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SECURITY INFORMATION

AEC 597/4

COPY NO. 18

December 22, 1952

ATOMIC ENERGY COMMISSION

OPERATION CASTLE

Note by the Secretary

The attached report by the Director of Military Application is circulated by request of the General Manager for consideration by the Commission at the meeting scheduled for 2:30 p.m., Monday, December 22, 1952.

ROY B. SNAPP

Secretary

WITH ATTACHMENTS/ENCL.

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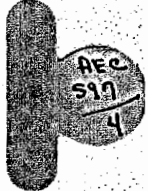
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By authority of U. S. Atomic Energy Commission

Per ~~Brig. Gen. K. E. Fields, cod. in~~ Date 12-22-52

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SECURITY INFORMATION

ATOMIC ENERGY COMMISSION

THE THERMONUCLEAR WEAPON TEST PROGRAM

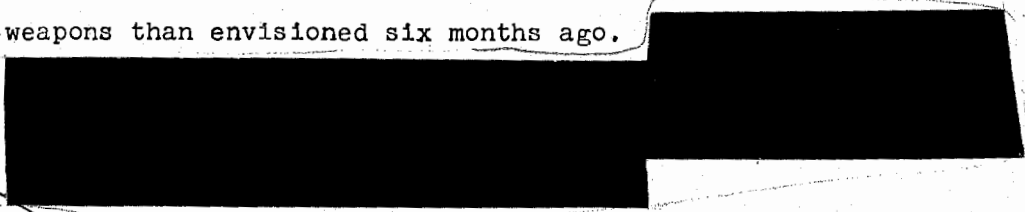
Report by the Director of Military Application

THE PROBLEM

1. To consider the timing of Operation CASTLE.

BACKGROUND

2. The annual weapon program submissions of the Los Alamos Scientific Laboratory and the University of California Radiation Laboratory (Livermore) are in process of preparation and review and will be submitted for Commission review and approval early in calendar year 1953. As a result of the extremely successful behavior of the Mike Shot of the IVY operation, from the standpoint of yield, these programs will propose a considerable expansion and a broader research and development in thermonuclear weapons than envisioned six months ago.



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3. In a letter of June 13, 1952, circulated previously as AEC 493/4, the Military Liaison Committee transmitted a Joint Chiefs of Staff requirement for the development of thermonuclear weapons which follows in part:

"a. A military requirement exists for the development of thermonuclear weapons giving yields of one megaton upward; a military requirement exists for the production of such weapons provided they are compatible in size, shape and weight with delivery systems that will be available in 1954.

"e. The Joint Chiefs of Staff wish to emphasize that prior production of a deliverable thermonuclear weapon by the USSR would serve to reduce the present U.S. preponderance in atomic weapons, and that such a shift in balance might exert strong influence on Soviet policy decisions. This factor, when taken together with the promise of U.S. thermonuclear programs, is considered to provide adequate justification for an approach which may represent considerable technical risk and large expenditure of funds."

4. Because of the urgency of the thermonuclear weapon development as expressed in the above paragraph the reorientation of the thermonuclear program must obviously be related to such policy considerations as well as to technical considerations. Since the production of a proven weapon involves full-scale testing, the date to be set for the CASTLE operation will be an important determinant of the scope and emphasis of the development program and the time at which operational capability will be realized. There is need for the earliest possible decision on this date. This paper discusses the main issues pertinent to timing of Operation CASTLE on the basis that the finally approved programs of LASL and UCRL will include projects indicated in letters from Drs. Bradbury and York circulated in AEC 597/2, and recommends a date for the test program which should satisfy the technical requirements as well as the DOD requirements.

