explosions with holes drilled for air injection—this is very similar to the method that was employed in Spain or Sweden for the extraction of oil from oil shale, there where holes were drilled close to each other and artificial heat units were introduced into the bottom of the hole and the oil was pumped out of another hole.

Are you acquainted with that method?

Mr. KELLY. Not with those particular ones in Spain.

Senator ALLOTT. I am not sure whether it was Spain or Sweden.

Mr. KELLY. I know there has been a fair amount of this kind of research going on; yes, sir.

Senator ALLOTT. I think that is all I have, Mr. Chairman.

Senator MOSS. The Senator from Wyoming; any questions?

Senator HANSEN. I am quite impressed with the problems that you have been discussing, Mr. Kelly.

I was just wondering if you have any idea when Projects Rulison and Dragontail will be budgeted and what you think they should be budgeted for?

Mr. KELLY. Well, Dragontail and Rulison are both gas stimulation type projects similar to Gasbuggy as opposed to oil shale.

I think the budgetary problem is one that depends in part on how much it turns out when you get the Dragontail proposals and Rulison evaluated as to how much the cost is, for the Government part of it. If it is relatively small you probably can get it soon. If it is larger, it is going to come later.

Senator HANSEN. What is the status of the cancellation or the deferral of the present Plowshare projects in Nevada?

Mr. KELLY. Well, that was a cratering shot designed for the development of a nuclear excavation technology for digging canals, highway cuts, harbors, and that sort of thing.