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April 29, 1957

AEC 952/5

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ATOMIC ENERGY COMMISSION

TEST ACTIVITIES FOR CALENDAR YEAR 1958

Note by the Secretary

The Acting 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

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ATOMIC ENERGY COMMISSION

TEST ACTIVITIES FOR CALENDAR YEAR 1958

Report to the General Manager by the  
Director of Military Application

THE PROBLEM

1. To consider:
  - a. The scope of Operation HARDTACK;
  - b. The use of Taongi Atoll as an additional test site.

SUMMARY

2. To assist the planning for Operation HARDTACK, tentatively scheduled for Spring 1958 at EPG, general guidance is needed as to the scope of the test program, and a decision must be made now on the possibility of using Taongi Atoll as a nuclear test site.

3. The test program as proposed by LASL, UCRL and DOD consists of 31 shots as listed in Appendix "B". Of these, 12 are proposed by LASL, 14 by UCRL and 5 by DOD. The laboratories' proposals are designed to meet the requirements of the weapons development program and provide a number of exploratory shots to assure continued progress in future development. The DOD program consists of the two high-yield high-altitude detonations at 250,000 and 100,000 feet approved by the Commission at Meeting 1266 on February 20, 1957, after consideration of AEC 952/4;

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a 92,000 foot balloon firing of a 2 KT device; and 2 underwater shots of 8-10 KT devices (similar to depth charges) in target arrays.

4. A HARDTACK program of 31 shots would compare to the 17 shots of REDWING. The total HARDTACK yield of about 80 megatons would be expected to produce 16 megatons of fission yield, as compared with 20.6 megatons of total and 8.5 megatons of fission yield produced in REDWING, and 47.8 megatons of total and 31.4 megatons of fission yield in CASTLE. The world-wide fallout produced by HARDTACK probably will exceed that produced by REDWING. 6(a)

5. Taongi is an uninhabited atoll 285 miles northeast of Bikini and 324 miles south-southeast of Wake. It is ideally located from the standpoint of distance and direction in relation to populated lands of the Marshall Islands and the southern boundary of the danger area, so as to be a safer place to fire high yield shots than either Bikini or Eniwetok. The firing of large shots will be appreciably easier at Taongi; it is estimated on the basis of a study by the JTF SEVEN Meteorological Center that the ratio of safe firing situations at Taongi as compared to Bikini might be as high as 3 to 1.

6. Taongi could be used only as a barge site. All diagnostics and firing could be accomplished from a specially outfitted and instrumented ship. Devices would be prepared and loaded on barges in the assembly area at Bikini, ferried by LSD to Taongi, anchored in the lagoon and fired. With no instrumentation stations or other facilities ashore, there would be no need for evacuation, re-entry and recovery operations as is now

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the case in the firing of barge shots at Bikini. Thus the firing of large shots would be appreciably accelerated. Meanwhile the firing of the remainder of the program, LASL at Eniwetok and UCRL at Bikini, could proceed without the interruption, delay, and possibility of damage from firing of large shots.

7. The use of Taongi requires increased logistic and military support. The extent of the additional military support requirements is not fully known at this time but the needs are being evaluated.

8. The use of Taongi as a test site would require the approval of the Departments of Interior and State, the closing of the area by the President for security reasons and notification of this action to the Security Council of the United Nations. Thus, problems of an international and public information nature are involved. Public justification in the United States and abroad would be difficult even though increased safety and potential decrease in the duration of a test operation would result. The draft announcements on the use of Taongi and/or Operation HARDTACK would be coordinated with the Department of State and would be referred to the Operations Coordinating Board for advice as to content and timing of such information in the light of climate of world opinion. Since possible use of Taongi for nuclear testing would cause speculation on our further plans for testing at EPG, the notification to the Security Council and public announcements might be coordinated with the announcements concerning Operation HARDTACK. It would be possible to issue an announcement on Taongi without relating it to HARDTACK. However, there undoubtedly will be widespread newspaper speculation on

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1958 tests in the Pacific, especially since correspondents have noted specific tests about every other year. Any announcement on Taongi would have to be coordinated with the notification to the Security Council.

9. The length of the test operation, based on a 31 shot program has been estimated at 3 months. This assumes the dual atoll concept and implementation of the full dual shot capability, with the laboratories centering their activities on separate atolls. However, the 3 month estimate does not include the use of Taongi. If Taongi is used it would almost certainly shorten the operation, possibly by as much as 3 weeks. If the number of shots were decreased to 25 there might be a time saving of 1 to 2 weeks, but this estimate depends on the specific shots which are eliminated.

10. HARDTACK would start in May of 1958 and extend into FY 1959. However, because most costs must accrue well before the firings, we estimate some 80% of the full HARDTACK costs will accrue in FY 1958.

a. The best rough estimates we can make at present would indicate that a 31 shot program using Bikini and Eniwetok only would cost approximately \$48 million, of which approximately \$40 million would be required in FY 1958. Using Taongi as well would add some \$6.1 million, largely in FY 1958. This would be partially offset by a decrease in cost of approximately \$2 million in FY 1959 due to the shorter operation.

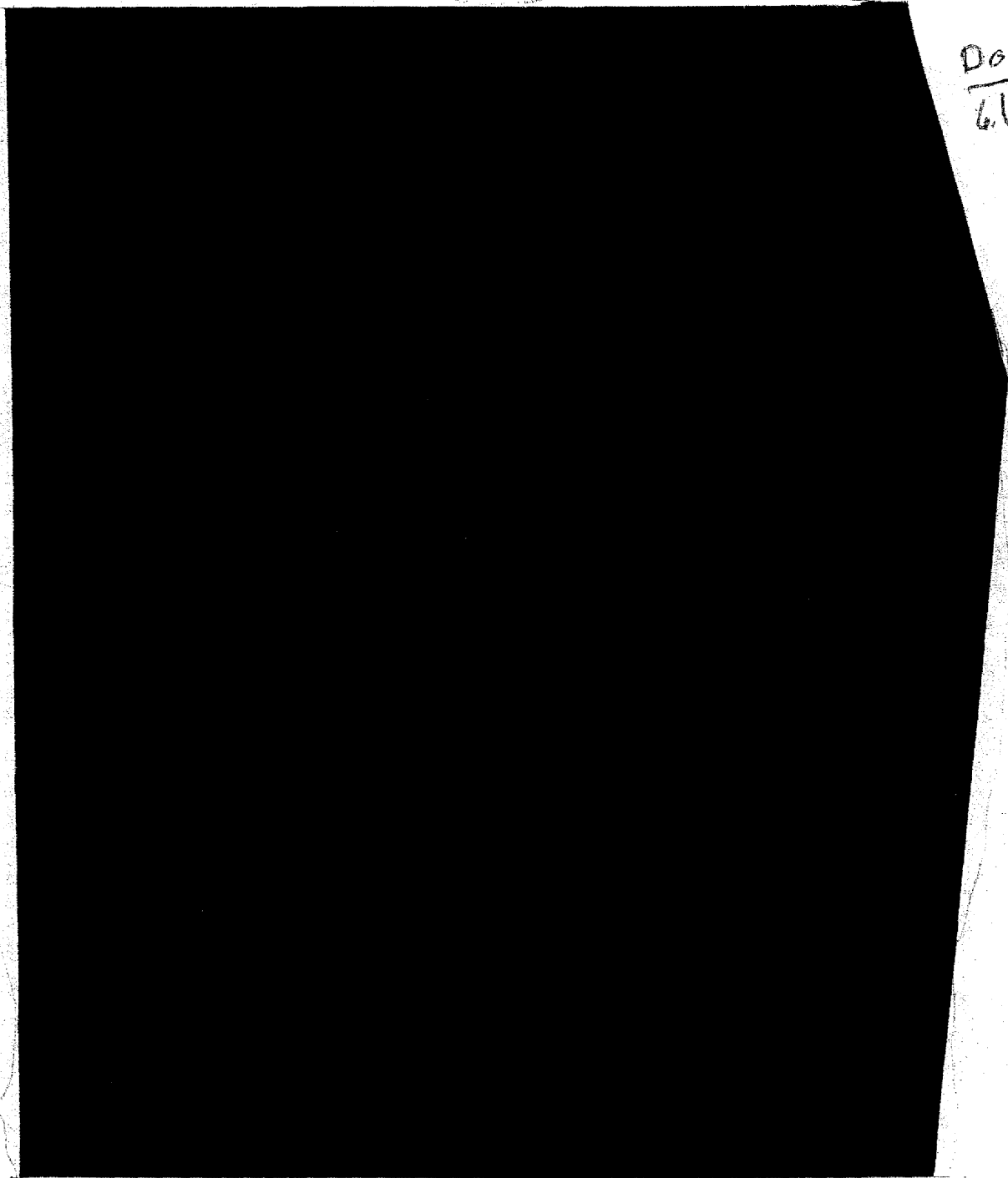
b. Against this there is budgeted for FY 1958 only \$34.7 million.

c. A twenty-seven shot program (in lieu of 31), including the use of Taongi, is estimated to cost some \$52.7 million of which \$44.7 million would accrue in FY 1958.