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DISCUSSION

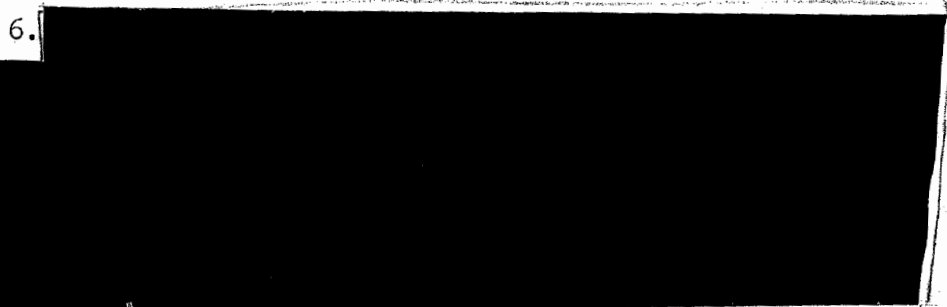
5. Dr. Bradbury of LASL, Dr. York of UCRL, and Mr. Tyler of SFO have recommended (see AEC 597/2) that CASTLE, now scheduled for fall of 1953, be rescheduled to spring 1954. In summary, Dr. Bradbury's reasons are:

a. Information derived from Operation UPSHOT can then be used to assist in designing and selecting the best of the several competing models now being considered.



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Without this information the laboratory cannot proceed in an orderly, scientific way from the 80-ton Mike fixture, to a 25-ton deliverable weapon. UPSHOT is scheduled to take place between March 17 and May 21, 1953; evaluation of its data will require several months following the test. Thus, in order to incorporate UPSHOT results in devices which are to be designed, fabricated, and delivered in time for CASTLE in early 1954, the theoretical work must be done very rapidly.

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Serious doubts concerning its performance were felt at this time due to the possibilities of the mixing of heavy and light materials. The Mike shot did not make this outlook any more favorable but if anything made these doubts more firm.

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8. [REDACTED]

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Conversely, ideas proved impractical would be abandoned. At the same time development of delivery systems and logistic support and production of weapon end items would be accomplished as a closely coordinated program between AFSWP, SWC, and AEC so that the "emergency capability" would exist on the military, as well as on the AEC, side of the question. To proceed on this basis CASTLE would have to be held in early calendar year 1954.

9. It should be noted here that, after all theoretical calculations have been completed and a prototype weapon fabricated, the completed package must be tested for deliverability in a series of about 40 drop tests. If the necessity for changes in case shape for ballistic reasons is evident following these

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tests, it is possible the whole device will require re-engineering since the case is a fundamental part of the weapon rather than merely an envelope as for other bombs. This, in turn, makes desirable allowing the longest possible period for development before CASTLE.

10. Evaluation of the risks involved in selecting one of the possible weapons now under consideration and attempting to fabricate it in weapon form so as to be able to test it in the fall of 1953 leads to the conclusion that this is not a wise course. Stopping, or materially decreasing, the effort on two of the three models and designing the best case now possible with our limited knowledge might make one model available in time for test in fall 1953. Its performance would, however, be almost unpredictable. Further, should any one of the many arbitrary decisions which would have to be made to meet this date prove erroneous, we would have no capability in this model at all. Centering all our effort on the one successful model, furthermore, would move back the date when we could have the other models available for proof test to fall 1954 or possibly later.

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CONCLUSIONS

12. The LASL proposes development of three possible thermo-nuclear weapon models which should be ready for test by spring 1954. [REDACTED] A successful full-scale test is necessary before any of these models can be accepted as an emergency weapon. Selection and design of these models for test at CASTLE will be critically influenced by the results of UPSHOT in spring 1953. DOL
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13. In conformity with these recommendations and in order to permit inclusion of UPSHOT data in the design of CASTLE devices, the Commission should postpone CASTLE until the spring of 1954. This will allow the weapon or weapons selected for test then to be the best from the development point of view, and offers the better possibility of attaining the desired thermo-nuclear capability by 1954.

14. The AEC should propose to the DOD the action outlined in paragraph 13 above, and request their comments.

RECOMMENDATION

15. That the Atomic Energy Commission:

a. Approve holding Operation CASTLE in early 1954;

b. Approve dispatch of a letter such as that in the Appendix to the MLC advising of the proposed schedule for CASTLE, and requesting their comments;

c. Note that possible CASTLE test items included in the LASL and UCRL developmental programs are described in the letters from Drs. Bradbury and York circulated in AEC 597/2 (see paragraph 3a-3d, page 2, Enclosure "A" and paragraph Iib, page 6, Enclosure "B", respectively).

