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ATOMIC ENERGY COMMISSION

FALLOUT PROGRAM - HARDTACK

Note by the Secretary

The General Manager has requested that the attached report by the Director of Military Application be circulated for consideration by the Commission at an early date.

W. B. McCool

Secretary

(6795)

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ATOMIC ENERGY COMMISSION

HARDTACK FALLOUT PROGRAM

Report to the General Manager by the
Director of Military Application

THE PROBLEM

1. To present to the Commission possible and recommended plans for fallout study in Operation HARDTACK.

BACKGROUND

2. In the REDWING series an extensive program of fallout study was carried out, designed primarily to establish gross intensity and dosage contours rather than to determine the distribution locally and world-wide of a particular isotope (such as Strontium 90 and Cesium 137). To accomplish this, arrangements were made to study five important shots.

a. For each of five shots: A forecast was made of the pattern and hot lines to be expected; on the Atoll, readings and some samples were taken from land stations and readings were taken from helicopters; up to 17 sampling skiffs were anchored in the vicinity and generally within 80 miles of the Atoll; 2 YAGS and one LST with extensive reading and sampling capability were placed upon the estimated hot line at some 40 to 150 miles from the Atoll; some other ships passing through the pattern took intensity readings and samples; four Navy aircraft flew missions for NYOO to delineate the surface pattern as far out as it could be followed (130 to some 180 miles from zero point); and a Scripps vessel, the "Horizon", operated throughout the pattern area taking water samples. The cost of this effort (exclusive of the normal cost of operating the military vessels and aircraft concerned) was roughly five million dollars, paid entirely by the Department of Defense.

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b. After correlating the results, AFSWP concluded that the amount of gross activity falling out locally (within some 24 hours and generally to a distance of approximately 200 miles) varied by shot, with the maximum being about 50% of the total activity in the shot, but the local fallout did not appear to vary significantly between the reef and barge shots studied. No appreciable local fallout resulted from the airburst.

c. Later, after the series was completed, effort was made to analyze available samples to determine what fractionation occurred; i.e., the tendency of certain isotopes to fall out in more abundance locally and of others in greater quantity at a distance. This effort led to AFSWP's conclusion that for reef shots there was substantial fractionation with Strontium 90 falling out at a greater distance, but for barge shots such fractionation was not evident.

3. At Meeting 1276 on April 9, 1957, the Commission directed that a major effort be made in HARDTACK to establish more accurately the local fallout with the objective of determining (also more accurately) the amount deposited world-wide. To determine means of accomplishing the Commission's request, the Division of Military Application assembled a working group consisting of Graves, Felt, Cowan and Sattisan of LASL, Ballou, Werner and Frailing of NRDL, Street of UCRL, Graveson of NYOO, Isaacs of Scripps, Lindwarm of CRL, Shelton, D. Lay and LaVier of AFSWP, Epley and Richie of JTF-7, and Potts, Dunning, Musick, Schnittke and Watters of AEC. Dr. Libby, Dr. Dunham and General Starbird participated also.

4. The group concluded that if we were to make any gain in knowledge over REDWING in measuring the local fallout:

a. A detailed operation similar to but more extensive than REDWING, utilizing YAGS-LST-HORIZON-land samples but excluding skiffs, would be the best approach (more extensive use of skiffs would give little more information);

b. The effort should be directed toward the taking and the analyzing of samples for a material balance rather than the establishment of gross activity contours;

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c. Useful surface or ship sampling probably could not be extended beyond 200 miles because of the difficulty of delineating the pattern at such distances and establishing the significance of the sample in that pattern;

d. Some additional indication as to the behavior of the cloud and fallout therefrom might be secured through following that cloud out to several hundred miles with AFOAT-1 type sampling aircraft (B-50's);

e. The cost of this effort would be approximately five million dollars for which neither the DOD nor the AEC had the funds. The group agreed that there would be some gain in knowledge of local fallout from such a program but felt that the gain would not be by a large factor.

5. The group noted also that the HARDTACK shots were not a type to give as useful data as were those from REDWING. [redacted] DOE 6.1(a) Their contribution world-wide will be small and the pattern difficult to follow. [redacted] DOE 6.1(a)

6. The group also concluded that if the objective was to determine world-wide fallout more accurately, it would be better to use such money and such means as could be made available to measure directly the cloud, how it moved, and how it changed.