11. DMA has reviewed the list of planned shots as given in detail in Appendix "B" and believes that a program of approximately 27 shots could be adopted now for planning purposes without

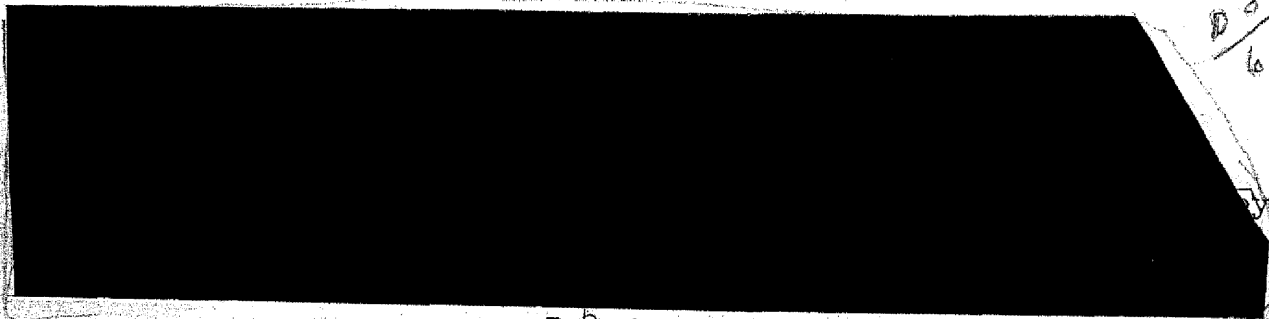
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material injury to the weapons programs. It might prove necessary to add later additional shots because of developments not now known. This program is based on the following tentative allocation by laboratory and type of shot:



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6.1(a)

12. We are still examining ways and means of decreasing fission yield (and the offsite fallout):



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6.1(a)

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DOE  
6.1(a)

STAFF JUDGMENTS

13. The Divisions of Biology and Medicine, Information Services and Finance, and the Offices of the General Counsel and Special Projects concur in the recommendation of this paper.

CONCLUSIONS

14. It is concluded that:

a. A test program of the order of magnitude of 27 shots, as described in paragraph 11 and Appendix "B", is essential for carrying out the <sup>Committee's</sup> comments of the AEC in the weapons program and permitting adequate exploration of new ideas to insure continued rapid and orderly future development.

b. A test operation of this magnitude can be carried out within a reasonable length of time, comparable to the length of REDWING.

c. The fission yield which will be produced by the firing of the proposed shots is consistent with the objectives of the HARDTACK test program.

d. The use of Taongi Atoll would be of great advantage for the increased safety it affords to both Marshall Island inhabitants and test participants, and for minimizing the length of test operations in the Pacific.

e. The advantages to be gained by using Taongi Atoll as a firing site justify the additional costs and increased logistical support which will be required. Because of the added military support required, the desirability and feasibility of approving this additional site should be coordinated with the Department of Defense prior to final Commission action.

f. There will be international and public information problems associated with the use of Taongi Atoll as a firing site. These problems will require careful coordination with the Departments of State and Interior and with the Operations Coordinating Board.

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RECOMMENDATION

15. The General Manager recommends that the Atomic Energy Commission:

a. Approve, for the purpose of guidance to the weapons laboratories and other agencies involved in the planning for Operation HARDTACK, the general scope of the test program, described in paragraph 11, of approximately 27 shots;

b. Note that the occupancy and use of Taongi Atoll as a firing site, in addition to Eniwetok and Bikini, would reduce fallout problems and minimize the length of test operations in the Pacific.

c. Approve a request for DOD comment on the desirability of occupancy and use of Taongi Atoll, and the feasibility of DOD support of such occupancy and use by letter to the MLC such as Appendix "C".

d. Note that the actual test program for Operation HARDTACK will be presented to the Commission for consideration at a later date.

e. Note that the test program outlined above and assuming the use of Taongi will require approximately \$10.0 million over the 34.7 million budgeted for overseas tests in FY 1958, and that this increase will have to be absorbed within the \$452.3 million budgeted for the weapons program for FY 1958 in estimates submitted to Congress. If the additional cost cannot be thus absorbed, the test program will be rescoped.

f. Note that it is not deemed appropriate to notify the JCAE at this time.

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LIST OF ENCLOSURES

	<u>Page No.</u>
APPENDIX "A" - Background and Discussion.....	8
APPENDIX "B" - Proposed Hardtack Program.....	21
APPENDIX "C" - Draft Letter to the Military Liaison Committee.....	27



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APPENDIX "A"

BACKGROUND AND DISCUSSION

1. Planning for Operation HARDTACK has reached the stage where it is necessary to decide the scope and concept of the operation. These broad decisions are necessary at this time so that subsequent planning, especially in the field of support requirements, will adequately reflect Commission desires. Detailed military support requirements for HARDTACK are presently being readied for submission to the JCS for approval and subsequent programming by the separate services.

2. Two major questions connected with the HARDTACK tests require Commission action at this time. The first has to do with general guidance as to the number and types of shots which will be tested on HARDTACK. The second concerns the use of Taongi Atoll as an additional test site for HARDTACK (and future) nuclear test activities.

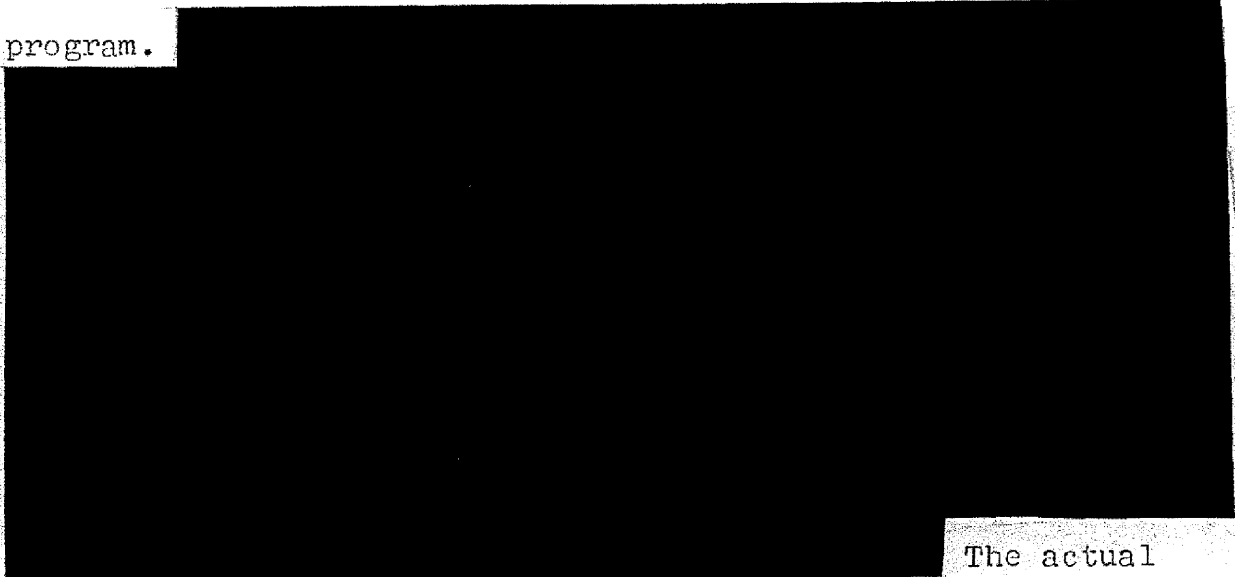
3. LASL and UCRL have submitted their best estimates of the weapons and devices which probably will be ready for and will require testing in Operation HARDTACK. In addition, DOD has programmed certain tests for inclusion in HARDTACK. The test program based on these estimates is described in Appendix "B" and consists of 31 shots of which 12 are sponsored by LASL, 14 by UCRL and 5 by DOD (The 5 DOD shots include the very high altitude shots previously approved by the Commission.) With the exception of the DOD shots, this program represents the very early thinking of the laboratories and can, and probably will, change materially in its details with developments at the laboratories and with the results of PLUMBBOB.

