INTERCONTINENTAL BALLISTIC MISSILE SCIENTIFIC ADVISORY COMMITTEE to THE SECRETARY OF THE AIR FORCE

Meeting of December 16 and 17, 1957

The Ballistic Missile Scientific Advisory Committee to the Secretary of Defense also serves as the ICBM Scientific Advisory Committee to the Secretary of the Air Force. The Committee met in this latter capacity on December 16 and 17, 1957, at AFBMD headquarters to consider the future Air Force - ~~RAND~~ Research and Development activities which should follow and develop from the current first generation ballistic missile program. The Committee was presented excellent briefings on a variety of possible future developments which had been studied by BMD and R-W staff members. These briefings occupied 1 1/2 days and were followed by a 1/2 day executive session during which the material which had been presented was discussed and the recommendations given below were formulated.

Unfortunately there was not sufficient time, either during the executive session or subsequently during the actual writing of this report, to include the detailed background material and thinking which underlies the specific recommendations. In general, the Committee was much impressed with the accomplishments of the BMD/R-W team to date, and with the high level of competence, imagination, and judgement which was apparent in connection with the studies of possible future programs which were presented. It is the Committee's belief that such a level of scientific, technical, and management competence in the ballistic missile, satellite,

and space vehicle field exists nowhere else in the Air Force; and it is this belief which leads to the first two of our recommendations.

Recommendations

1. Ballistic missile and military satellite programs of the Air Force should continue to be managed by the Air Force Ballistic Missile Division, ARDC. While this appears to be the intent of the Air Force, we are concerned to note that there is not yet an official understanding that AFBMD is a continuing organization set up to cover this role into the future. We urge that the official terms of reference for AFBMD be broadened immediately to include responsibility for: product improvement on presently scheduled ballistic missiles, succeeding generations of missiles, Air Force military satellite projects, and the necessary supporting research and development programs.

2. While we believe that space exploration transcends the normal area of responsibility of the Air Force, we recommend that insofar as the Air Force is involved with space flight technology, such programs be managed by the BMD, with full utilization of other Air Force capabilities and facilities.

3. We believe that the development of the second generation of long range ballistic missiles should proceed along two quite different paths: the first aiming towards simplicity, small size, mobility, quick readiness, and similar characteristics to further true operational capability; the second in the direction of larger size and higher performance, to be operated

from relatively large fixed installations, which would lead to missiles of much larger payloads and to first stages for advanced satellite and space vehicles. Of the two ICBM's now in the development stage, the Titan has a much greater development potential in this second direction. Although it has as yet undergone no flight tests, we have no doubts of its success.

a. We recommend, therefore, that the Air Force undertake a systematic program of product improvement and future development based on the Titan. This will minimize the need for such a program for Atlas.

b. We also recommend the initiation of a program proceeding along the other path, aimed at the development of a small, highly reliable, and operationally simple ICBM, probably using a solid propellant. A very essential characteristic of such an advanced missile is the provision in its design for a substantial payload of counter-measures. This requirement, when combined with a reasonable upper limit on gross weight, means that the target date should be set so as to make possible the incorporation of truly advanced solid propellant motors.

c. While by-products of such an ICBM program could be advanced versions of IRBM and other shorter range missiles, the urgency of replacing Thor by an operationally simple, highly reliable, and smaller missile is such that this objective should not be paced by the rate of development of the advanced ICBM. The early attainment of an operationally much superior IRBM can best be achieved if the Air Force makes full use

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of Polaris, adapting early versions to land use. We recommend that this procedure be urgently explored and such a program be undertaken.

4. In order to ensure a capability for advanced missiles, satellites, and space vehicles, it is essential that authorization and funding be provided for exploratory research and development in specific areas of technology which will be required to make the advanced vehicles feasible and useful. We recommend that such exploratory work be promptly initiated in areas such as the following:

a. Ablating ICBM nose cones.

b. Fluorine and high performance solid propellant motors for the later stages of multi-stage vehicles. In particular, it would appear that development should start at once on second stage fluorine motors in the thrust regions of 15,000 and 100,000 pounds.

c. Guidance systems of materially improved accuracy.

d. Nose cones with lower vulnerability (including such approaches as decoys and neutron shielding).

e. Very large rocket engines, in the region from 1/2 to 2 million pounds thrust.

It is noted that such explorations, requiring both paper studies and experimental work, must be supported and conducted independently of specific weapons system programming.

For the ICBM Scientific Advisory Committee

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Clark B. Millikan, Chairman