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APPENDIX

DRAFT LETTER TO THE CHAIRMAN, MLC

1. The results of the IVY thermonuclear experiment indicate certain reorientation of the thermonuclear weapons program in order to insure broad and rapid progress in this activity. The revised program and its bearing on the timing of the CASTLE operation are discussed below.

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The Mike shot behavior unfortunately did not dispel these doubts. In addition, it is now apparent that material available for this weapon indicates November as the probable earliest date for its full scale test.

3. The Mike device behavior leads us to believe that adaptation of its design to a weapon or weapons offers real promise.

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To convert the Mike type design to a weapon configuration, however, involves a great amount of engineering and process development and test, including a number of important tests now scheduled in the UPSHOT series in the spring of 1953.

4. We have approved programs on the above type designs and intend that they be prosecuted with all vigor and dispatch in order that the possible models and the date of their readiness may be determined at the earliest practicable date.

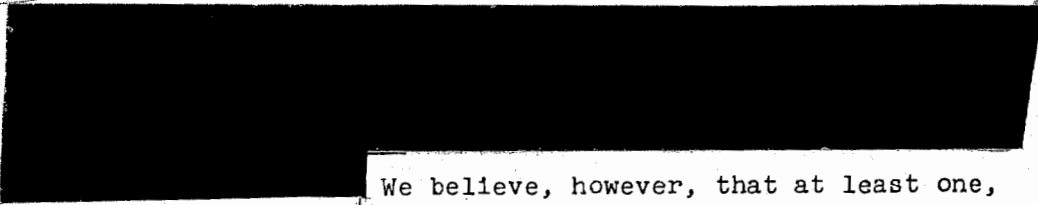
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We believe, however, that at least one, and probably both, of them will emerge as possible for test and emergency capability early in 1954.

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We believe that such course is indicated in view of its increased promise for obtaining a capability in thermonuclear weapons in early 1954.

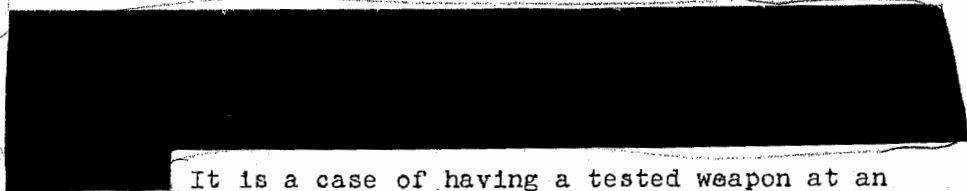
6. We realize that the above suggested plan has a major impact on military planning, as well as on the supporting Task Force. With respect to the latter, it would be desirable from our standpoint if at least the principal staff of the present Task Force could be held intact.

7. In view of the importance of this program, your early comments are requested.

2. Proposed Change of Date for Operation CASTLE

793rd AEC Meeting
12-22-52
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Mr. Murray initiated the discussion by asking why it was necessary to decide on the timing of CASTLE at this particular time. General Fields replied that Mr. Bradbury had written asking for permission to take preliminary steps in the development of thermonuclear weapons, which, if taken, would make it extremely difficult, if not impossible, to carry out the tests in the fall of 1953. (see AEC 597/2)



It is a case of having a tested weapon at an earlier date.

Mr. Dean said that it is not now certain that the test will be postponed until 1954 although it is highly probable. However, because of the uncertainty it would be unwise to disband the task force. Mr. Zuckert said that we should continue a requirement for a task force in late 1953 in the event that it is necessary. The military position is indeed inconsistent in that they ask for an early emergency capability but are reluctant to support one. He pointed out that the members of the MLC do not really have the responsibility to act on this

task force problem. The issue might be put to the MLC in this manner: Does the DOD have an over-riding priority for a tested weapon in the fall of 1953 and if so, is this priority high enough that they are willing to risk a failure and the eventual postponement of the development of more certain weapons as a result of holding this early test? He added that the task force issue should not be brought up in the MLC meeting until the primary issue has been discussed. Mr. Dean suggested that the Commission should not act on this matter formally at this time. After further discussion the Commission:

a. NOTED that the proposal to defer CASTLE would be

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discussed with the MLC; and

b. DEFERRED action on AEC 597/4.