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4. The laboratories' HARDTACK program represents an 80 percent increase (on a shot basis) over the 17-shot REDWING program.

  
The actual devices to be fired, their total yields, fission yields, and positions of firing are not firmly established; nevertheless, it would appear that Operation HARDTACK may and probably will produce more world-wide fallout than did Operation REDWING.

5. It was felt that every effort should be made to keep the number of shots and the total fission products to a minimum. Consequently, the laboratories were asked to screen carefully their proposals to insure that the number of shots and the yields were clearly necessary in the interest of furthering the weapons program. They were specifically requested to consider reduced yield versions of their large-yield shots, which would still be capable of providing the necessary important data, and to consider the impact on their ability to conduct an effective and adequate test program if they were limited to 20 shots, 10 to each laboratory. The number 20 was chosen as representative of the order of magnitude of REDWING.

6. Dr. Bradbury, in his reply, pointed out that approximately 10 of the 12 shots proposed by LASL are required for their

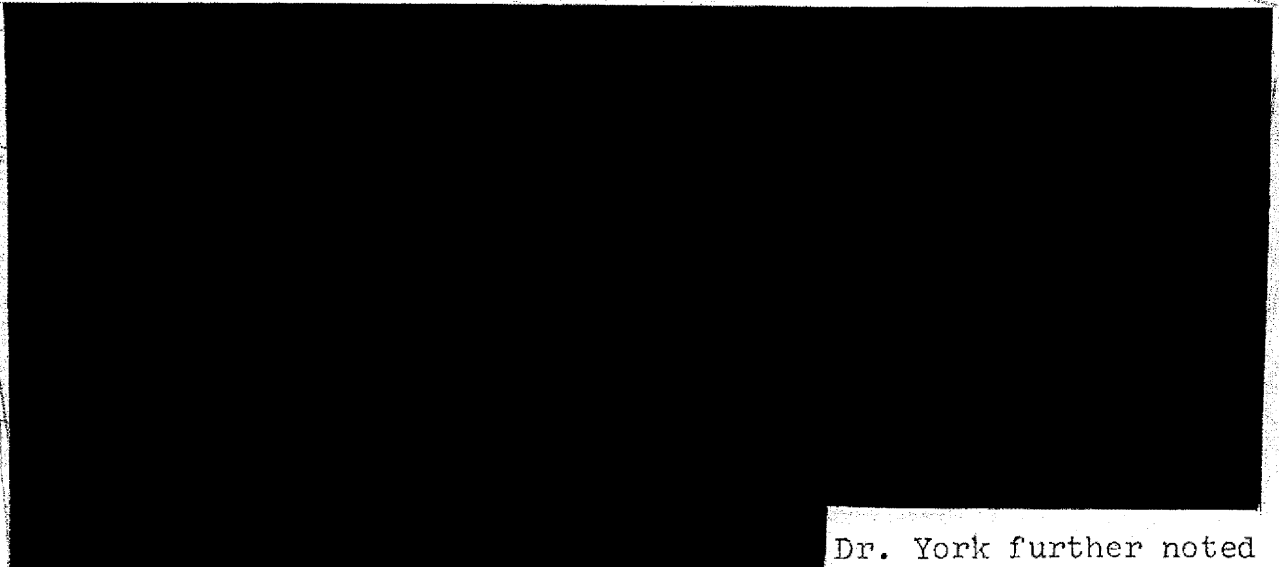
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programmatic commitments alone. Consequently, if LASL were limited to 10 shots then of necessity their experiments would have to be devoted primarily to their immediate and definite programmatic responsibilities. This would seriously curb exploratory effort. Dr. Bradbury felt that the laboratory should have some freedom to engage in a wide variety of exploratory experiments.

7. Dr. York, in his reply, pointed out that a workable compromise between required and allowable yield could be reached.



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Dr. York further noted that if necessary UCRL would live within a limit of 10 shots.



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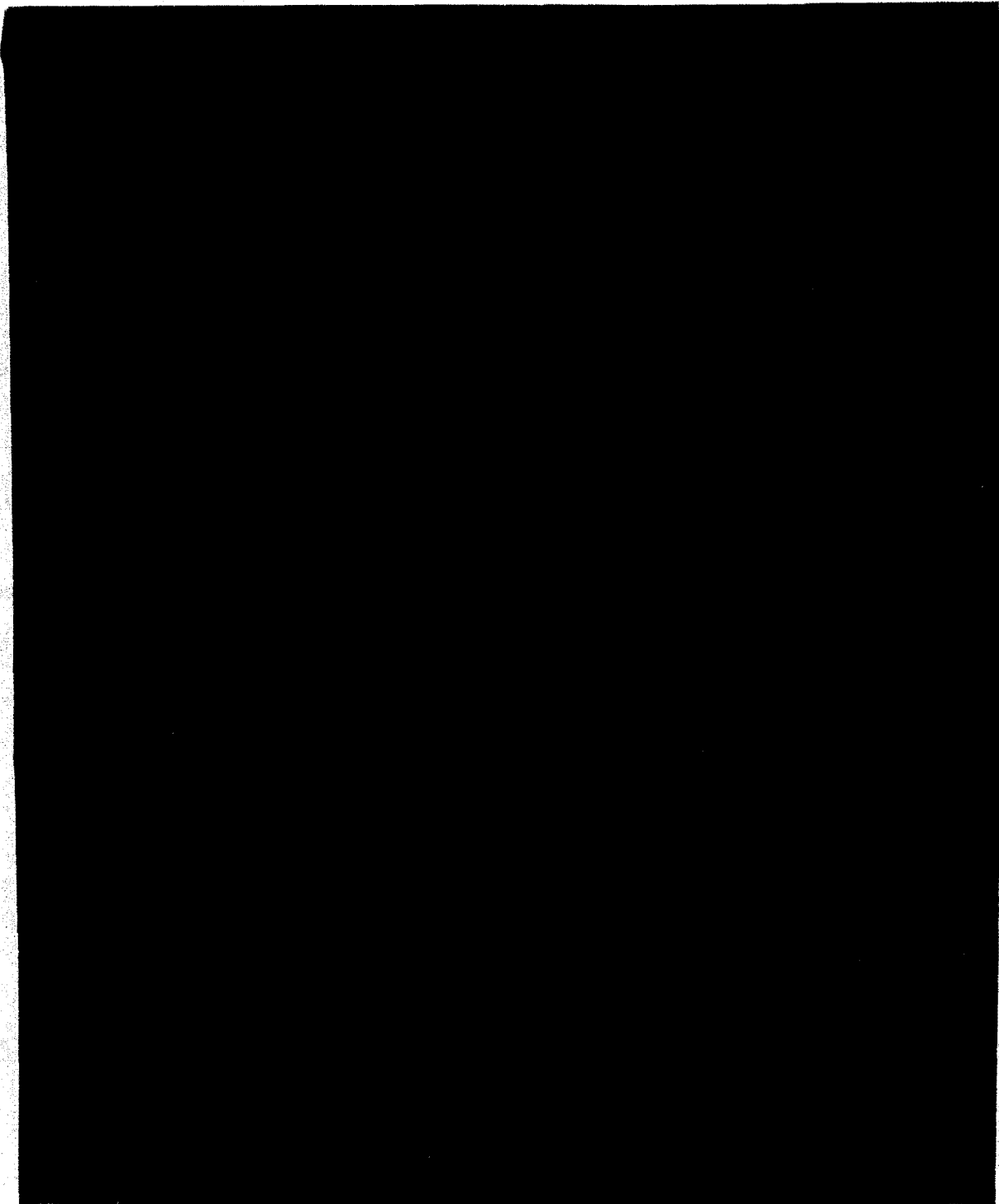
8. DMA has reviewed the list of shots planned and given in detail in Appendix "B" and believes that a program of approximately 27 shots could be adopted now for planning purposes without material injury to the weapons programs. It might prove necessary to add later additional shots because of developments not now known. This program is based on the following tentative allocation by laboratory and type of shot:

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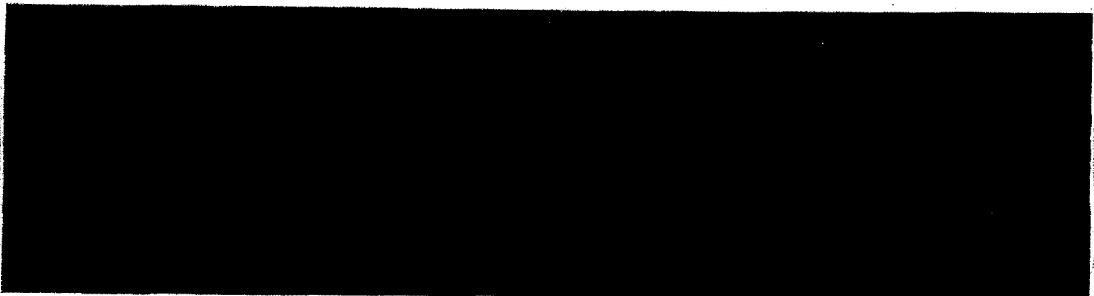
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fission yield (and the off-site fallout):



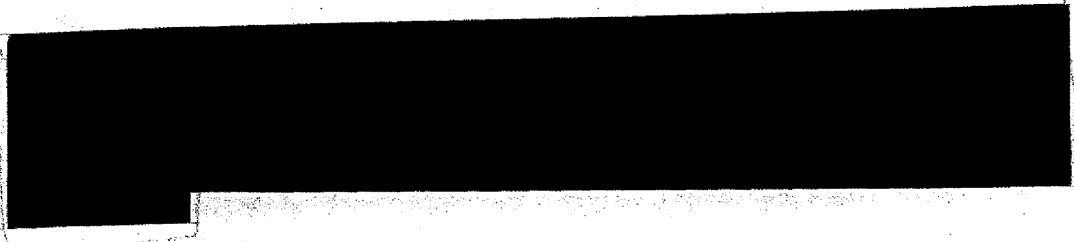
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DOE  
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10. It has been proposed by UCRL and ALOO that Taongi Atoll be set up as a third firing site at EPG for HARDTACK and future test operations. Taongi is an uninhabited atoll located approximately at 168° 50' E longitude and 14° 40' N latitude, 285 miles northeast of Bikini and 324 miles south-southeast of Wake Island. It is crescent-shaped, approximately 10 miles long and 4 miles wide at its greatest width. A chord joining the tips of the crescent lies along a NNW-SSE direction and is approximately normal to the wind. The lagoon is totally landlocked except for a very narrow channel in the leeward reef. The land areas of the atoll, consisting of long narrow sand islands lying along the southeastern side of the atoll from northeast to southwest, span a distance of some 8 miles. There are two major advantages to using Taongi. First, due to its unique location with respect to inhabited lands of the Marshall Islands, the southern boundary of the danger area and the permanent facilities of EPG, Taongi has always been recognized as having distinct advantages as regards safety. From the standpoint of fallout, Taongi is a safer place to fire high yield shots than either Bikini or Eniwetok. It may be necessary to extend the danger area to the east since the distance from Taongi to the eastern boundary of the danger area used on REDWING is only about 200 miles. But this does not necessarily imply that the HARDTACK danger area would be larger than that for REDWING; the danger area to be used will be based upon an evaluation of all pertinent factors such as yield, shot site, position of device, and so forth. Also, the

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length of a test operation, which is primarily determined by the delays incident to obtaining weather conditions favorable for "safe" firing situations, could be shortened if the more difficult shots from the standpoint of radiological hazard were fired at Taongi.

11. The laboratories' requirements for testing have increased over the 17 shots of REDWING and the 6 of CASTLE. At the same time there is a greater awareness of the radiological effects of fallout and greater effort and care is being exercised in preventing deposition of fallout on inhabited areas; this has resulted in a more critical appraisal of safe firing situations. Both of these effects tend to increase the duration of a test operation. This tendency has been attacked by the development of a full dual capability concept which would enable firing two high-yield shots within twenty-four hours of each other. However, the necessity for evacuation, re-entry and recovery operations for large shots at Bikini does not permit full advantage to be taken of the flexibility and efficiency inherent in the dual atoll concept. Further reduction in the length of the operation can be obtained only by firing large shots at Taongi. This would allow the operation at Bikini to proceed without the above delays, and would decrease the weather delays for large shots because of a more favorable radiological safety situation at Taongi.

12. The firing of very large shots at Bikini can cause considerable damage to the test structures, diagnostic stations, and temporary camp buildings in the atoll. [REDACTED]

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13. Taongi has previously been considered by the Test Organization as a possible test site. However, its limited size, unsuitable entrance, and lack of anchorage facilities have weighed against it, particularly from the standpoint of blast and water damage to diagnostic stations and heavy contamination of these facilities. With the development of methods of obtaining the necessary diagnostic data remotely from a diagnostic ship reconsideration of the use of Taongi is appropriate.

14. On the basis of preliminary reports of the Task Force Weather organization and Taongi's geographical location with respect to populated islands in the Marshall Islands, it seems quite obvious that firing from Taongi should be appreciably easier than from Bikini or Eniwetok. Shots can be detonated at Taongi under normal wind conditions, whereas at Bikini it is necessary to fire on what might be referred to as abnormal conditions, i.e., with some appreciable wind components from the south. It might be said that we could fire at Taongi under more stable weather conditions and less positive predictable weather conditions. In addition to its superior position with respect to prevailing winds, the increased distances to populated islands are a distinct advantage from the safety aspect for two reasons. First, in case of fallout on any populated areas, the levels will be lower; and second, there will be appreciably more time to take emergency action. The chart attached as an Annex to Appendix "A" shows the location of Taongi with respect to the other atolls of the Marshall Islands, its more favorable situation with respect to direction, and the distances from Eniwetok, Bikini and Taongi.

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15. Taongi would be used only as a barge site. All diagnostics and firing would be accomplished from a ship. Use of the ship would permit a flexibility in operation and would further reduce the time of stay of technical personnel overseas by about one month, since installation and dry-running of equipment could be accomplished while the ship is still on the West coast. This ship would be controlled by the AEC and manned by MSTS or Holmes & Narver personnel. Although the cost of outfitting and operating such a ship appears large, there are offsetting considerations and survey is presently under way of vessels which might be available and suitable for this use. It would not be necessary to construct any diagnostic stations or other facilities, estimated to cost \$2.5 million, on Taongi. In addition, the diagnostic ship provides a facility for a "quickie" tests of smaller over-all magnitude at a minimum cost.

16. The use of Taongi would require additional logistic support. The air operations of Task Group 7.4 (Air) and the surface operations of Task Group 7.3 (Navy) would be increased. Shot barges would have to be ferried by LSD from the Eniwetok/Bikini area to Taongi; however, the establishment of a UCRL assembly area at Bikini would practically eliminate the LSD trips between Bikini and Eniwetok for UCRL shots at Bikini, thus compensating for the Taongi trips. The re-supply of the diagnostic ship, small craft support, liaison aircraft or helicopter support, and increase Task Group 7.5 support requirements would be additional. However, the elimination of evacuation, re-entry and recovery operations for large shots at Bikini will accelerate the operation and offset somewhat those increases occasioned by use of Taongi. The question of the capability of DOD to provide the additional military support requirements resulting from the use of Taongi has not been resolved.

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17. In studying the Taongi proposal, consideration has been given to possible effects on tuna fishing, contamination of ocean waters and bird life.

a. The Japanese fishing records for the period from May 1953 to September 1954 disclose that there was no fishing in the area about Taongi. The greatest fishing intensity was a few degrees north of the equator. Fishing boats in transit to the fishing area grounds may occasionally pass near Taongi. However, this would certainly present no greater difficulty than during REDWING since Taongi lies well within the danger area which itself presents the greatest interference with transient shipping.

b. Fallout into the ocean from tests at Taongi would be expected to be into the same general part of the North Equatorial system as fallout from the Eniwetok Test Site. The flow of the North Equatorial current at these latitudes is westward, but it is possible that fallout from either test site may temporarily become part of a local eddy system. The likelihood of tunas entering water contaminated by fallout is no greater, and probably less, for Taongi than for the Eniwetok Test Site, as Taongi, being north of Eniwetok, is farther removed from the area in which tuna are most abundant.

c. There is an enormous number of sea birds at Taongi which the Marshallese, in the past, considered to be a bird reserve. Bikar Atoll and Jemo Island, 150 and 275 miles to the south, respectively, were also bird reserves. From the literature it is known that sooty terns, wedge-tailed shearwaters, and frigate birds are present in great numbers, but it is not known if this atoll is used as the exclusive rookery for any one species. If the amount of guano is an indication, the evidence would indicate that this atoll is not an important rookery, as Fosberg writes ". . . guano was so scarce it was difficult to get a proper sample for analysis." The information about the birds present throughout the year probably is not available in the literature because, other than the annual visit by the Marshallese and the occupation by the Japanese during World War II, only on a few occasions and for short periods have visitors set foot on the atoll. Parties by Cameron in 1893, Immer in 1896, and Fosberg in 1952 are the only known white people to have been on Taongi (Pokak Atoll).

