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GENERAL ADVISORY COMMITTEE
to the
U. S. ATOMIC ENERGY COMMISSION
Washington 25, D. C.

July 16, 1954

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Mr. Lewis L. Strauss, Chairman
U.S. Atomic Energy Commission
Washington 25, D.C.

Dear Mr. Strauss:

Herewith is the summary report of the 41st Meeting of the General Advisory Committee held in Los Alamos and at the Sandia Corporation in Albuquerque on July 12, 13, 14, and 15, 1954. All members with the exception of Dr. Wigner were in attendance.

The first three days were devoted to briefings by the Sandia Corporation, the Los Alamos Scientific Laboratory, and the Livermore Laboratory in connection with a simultaneous visit by the Military Liaison Committee to the AEC, the Defense Department's Coordinating Committee on Atomic Energy and its Technical Advisory Panel. The 15th was devoted to a meeting of the GAC with Commission and Los Alamos staff. At this time, we had the benefit of the presence of the Commission Chairman for an important discussion of the U-233 program with the Director of the Division of Military Application, the Director of the Los Alamos Laboratory, and AEC and LASL staff.

Our comments and recommendations follow.

1. U-233 Program. After a lengthy and lively discussion, it became clear that Program "B", providing for the production of U-233 and the suitable adjustment of other production schedules, as outlined by Gen. Fields would furnish, according to the best available knowledge, a complete answer to the [redacted] family of weapons; that this program involved little or no additional cost in weapons or in money; that this program was not an irretrievable commitment but could easily be reversed; that the availability of U-233 would most likely be of importance in other weapon programs; that the use of thorium would lessen our dependence on foreign supplies of raw materials; that there is no other easy way presently known to remedy the [redacted] weapons.

For these reasons we unanimously recommend the immediate initiation of Program "B" with such modifications as may appear desirable after further discussion and after consultation with the duPont Company.

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We also recommend that a test of a device using U-233 be made as soon as practicable when a sufficient quantity is available.

2. Aircraft Nuclear Propulsion Program. The pressure of time, and the injection of the U-233 problem into our agenda at a very late date, combined with the lateness of the Commission request for further elaboration of our comments on the ANP program as given in the report of the Chairman of the GAC dated June 3, 1954, made it impossible to study the ANP problem in greater detail at this meeting. However, the Subcommittee on Reactors proposes to meet at Oak Ridge for three days, September 21, 22, and 23, 1954, to consider the whole ANP program and hopes that the Commission will invite attendance at this meeting of representatives of the Nuclear Development Associates and the General Electric Company, as well as AEC staff and other interested parties. We hope that a report, which may be useful to the AEC, will result from this meeting.

We wish to reiterate our belief in the importance of the ANP program for our national defense, and our hope that it can be so organized as to proceed to its objectives with minimum delay.

3. Comments on the Discussions of July 12, 13, and 14. Jointly with the MLC and the CCAE, we had three days of review and discussion at Sandia and Los Alamos with the principal staffs of Sandia Corporation, LASL, and Livermore Laboratory.

(a) Sandia. We were impressed with the strength of the organization for engineering development and design, and the great attention which was given by the organization to reliability and effectiveness in weapon designs. Significant progress was reported in the development of fuses in the direction of reliability and simplicity.

We noted with special interest and approval the careful effort which is being made in system studies toward understanding the nature of weapon systems which make for maximum effectiveness.

We were also gratified to observe the close and friendly cooperation of Sandia with LASL and with the military organizations.

(b) Los Alamos. The day and a half of briefing and discussion by the staff of Los Alamos was illuminating and complete. We heard from: Dr. Graves on the CASTLE tests and the future TEAPOT, Post-TEAPOT, WIGWAM, and REDWING tests; Dr. Schreiber on present weapon status, nuclear safing and [redacted] Dr. MacDougall on tactical and small weapons, and also on possible improvements in the 30 KT region; Dr. Mark on CASTLE and forward-looking prospects in two-stage weapons, and also on the use of "dirty" plutonium; and, finally, Dr. Bradbury on future directions in weapon design, utilization and stockpiling.

We were impressed by the broad range of Laboratory objectives, and by their realistic formulation in relation to military utilization, which are indicative of the great strength and maturity of this Laboratory. Although many formidable technical problems in the forward-looking program remain to be solved, particularly in the small weapon field, the prognosis for continued success seems favorable.