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U. S. ATOMIC ENERGY COMMISSION
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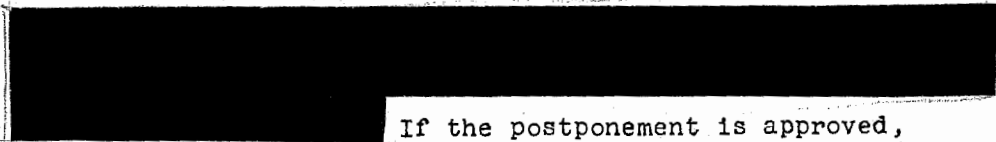
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4. Timing of Operation CASTLE

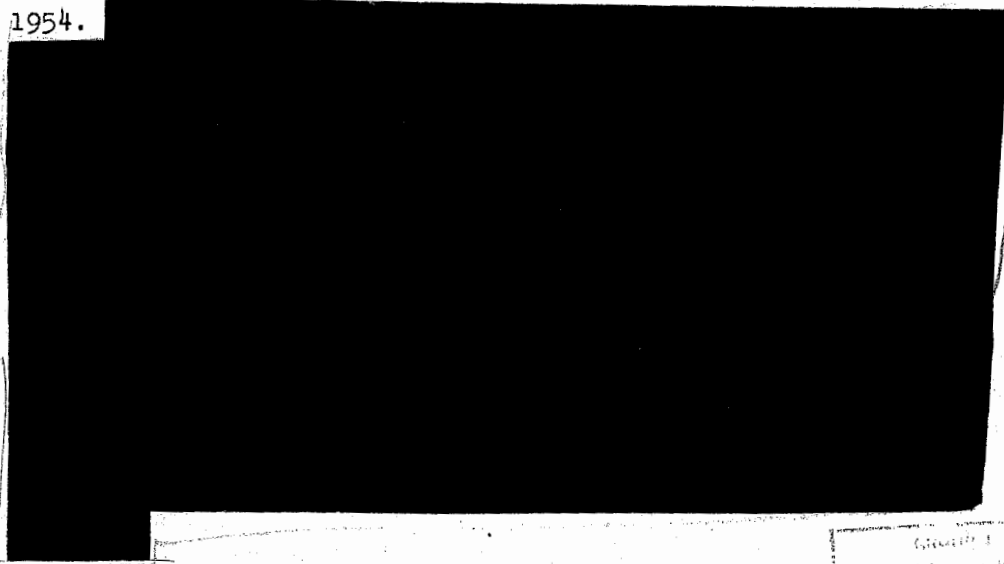
Mr. Dean and General Fields pointed out that for technical reasons it would probably be necessary to postpone Operation CASTLE from the fall of 1953 until early 1954.



If the postponement is approved, Los Alamos will develop three different thermonuclear weapons

which would give us a greater certainty of having a deliverable weapon than if one weapon is backed in the fall to the exclusion of the other two. This would be the case if the test must be held in late 1953. General Fields added that the likelihood of having a deliverable thermonuclear weapon early in 1954 is greater, in his opinion, if three different types are developed simultaneously and tested in early 1954 than if one weapon is developed exclusively and tested in 1953. The alternate types of devices to be tested and the various problems in their development were discussed.

General Bunker asked why it would not be possible to test one device in the fall and the other two in early 1954.



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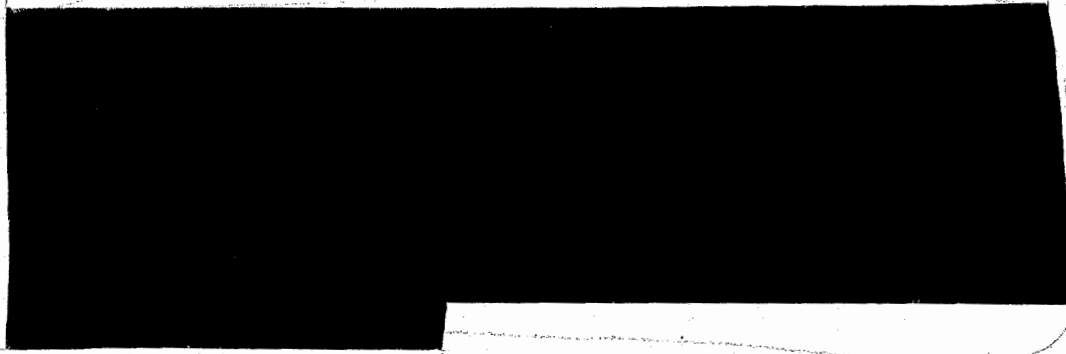
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BY Harold S. Gammage, Jr. DATE 3/28/64