In conclusion it can be said that the use of Taongi as a test site would probably have no greater effect upon the Japanese tuna fleet or contamination of the ocean than the use of Eniwetok-Bikini. A great many birds would be killed at Taongi but there is not sufficient information in the literature to determine if this may mean the extinction of a species.

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18. If the decision were made to use Taongi it would be necessary to acquire occupancy and use of the atoll for conducting nuclear experiments, as is now the case for Eniwetok and Bikini. The AEC does not have ownership or jurisdiction over these atolls; by Executive Order of the President, the Administration of the Trust Territory of the Pacific Islands rests with the Secretary of the Interior. In an exchange of letters in 1951 the Department of the Interior recognized the AEC's interest in the Eniwetok/Bikini area and agreed that conditions satisfactory to the continuity of the testing program would be maintained there. To obtain similar rights at Taongi it would be necessary to obtain the concurrence of the Departments of Interior and State, and following this it would be necessary for the President to close the area for security reasons and notify the Security Council of the United Nations of this action, as was done in the case of Eniwetok in 1947 and Bikini in 1953.

19. Notification to the United Nations and subsequent publicity given to the proposed use of Taongi for nuclear experiments would give rise to a number of problems in the public information and international fields. Public acceptance of the use of Taongi may be aided by carefully timed announcements, coordinated with the Departments of State and Interior and the Operations Coordinating Board, emphasizing the value of U. S. weapons tests to the defense of the United States and the free world and the precautions used to prevent fall-out from harming people in any area of the world. A comprehensive public information plan would have to be devised for this purpose and to combat expected propaganda on the part of the unfriendly nations. In addition, publicity on Taongi would lead to speculation on our future test plans. For these reasons, it appears desirable

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that notification to the Security Council and public announcement of the closing of Taongi be delayed and coordinated with our announcement of Operation HARDTACK even though certain activities would be under way there.

20. The laboratories and the EPG Planning Board have estimated that the length of the test operation composed of 31 shots would be about 3 months, (not considering the possible use of Taongi Atoll). This may be compared with REDWING which used 79 days for 17 shots; however, in REDWING, 18 days were spent waiting for suitable weather to airdrop the Cherokee event. In REDWING we had a limited dual shot capability in that we were able to fire one large and one small-yield shot nearly simultaneously. It is planned, for HARDTACK, to enlarge to a full dual shot capability which would permit to firing two high-yield shots within twenty-four hours of each other. LASL activities would be centered at Eniwetok and UCRL activities at Bikini, thus insuring maximum flexibility. It is believed that the implementation of a full dual shot capability will enable the test program to be carried out in 3 months.

21. The adoption of the proposal to incorporate Taongi Atoll into the EPG would enable UCRL to fire its larger shots at Taongi. UCRL estimates that it would take 3 months to fire its shots at Bikini alone but only 5 weeks based on the use of both Bikini and Taongi. It is more difficult to estimate the effect of the adoption of the Taongi proposal on the combined programs of both laboratories. The general feeling is that it would almost certainly shorten the operations, probably by about 3 weeks.

22. A reduced test program as in paragraph 11 of the Summary would probably shorten the operation by about 1 to 2 weeks.

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23. The cost to the AEC of conducting the HARDTACK program has been estimated by extrapolating REDWING costs, taking into account the decrease in the unit cost per shot as the number of shots increases. These estimates are made without complete knowledge of the extent or cost of AEC participation in the UHA and VHA Prime shots. In order to support a 31-shot program using only Bikini and Eniwetok Atolls, the cost to the AEC in terms of test construction and site operation would be about \$48 million. About \$40 million of the total would accrue in FY 1958 and exceed by about \$5.3 million the cost budgeted for overseas testing in the FY 1958 budget. For the 27-shot program the total cost would be about \$46.6 million and that for FY 1958 about \$38.6 million or about \$3.9 million in excess of the FY 1958 budget.

24. If Taongi is developed as a test site, these costs would increase. The total cost of developing Taongi, including the outfitting and operation of a diagnostic and firing ship, is estimated at \$6.1 million. Although savings in reduced damage to structures and equipment at Bikini and in reduced time in the atoll are expected to approximate \$3.7 million, some of these savings probably would not be realized until FY 1959 and FY 1960. Therefore, for the 27-shot programs and if Taongi is used, about \$44.7 million in costs would accrue in FY 1958, or about \$10.0 million over the cost level budgeted for that fiscal year.

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ANNEX TO APPENDIX "A"

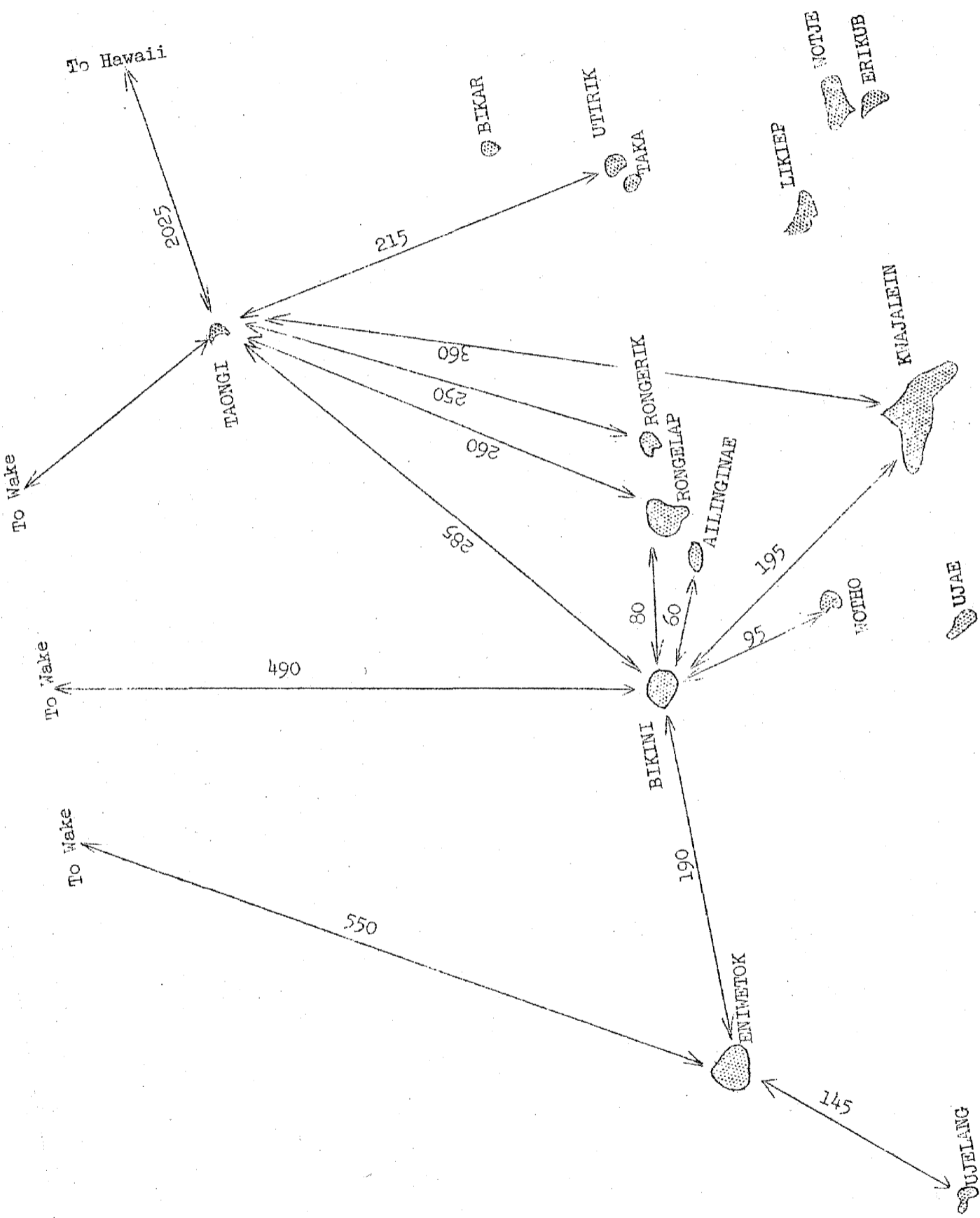


CHART OF MARSHALL ISLANDS

Annex to Appendix "A"

