These scientists have grown up with the space program, and the universities where they were trained were also adjusted to the new science. These new scientists are from 30 to 40 years old. They now have 10 years of experience and a thorough understanding of the potentialities of space. The educational process was a natural evolution and now its effects are beginning to appear.

Mr. GURNEY. Take the Earth sensors as an example. This is a new concept, to use space to aid in the management of our water and food resources. What was the source of that concept? Is it a product of the scientific community, industry, or the Government?

Mr. ABLE. A combination of all of them. Crude sensing devices were first produced for military application; then more sophisticated sensors were developed for the space program. Now their capabilities have improved so substantially that we are able to project many economically productive applications for their use in space. This is a brand new field, and we are just on the threshold.

Mr. DORRENBACHER. Still on the subject of Earth sensors and how they relate to the surveillance of our natural resources on a national or global scale, we see this kind of evolution: from 30 years ago, when we had crude weather prediction sensing devices and nothing more, we progressed to somewhat more sophisticated sensors, and better correlation and reporting systems, to the use of sensors in aircraft. The first aircraft systems were used to survey larger surface areas than had ever been surveyed before. It was then possible to conduct large area surveys in a very short period of time. Looking at color differences on the surface of the Earth gave us a whole new category of intelligence. From the first use—to detect camouflage—the science was advanced to include surveys of vegetation and the prediction of food resources. This capability led to an increase in our economic well-being. The problem is that it is expensive, prohibitively so, if we want to repetitively survey large areas of the Earth's surface. If we wanted to cover a single county in California once every 10 years, we could do it from an airplane. However, if we need continuous surveillance of the total pattern of how water pollution, air movement, and smog effect groundcover and other natural resources, aircraft surveys are totally impractical and cannot provide complete continuity. That kind of task has to be done by sensors from a space platform. Few people would contradict this logic.

The Tiros satellites are relatively unsophisticated systems. However, studies now show that the economic benefits that they provide, range to millions of dollars per year, and are responsible for saving a number of lives. Yet the data that we get from Tiros is very crude in comparison to what we can expect from an orbiting laboratory. Today, differences of opinion are mainly concerned with whether similar tasks can be accomplished sufficiently well from unmanned satellites or whether manned satellites can provide a great enough degree of increased sophistication to maintain an attractive ratio of cost effectiveness. Our opinion here at Douglas is that it can.

Mr. ABLE. Well, gentlemen, we're winding this up right on schedule. The one element that goes through all that we have shown you today is that existing space hardware has future applications and