(c) Livermore. We were impressed by the detailed diagnosis of the [redacted] shot at CASTLE as presented by Dr. Teller. This diagnosis was not only an excellent job in itself but also showed the presence of able people at the Laboratory, which augurs well for the success of their program for the Class "D" two-stage weapon. A program for investigation of small weapons utilizing the [redacted] technique was presented by Dr. York. This technique may provide an alternative to the gun or [redacted] assembly methods and is therefore interesting to explore.

There was expressed in the Committee a certain concern with the program as a whole, particularly in the light of the altered two-stage weapon situation. Although no specific suggestion on the program is offered, it was felt that some thought should be given to a firm assignment of responsibility and authority to a full-time director of the Livermore Laboratory which may result in a more crisp program and a more effective sharing of weapon responsibility with LASL.

(d) Test programs--TEAPOT, WIGWAM, Post-TEAPOT, and REDWING. We do not wish to comment on specific items of the test program at the present time since the plans may still be subject to drastic change. However, it is very gratifying that even after the numerous advances of the last years there are so many items which are worthy of the effort and expense involved in weapon tests. This may be an appropriate time again to emphasize the importance and value of the test programs.

(e) Weapons Development Philosophy. The proposal by Dr. Bradbury of a philosophy to guide weapons development over the next years, we believe, deserves particular attention. In the period of scarcity of materials and limited numbers of weapons, interchangeability of nuclear parts was an important criterion of stockpile weapons design. The present is a period of transition -- from scarcity to relative abundance, from a modest range of yields to one almost without limit from very small to very large. Interchangeability should no longer dominate design if it restricts numbers of weapons, their readiness and flexibility of use in time of emergency, or their effectiveness in accomplishing the specific missions assigned. We would, therefore, urge a careful reappraisal of the relations between the types of design of nuclear weapons and the missions for which they are appropriate, with the objective of establishing guidance principles for optimizing the design of the several classes of weapons, small and large, which could accomplish these missions. In such a reappraisal, both LASL and Sandia should take part with the Military Departments in the necessary comprehensive system studies.

4. Argonne Reactor Program -- Boiling Reactors. At this Meeting the Committee heard a report from its Subcommittee on Reactors covering a three-day set of detailed and thorough briefings by Dr. Zinn and his associates at ANL during the preceding week. This study was undertaken so that the Committee could respond to the General Manager's request for an appraisal of the boiling water reactor development being carried out as part of the ANL reactor program.

We wish to endorse the general program outlined by Dr. Zinn, including the long-range development of the fast breeder reactor. In the following, we comment specifically on the boiling reactor program.

Present plans call for testing the existing boiling reactor installation at Arco under conditions of high operating power leading to destructive melting of the fuel elements. Further tests will be carried out on a new and improved installation this fall. It was also noted that a tentative schedule has been established for constructing, at the Argonne National Laboratory, an experimental boiling reactor (BER) capable of delivering five megawatts of electric power. This schedule provides for construction to begin April 1, 1955, and for the reactor to go critical by the end of 1956. The component tests and studies, outlined by Dr. Zinn, on fuel element design, corrosion, burn up, the use of radioactive steam in turbines, and chemical costs are integral and essential parts of this program.

The Committee continues to believe that the boiling water reactor development program is one of great promise. We recommend continued strong support, with arrangements which will minimize contractual delays.

In our study of this subject we have been reminded of the importance of maintaining a flow of information between different groups with common technological interests; and we hope that arrangements can be made to facilitate the exchange of technical reports between ANL, Hanford, and Savannah River.

A more detailed report is being prepared by the Subcommittee and will be available at a later date.

5. The Meeting was the last meeting of the General Advisory Committee before the terms of office of Dr. Buckley, Dr. von Neumann, and Dr. Rabi expire. It was therefore impossible to fix a definite date for the next meeting. However, a tentative date was set for October 4, 5, and 6, 1954.

In any event the meeting will occur in a period between October 1st and October 11th. Among other matters, the Committee hopes to discuss weapons effects, and Project Sunshine.

In the meantime the members of the Committee will continue to be available to the Commission for any problems which may arise.

Sincerely yours,

I. I. Rabi
Chairman