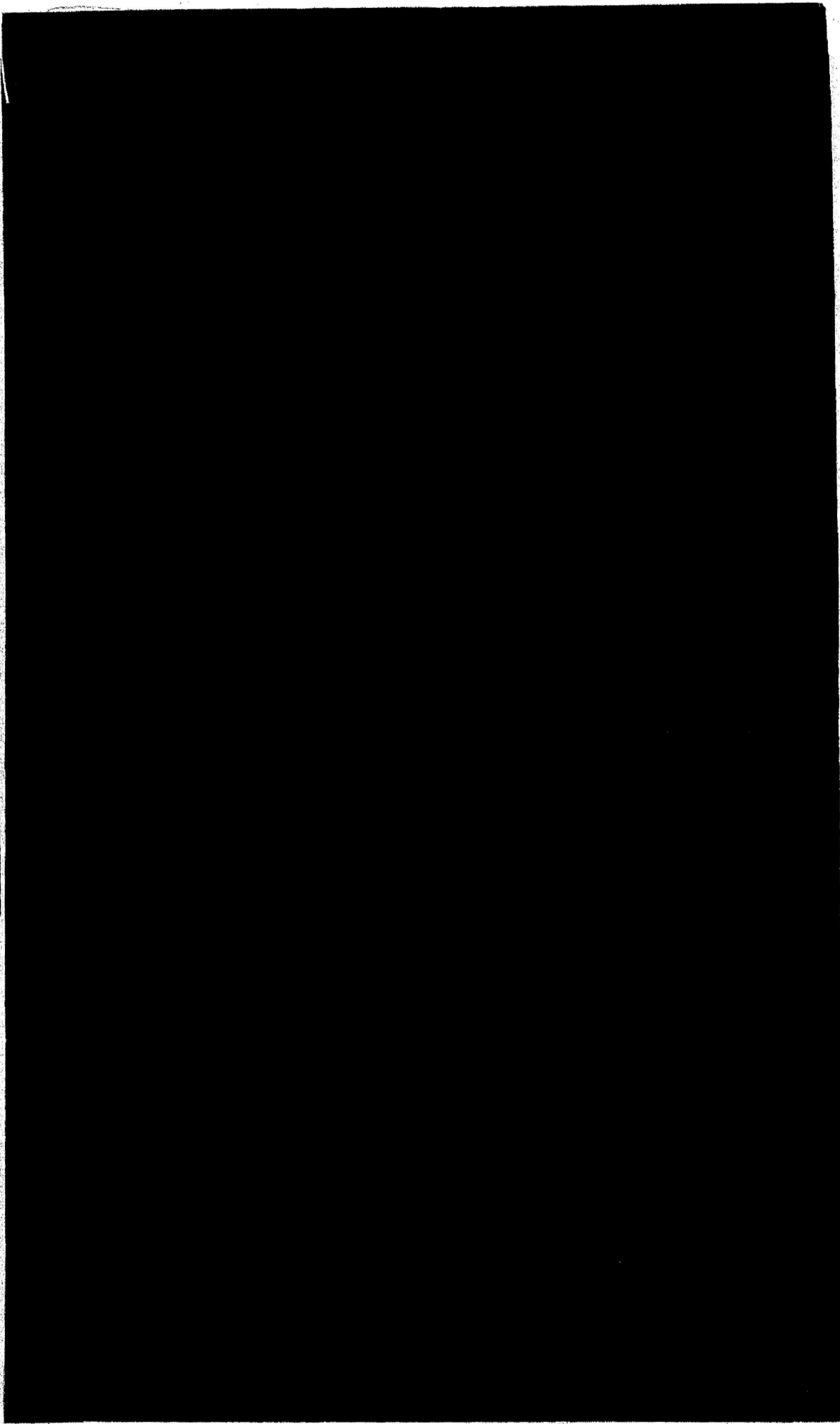
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PROPOSED HARDTACK PROGRAM