7. On July 24, Dr. Graves presented to the Commission the DOD-JTF-7-DMA recommendation as to what the HARDTACK fallout program should be. He recommended that:

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a. We mark the debris from the very high altitude firings (whose debris would be initially entirely above the tropopause) with tracers so as to learn the rate and uniformity of its deposition on the earth.

b. With high-altitude sampling aircraft (now determined to be strengthened versions of the B-57D capable of operating up to 63,000 feet) we determine the distribution of material (from several shots other than the three high-altitude detonations) in the lower cloud near zero point and as far out thereafter as possible, perhaps out to 100 miles.

[redacted]

DOE 6.1(a)

d. If funds can be made available, we use some $800,000 to include in the series a 30 rocket sampling of one firing to determine the feasibility of using this method in later series.

e. We not undertake any large-scale effort to determine surface samples. This would include notifying the Navy it could proceed with its plans to mothball the 2 YAGS which served in REDWING to take samples in hot areas and to analyze these samples and those taken on other vessels.

8. Dr. Libby has recommended most strongly that the 2 YAGS be retained in HARDTACK. If these could be positioned on the hot line they would give us total fallout samples for analysis in the 2 areas where located. There is grave question as to the ability to correlate this data with the B-50 samples; but, if it is possible, such correlation would provide a better quantitative estimate of the fallout at distances up to several hundred miles from the shot. The YAGS could analyze their own samples and any given to them from other ships. However, in connection with this possibility of using other ships for obtaining samples, the number of vessels being made available is tailored to other essential needs and it is improbable that any sampling program could be accomplished from them without additional expense. It has been estimated that adding the 2 YAGS to the HARDTACK program would cost about 1.5 million which the

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DOD thus far is not willing to assume, and would defer the mothballing of two ships which the Navy wishes to decommission. Adding, additionally the one LST used in REDWING would cost another $300,000 and adding the "Horizon" vessel, at least $500,000 more. Also there will be an added cost of 10% to 20% of such additions to JTF-7 for support costs.

9. In view of our financial situation, I feel I again must recommend against undertaking the YAG and LST program. Briefly, the situation is that when we budgeted originally for HARDTACK we had no basis for knowing the number of shots we would require and we programmed a series similar to REDWING and costing the AEC 40 million dollars in FY 1958. Later, just before testifying to the House, we raised this 40 million dollars to 45 million dollars, reducing other DMA sub-programs correspondingly. The Bureau of the Budget only reluctantly allowed this change and indicated that a full review and rejustification would be required prior to apportionment of the increase. The laboratories have indicated some 29 devices they might wish to fire and DOD plans 5 additional. This contrasts with 17 fired in REDWING. This 29 is beyond the laboratory capability to ready. We have arbitrarily told LASL and UCRL that they can plan on the basis of 10 shots each and our latest estimate of such a program is 48 million dollars. This is, of course, a flash estimate and, to carve down the amount as much as possible, we have told Mr. Hertford and Mr. Reeves that they must make every effort to save in PLUMBBOB. We have given similar instructions to the 3 laboratory directors concerning both PLUMBBOB and HARDTACK.

STAFF JUDGMENT

10. The Division of Biology and Medicine and the General Counsel concur in the recommendation of this paper.

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11. The Controller points out that he is not in a position to concur in the recommendation of this paper since he is not aware that sufficient funds have been budgeted in FY 1958 for the Weapons Program to provide for the increased costs that will result from the program recommended herein, and since he cannot forecast at this time where reductions may be made to other operating programs to offset the cost increases which will be required as a result of the recommended program.

RECOMMENDATION

12. The General Manager recommends that the Atomic Energy Commission approve conducting a fallout program for HARDTACK similar to that outlined in paragraph 7 above.

13. In the event the Commission decides that the 2 YAGS are absolutely essential to the success of the fallout program and should be added to the program outlined in paragraph 7 above, the General Manager further recommends that the Commission make a direct approach to the Deputy Secretary of Defense, pointing out the desire to have the YAGS and asking that the DOD make them available at DOD expense.

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