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There followed a discussion of the support problems resulting from a postponement of the test. These problems include the deployment of elements of the task force. Admiral Wright stated that it might be necessary to withdraw certain of the Naval elements. Mr. Zuckert pointed out that if the task force is disbanded and another formed at a later date it could very well result in a further delay of the test. He stated that, in his opinion, the support elements of the test must not become the over-riding consideration. Admiral Wright said that it would be necessary for the Navy to have a decision in the near future in order that it might plan for this eventual postponement. Mr. Dean suggested that the matter of timing of CASTLE could not be settled at this session and that, on an interim basis, Admiral Wright might tell the Navy that the Commission has serious doubts that the test can be held in the fall of 1953.

It was agreed to meet again on December 23 to consider this problem further.

791st AEC 2: Plans for Operation CASTLE
Meeting
12-18-52

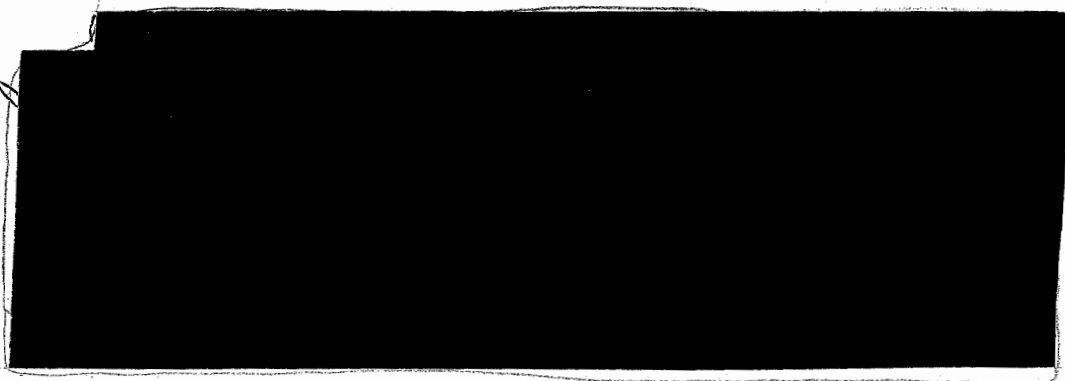
General Fields explained that because of technical con-
ts siderations it now appears necessary to postpone Operation

CASTLE to the early part of 1954. This postponement would make possible the test of three potential deliverable thermonuclear weapons, and this should increase the probability of having a deliverable weapon by June of 1954.]

General Clarkson said that he was pressed on all sides by the three services for the personnel and equipment of his task force and that he required a decision as to its future status as early as possible. He added that if the test is to be postponed the services will want to cut the size of the task force. Mr. Zuckert pointed out that the military position was somewhat inconsistent; on the one hand they are asking that the AEC develop a deliverable thermonuclear weapon at the earliest possible date; on the other hand they wish to cut the task force which is necessary to test these weapons. The postponement does not seem to be long enough to justify disbanding the task force. If this is done, it will only be necessary to build up a new one which could lead to further delays. Mr. Dean and the other Commissioners agreed that it would be desirable to hold the task force together.

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Mr. Smyth described the thermonuclear test program. Assuming the goal of X number of megaton thermonuclear weapons, there are three possible routes to this goal.

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Elaborate cryogenic equipment, which presents severe logistical problems, is not required and the material inside is cheaper. On the other hand, it is not certain that it will work.

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Dr. Graves agreed the objective is not to prove a principle but to get a deliverable weapon.

General Fields concluded this discussion by stating that the Division of Military Application had a paper recommending that CASTLE be postponed which would be presented to the Commission the early part of the following week. This matter would be a subject for discussion at the MLC meeting the following day.

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