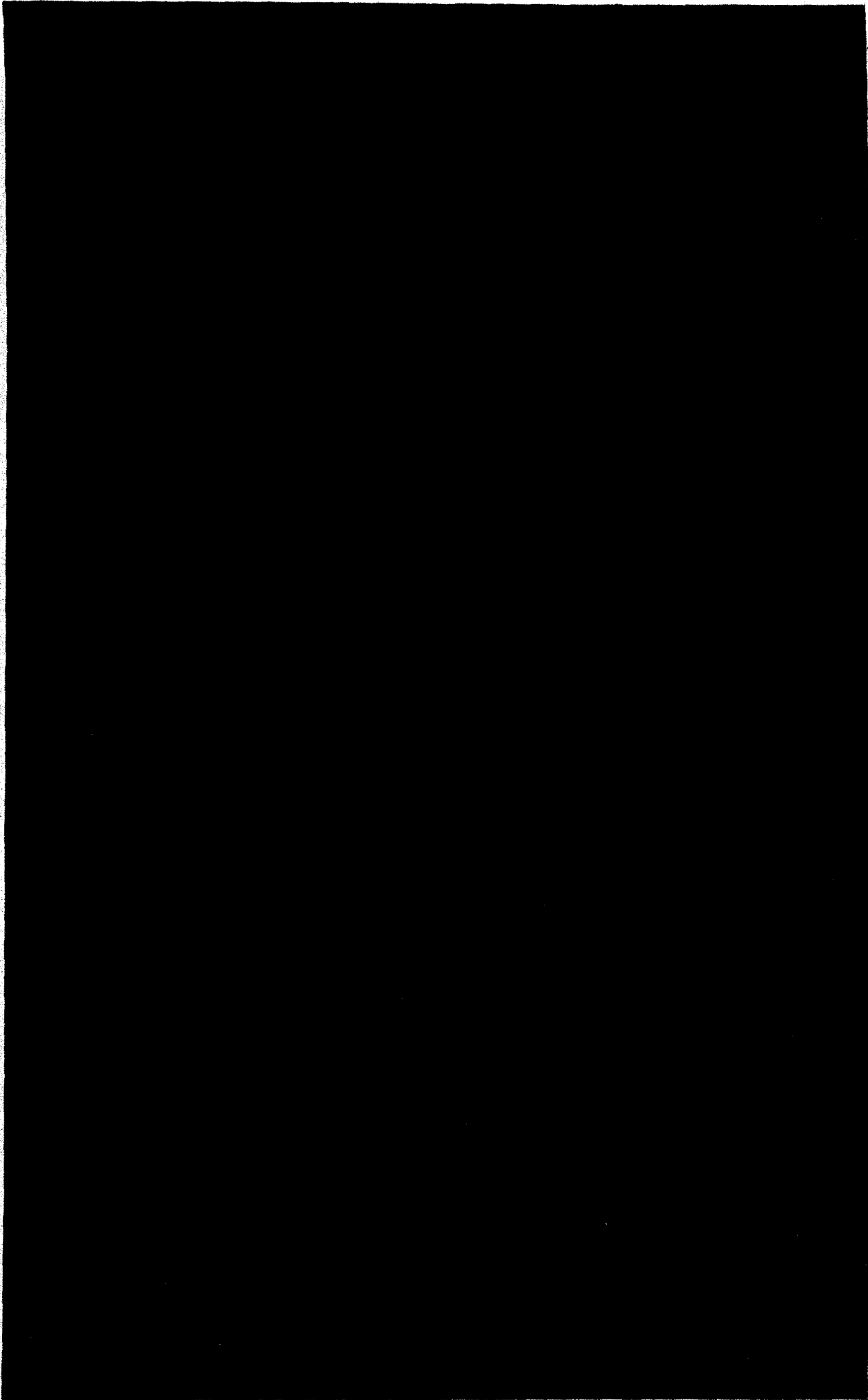


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DOE  
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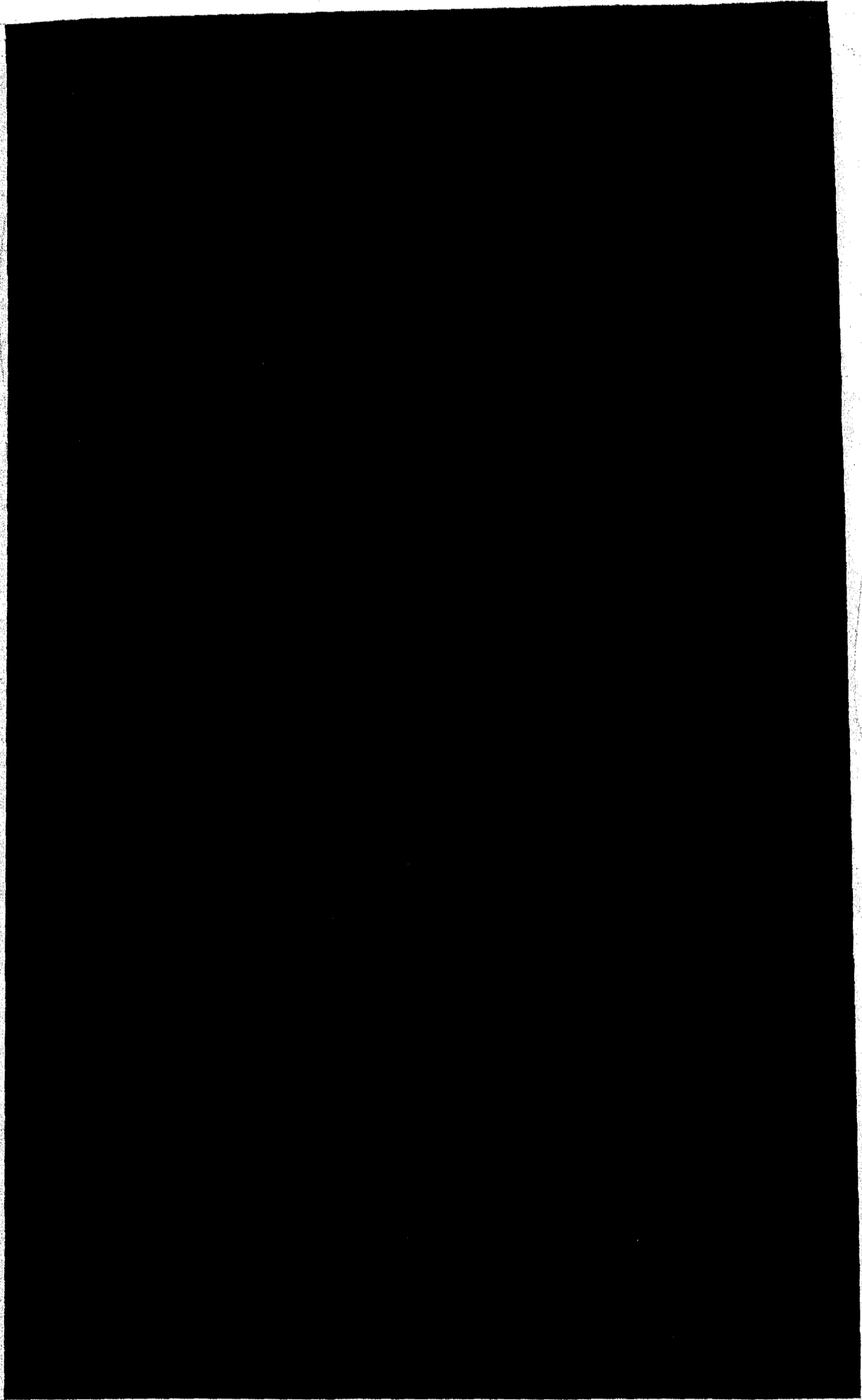


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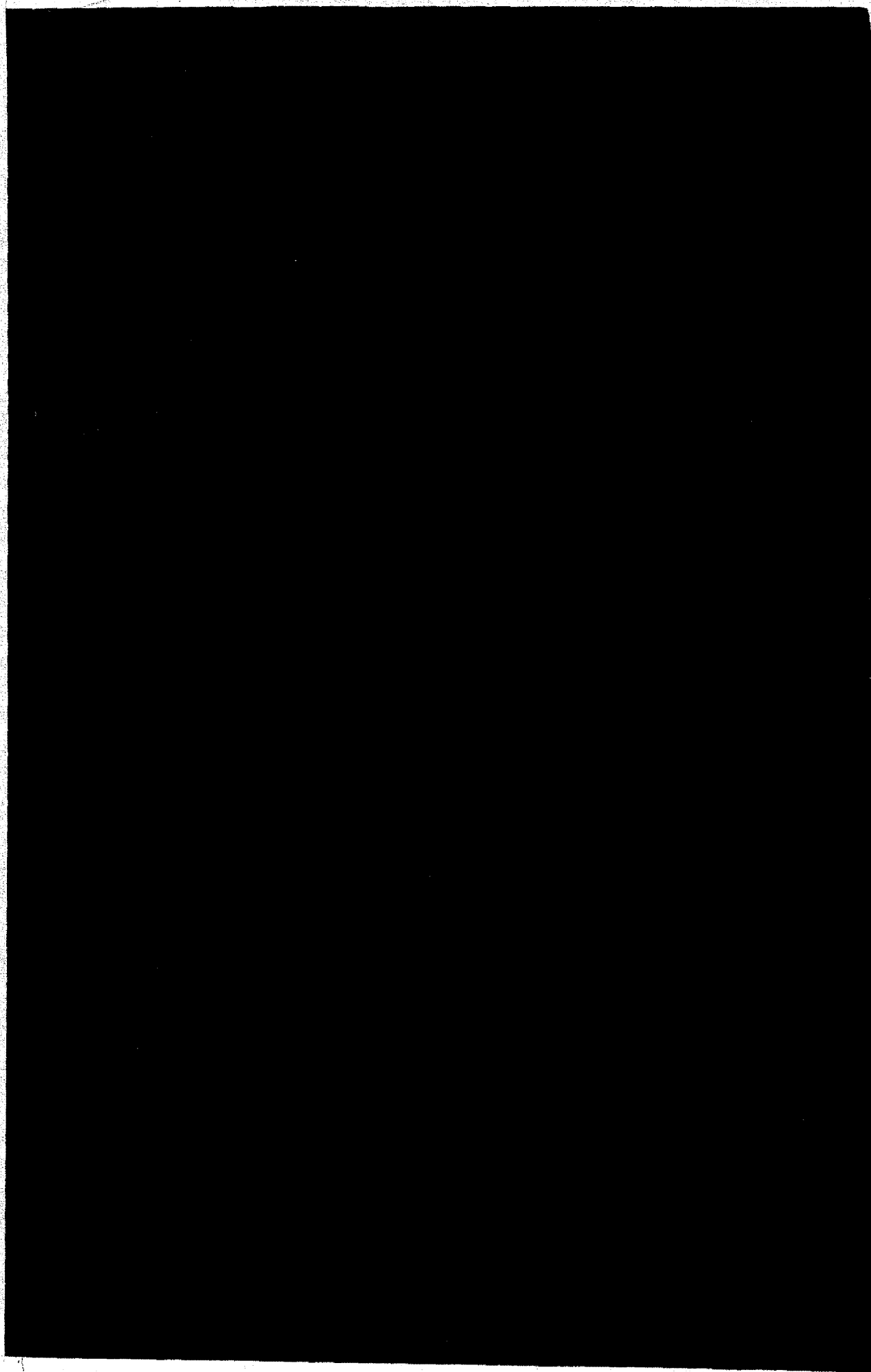


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DoE  
6.1(a)

