INTRODUCTORY REMARKS

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I'm Don Thompson, Director of the Structural Materials Department at the Rockwell International Science Center and Program Manager for the ARPA/AFML program. It's a pleasure to welcome you to our annual ARPA/AFML Review of Progress in Nondestructive Evaluation. It is the first time that this meeting has not been held at the Science Center; we are very pleased with the courtesies and hospitalities that the people at Asilomar have shown us.

This has been a busy summer for meetings in NDE. The schedule started with a meeting at the Bureau of Standards in April followed by an ASTM meeting in Florida on NDE; a special ARPA session was held in La Jolla in July and a meeting was held at Sagamore last week which was arranged by the AMMRC people; this review is to be followed by an internal DoD meeting on NDE and an international meeting in Cannes, France next week. Despite all these, we have a good crowd for which we are very pleased.

We're also pleased to have with us, and wish to welcome, two special guests. They are the Honorable Harold Brownman, Assistant Secretary of the Army for Installations and Logistics, and Mr. Roy Sharpe, Director of the NOT Centre at Harwell, England. Mr. Brownman will deliver the keynote address a little later this evening, and Roy has agreed to tell us of his experiences in technology transfer at Harwell on Friday morning. We look forward to both of these presentations.

I would like to make a couple of comments to try to place in perspective some of the work that you will hear during the course of this program. It may be worthwhile to take a step back and look at NDE in perspective. It is my opinion that if we look at it from this viewpoint, one can recognize that NDE is at the same time a general and a specific subject. It is general in the sense that there is a generic interdisciplinary "core" of phenomena and measurements that are applicable to many NDE problem areas. In a specific sense, one finds that each application may require a special configuration of transducers and/or sensors as dictated by the details of the part or the manufacturing process at which one is looking.

The work that you'll hear about during the course of this meeting falls mostly into the first category, i.e. the generic interdisciplinary "core" of research and development that forms the basis from which specific applications can be constructed.

We are very much interested in the ARPA/AFML program in seeking the opportunities for technology transition. You'll hear more about this on Friday morning. But we believe very strongly that one also needs to know something of the nature of the more fundamental mechanisms underlying the applications so that a feeling of confidence in the final NDE device can be developed and so that "oversell" of new technology may be prevented.

I'd like to say a few words now about the goals of the current ARPA/AFML program. They are:

- To pursue advanced research in quantitative techniques with NDE.
- To establish a focal point for NDE research.
- To enhance communication between the research community and the NDE user.
- To promote the image of NDE.

We believe these things are all very important.

The program content is divided into two projects. Project I is devoted to flaw characterization by ultrasonic techniques. About two-thirds of our activity is devoted to this area; it will be reported upon Thursday. Our motivation and goal in this area is to provide the capability for ultrasonic characterization of defects. The second project is concerned with the nondestructive evaluation of strength related properties of materials. Work is being done to develop measurement techniques and knowledge to the point where we can nondestructively determine the strength of an adhesively bonded structure and the strength of a composite as affected by moisture degradation. These are important measurements which will help relieve some of the limitations upon the application of these materials. Other work in this project is aimed at the development of ways to measure residual stress. We believe these are important measurements in the development of a capability to predict the remaining life of a part. Another area that we're looking at in this project is that of acoustic emission. The work in this area this year has been primarily associated with acoustic emission in composite materials and the discovery of emission characteristics that can be related to strength properties.

I'd like to say a few words about the program plan that we have followed. During the first year we recognized that, in order to develop these projects and because of the lack of fundamental activities in past years in some of these areas, it was necessary to focus individual capabilities into primary problem areas. This, I believe, was quite successful. During the second year several interdisciplinary teaming interactions occurred and a synergism began to develop both of which were essential to the solutions of some of the problems. Our efforts in the third year will be aimed primarily at further integration in order to achieve the desired ultrasonic and other material property capabilities. We have people working with us who have varied expertise in their own rights and in their own fields. Each of them has a role to play in developing a piece of the overall problem in order to achieve the composite goals of this program.
In conclusion, I would like to make two more comments. Perhaps by now many of you have become aware of the COSMAT report that was published a couple of years ago concerning the priorities given to the subject of nondestructive evaluation and its importance in our society as a whole. This report, which was prepared after a rather exhaustive survey of technology, recognizes a high priority need for both basic and applied NDE research.

Secondly, the report made the comment that routine uses of new methods requires more understanding of the physics of the phenomena involved, its quantitative relationship to the physical property to be monitored, and the limits of its applicability. These strike me as very important words. You can make many mistakes by not knowing at an early point the limits of applicability of a measurement technique. Such understanding is important to the development of confidence in a technique.

We are all also aware of the various concerns that have been voiced with regard to both energy and materials availability in the future. Regardless of how each of us views these various warnings, there is little doubt that more efficient usage of these commodities is important. A quantitative NDE capability is important to the achievement of those goals. As an example, over-design in structures can be reduced if increased capability and confidence in NDE technologies can be obtained. Reduced overdesign and weight conserves on both materials usage and fuel (energy). Concern for product safety is also increasing, both on the part of the consumer and on the part of the manufacturers. Quantitative NDE capabilities offer a potential trade-off option to ensure safety consistent with minimum materials and energy consumption.

Thus, I believe very strongly that the subject of NDE is large in scope. It relates to many aspects of immediate problems as well as being a key aid in the solutions of those that are going to be with us for many years.