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ATOMIC ENERGY COMMISSION

HIGH ALTITUDE TEST

Note by the Secretary

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

W. B. McCool

Secretary

REPOSITORY NARA College Park
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BOX No. 221 (AN3-326-93-010)
FOLDER R+D 9 Foreign Detection Program

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ATOMIC ENERGY COMMISSION

PROPOSED HIGH ALTITUDE TEST

Report to the General Manager by the
Director of Military Application

1. In a letter to me dated October 7, 1955* Professor E. O. Lawrence expressed concern over the possibility that the USSR may be capable of detonating nuclear devices at very great altitudes, circumventing thereby our attempts to maintain long range surveillance of their nuclear testing activities. In support of his concern Professor Lawrence pointed out that on two USSR tests we obtained only an acoustic signal. Professor Lawrence requested that AFOAT-1 be asked to investigate this possibility, paying particular attention to a review of the acoustic signal data now in its possession. Further, Dr. Lawrence suggested that the USAEC undertake a direct experimental investigation of this problem by detonating one or more high yield weapons at very high altitudes.

2. In furtherance of Professor Lawrence's suggestion we wrote to AFOAT-1 on November 3, 1955* advising that organization of Professor Lawrence's letter and requesting it to investigate the possibility that the USSR could conduct thermonuclear weapons tests at altitudes which would diminish the effectiveness of our long range detection methods and further requesting that we be furnished the AFOAT-1 estimate of suitable combinations of yield

* On file in Division of Military Application

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- 1 -

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and height of burst that would provide a basis for a worthwhile experiment to corroborate or to disprove this possibility. AFOAT-1 replied to our query in a letter dated January 17, 1956, (AEC 12/7) which enclosed a study entitled "Long Range Detection of Very High Altitude Nuclear Weapons Tests" which covered the acoustic detection method in some detail and touched lightly on the other methods.

[REDACTED]

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3. On November 3, 1955, we advised the Military Liaison Committee (MLC) of Professor Lawrence's proposal, and we requested that the Department of Defense furnish us information concerning missiles appropriate to the task of carrying nuclear warheads to very high altitudes.

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The MLC stated that by 1958 the REDSTONE missile and the NIKE-B missile would be available.

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4. Advice was requested from Sandia Corporation on the feasibility of providing necessary warhead components for the

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100,000 foot detonation using the Corporal missile.

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5. Meanwhile, we had requested Dr. Bradbury and Dr. York to review the AFOAT-1 study of the high altitude shot. Dr. York's reply of May 8, 1956, (AEC 12/10) indicated that the problem was quite complicated, and there was not enough time for his laboratory to study the problem adequately during Operation REDWING. However, Dr. York did indicate that there is a possibility of formation of an acoustic signal through heating of the atmosphere by X-ray radiation from the bomb case, a phenomenon not considered by AFOAT-1. Dr. Bradbury, in his reply of May 8, 1956, (AEC 12/10) is in general agreement with AFOAT-1 in that our standard means of detection would encounter new problems in obtaining signals from an explosion of given size as burst height is increased. However, he was highly mistrustful of the quantitative results of the AFOAT-1 analysis. He pointed out that LASL was not in a position to provide estimates without a formidable amount of theoretical work. Dr. Bradbury concluded that the difficulties facing any country conducting an atomic weapon development program, but utilizing only very high altitude tests would be stupendous, probably to the point of impracticability.

6. During my recent trip to the Pacific Proving Grounds I explored with Admiral Hanlon, Dr. Ogle and others the possibility of adding this very high altitude shot to Operation REDWING. JTF-7 can accommodate the shot operationally and requested that the target date be set at July 15, 1956. However scientific personnel were extremely pessimistic over the data

- 3 -

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gathering possibilities of the shot. The task is indeed formidable.

7. My staff and I have held further discussion with parties interested in this shot in the Washington area. The Army has indicated informally that it could have personnel and equipment at West Coast ports of aerial embarkation on thirty (30) days notice. AFOAT-1 has indicated a strong desire to do this high altitude experiment during Operation REDWING since its personnel and equipment are already deployed. A major effort would be required by AFOAT-1 to deploy necessary equipment and personnel for a 1957 test. Sandia Corporation has indicated that it could supply the desired warhead on about six weeks notice. In this connection, Sandia Corporation is already working on a design. Dr. Edward Teller visited me, and he is very strongly in favor of doing the shot in Operation REDWING.

8. In recapitulation I believe that the following points must be weighed:

a. The time between now and July 15, 1956 is short and if the high altitude test is included in REDWING, it would be necessary to lay on the Operation with great dispatch.

b. The amount of weapons effects or basic scientific data that can be obtained from the tests in REDWING will be limited due to inadequate time to prepare instrumentation. It will not be possible to make use of close-in airborne instrumentation in the time available. Instrumentation will be limited to that which is possible from the ground with possibly some limited observation from orbiting aircraft. Scientific opinion is not unanimous on the value of the weapons effects information that can be obtained with the limited instrumentation.

c. Comments from Drs. Bradbury and York indicate that the formation of the acoustic signal in a high altitude shot has not been fully explored and further, theoretical studies should provide additional information on the high altitude burst phenomenon which should make possible more reliable estimates on the yields and heights of burst appropriate for the test.

- 4 -
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d. AFOAT-1 is in a good position at the present time to record data pertaining to long range detonation of high altitude shots due to the fact that they have installed additional stations for REDWING.

e. The safety aspects of the operation could not be fully explored in the time available.

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However, all of these safety features are subject to some probability of malfunction, and due to modification of the standard warhead which is required, the probability of premature detonation or other malfunction is not known at this time. In view of this it has not been determined whether remote launching of the missile would be required. No estimate has been made of the extent to which personnel and ships would have to be removed from the launching point.

f. The additional shot most probably would necessitate a longer operation REDWING and would divert somewhat the energies of personnel now there to this new activity.

g. If the test is deferred to a post REDWING date, more time would be available for a thorough and systematic approach to the experiment and greater benefit would be derived therefrom. Moreover, a complete series of high altitude tests could be planned and implemented. In this connection, it should be pointed out that this one shot in REDWING would not rule out other high altitude shots at a later date.

9. In view of all the above I do not believe we have justification for recommending this added shot in REDWING but should consider it (and other high altitude shots) for later scheduled (or possibly special) tests. I intend to proceed on this basis but desire to inform the Commission of the facts and contemplated course of action. If the shot need be added, full-scale preparatory work would have to begin immediately.

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