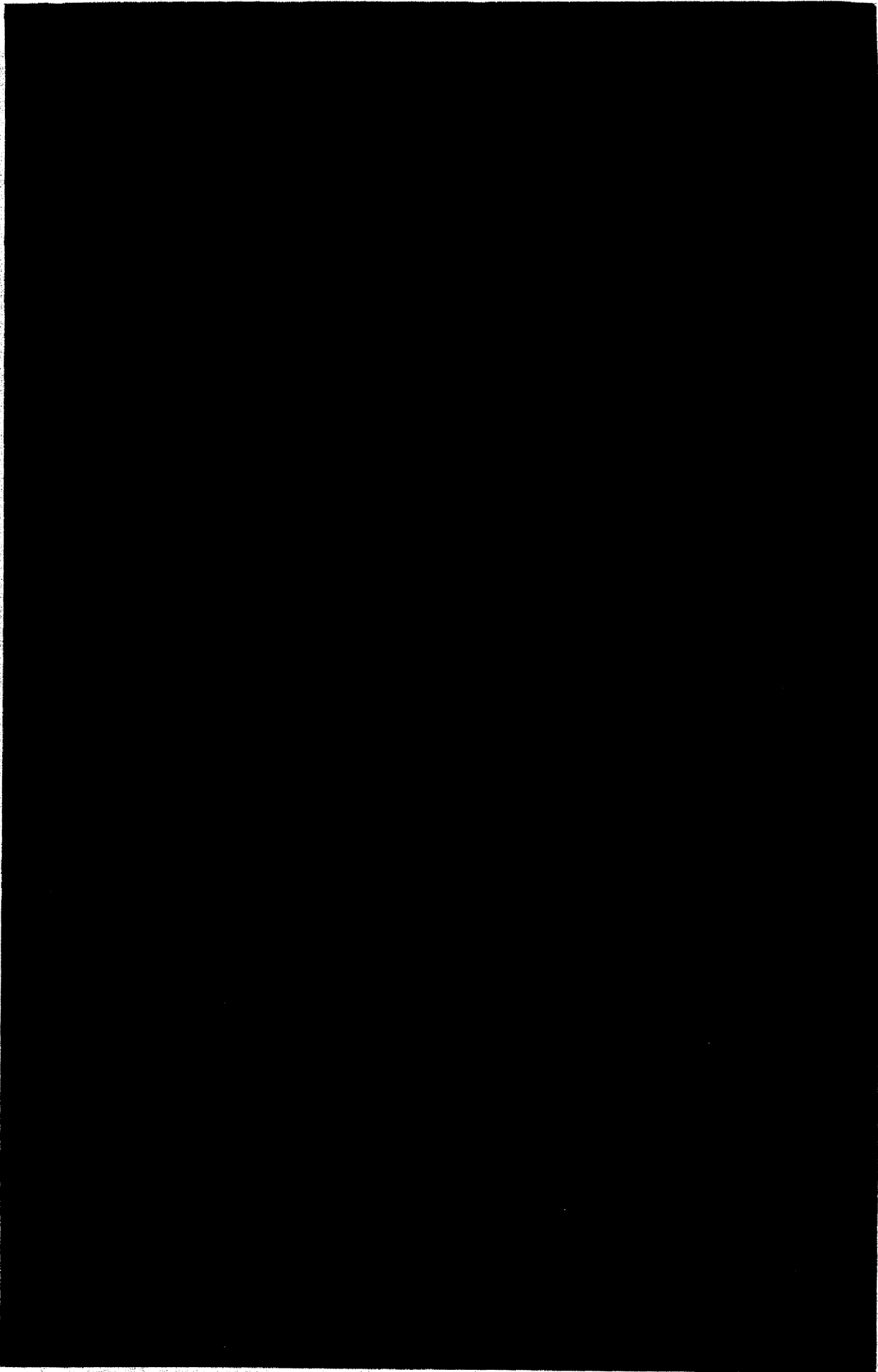
Purpose

Description

Probable Yield

Device or Test

Sponsor



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DoE  
6.1(a)

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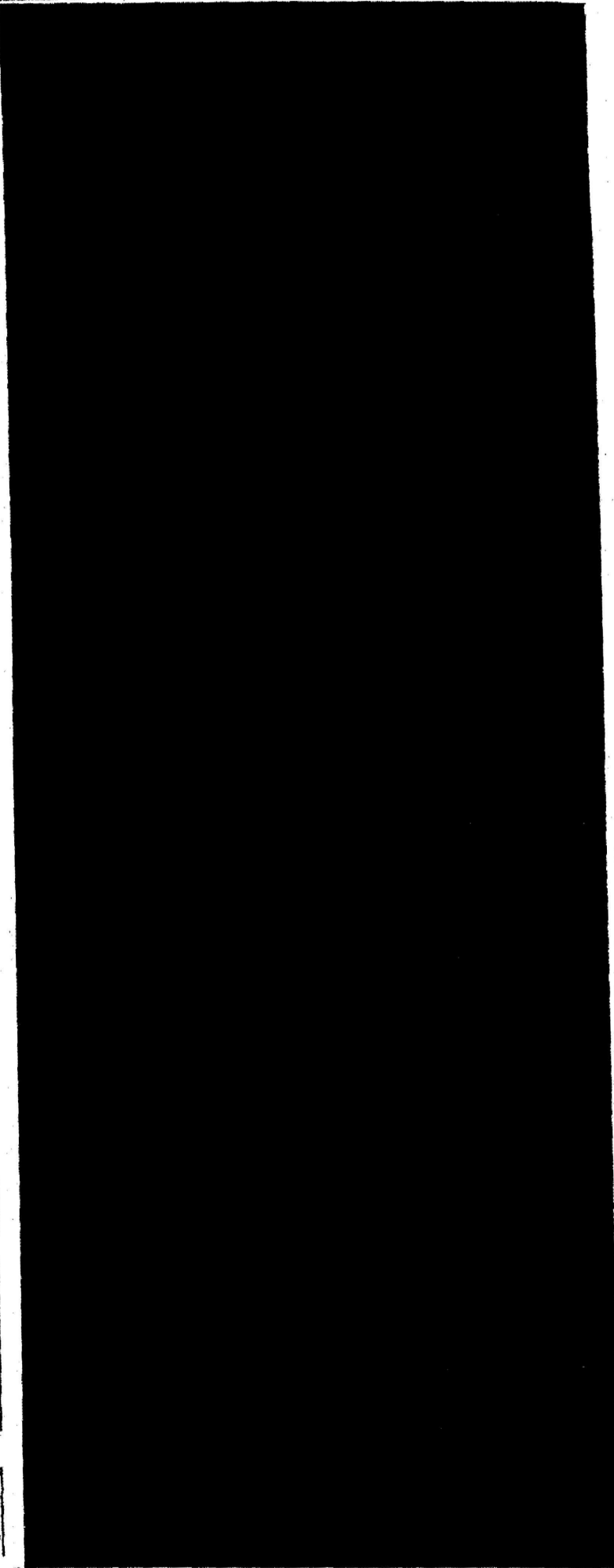
Purpose

Description

Probable Yield

Device or Test

Sponsor



Appendix "B"

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APPENDIX "C"

DRAFT LETTER TO THE MILITARY LIAISON COMMITTEE

1. The Atomic Energy Commission is considering the occupancy and use of Taongi Atoll for the conduct of nuclear experiments. The use of Taongi as a firing site in addition to Eniwetok and Bikini has certain very desirable features. From the standpoint of fallout, Taongi is a safer place to detonate high yield devices than either Bikini or Eniwetok. The greater distances from Taongi to the inhabited areas of the Marshall Islands and its superior position with respect to direction from these areas are distinct advantages and give increased assurance against the repetition of fallout incidents such as that which occurred in March 1954. At the same time the greater ease of firing large shots from Taongi will have advantages in reducing the length of a test operation. It is estimated that Operation HARDTACK as presently planned would probably be shortened by about three weeks if Taongi is used, and in addition Taongi may be the only place where it is feasible to test any of the very large yield weapons.

2. It is planned that all firings at Taongi would be barge shots and all diagnostic data normally taken from land would be secured from a ship. The use of Taongi Atoll as an additional test site during Operation HARDTACK would require some additional military support. The support requirements have been discussed with the JTF-7 staff.

3. If Taongi is to be used there must of necessity be coordination with the Departments of State and Interior. After concurrence by these agencies we would request the President to

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close Taongi Atoll for security reasons and notify the Security Council of the United Nations, as was done in the case of Eniwetok and Bikini.

4. We would appreciate as early as possible a Department of Defense opinion as to the desirability of such use of Taongi and a statement as to its ability to support, and concurrence with the arrangements for, this additional site.

DECLASSIFIED  
E.O. 12958, Sec. 3.3

NW:972066A  
By DM HC Date 7/27/05

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