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MINUTES

Fortieth Meeting of the General Advisory Committee
to the U. S. Atomic Energy Commission

May 27, 28, and 29, 1954
Washington, D. C.

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FIRST SESSION
(May 27, 1954)

The Fortieth Meeting of the General Advisory Committee was called to order at 9:30 a.m. by the Chairman. The following members were present: Dr. Rabi (Chairman), Dr. Buckley, Dr. Fisk, Mr. Murphree, Dr. von Neumann, Dr. Warner, Mr. Whitman, and Dr. Wigner. Dr. Libby was unable to be present at this Meeting. Dr. McDaniel, who served as Acting Secretary in the absence of Dr. Dodson, and Mr. Tomei were also present.

Minutes, 39th Meeting Since the Minutes of the next previous meeting had been approved by the individual members of the Committee prior to this Meeting, they were not read. (Secretary's Note: The Minutes were distributed to the usual recipients on May 12, 1954.)

Agenda The Chairman explained the agenda (Appendix A) for the Meeting, and there followed a general discussion of the weapons problems which were brought about by the advent of large weapons. It was agreed that the Committee should thoroughly air the entire weapons field, including the fall-out situation. During these discussions, Dr. Rabi said that the proposed reduction in research funds by the House had been opposed by the Senate and that a conference to resolve the disagreement was scheduled for about June 7; all members expressed the hope that the Senate view would prevail.

Sub-committee Meetings The members of the Committee then made plans for Subcommittee meetings as follows: Reactor Subcommittee at Argonne on July 7, 8, and 9; Weapons Subcommittee at Sandia and Los Alamos on July 12, 13, and 14, 1954.

The value of awards was discussed, and it was agreed that the Committee should inquire further into the status of the proposed Presidential citation for the Los Alamos Scientific Laboratory.

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Policy on Aliens meeting concerning the participation of alien scientists in the research program of the Commission was held. Dr. Rabi suggested that inquiry be made as to its status.

Meeting with the Commissioners and General Manager Meeting Manager Nichols joined the meeting.

Dr. Smyth, in the absence of the Commission Chairman, welcomed the members of the Committee. He asked Mr. Nichols to explain the items on which the Commission would like to have the advice of the General Advisory Committee.

Successor to Dr. Beckerley Mr. Nichols told the members that Dr. James G. Beckerley had resigned as the Director of the Office of Classification, and that Dr. Beckerley would be leaving the Commission in early summer. Dr. Charles D. Luke, Chairman of the Department of Chemical Engineering at Syracuse University, was mentioned by Mr. Nichols as a possible successor to Dr. Beckerley. Mr. Nichols described Dr. Luke as a man with Manhattan Engineer District experience under Dr. Ruhoff, and with some experience with the Standard Oil Company. Mr. Nichols said that Syracuse would give Dr. Luke a one-year leave of absence.

Dr. Rabi asked whether this position did not call for long experience in handling information problems. Both Dr. Smyth and Mr. Nichols agreed, but told of their difficulties in finding the proper man. They said they also were considering Mr. Charles Marshall and Mr. Murray Nash of the Office of Classification for the job.

Mr. Whitman and Mr. Murphree said they knew Dr. Luke, and that he had many of the right qualities for the job.

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Materials Testing Accelerator Program (MTA). Originally, he said, the MTA was thought of as an alternative to the ore supply. Now the ore supply is more certain. Dr. Rabi pointed out that MTA also had two other purposes when originally planned, namely, the production of polonium substitutes and the production of tritium. It was agreed that the critical requirements for both these materials have changed.

Mr. Nichols explained that the Commission would have a proposal for the Fiscal Year 1955 Program for MTA before it soon, and that he was seeking guidance as to the appropriate funding level for this activity.

Dr. Smyth restated the question as, should we put the results, as they now stand, on the shelf; or should we spend another $3\frac{1}{2}$ million dollars or so to operate the new machine and then put it on the shelf?

Mr. Murray thought it a mistake to keep putting off the decision as to what to do with the MTA. He said that unless we are going to build a production machine we probably ought to stop, but that the GAC could give the Commission advice on this subject.

"L" Category of Information
Dr. Smyth and Mr. Nichols, in response to Dr. Rabi's question, explained the Commission's proposed plan to segregate information of low security significance but of value to industry and friendly foreign countries. Dr. Rabi inquired into the adequacy of Belgian security. Dr. Smyth stated that generally it was pretty good. Dr. Rabi then mentioned three items which he thought bore on this information problem: (1) denial to the Russians; (2) prevention of competitor nations obtaining a position adverse to ours; and, (3) securing an advantage to the United States by trading.

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Dr. Rabi said that the GAC had recommended the same sort of thing previously, and that they would be glad to hear more about it from the Reactor Development Division.

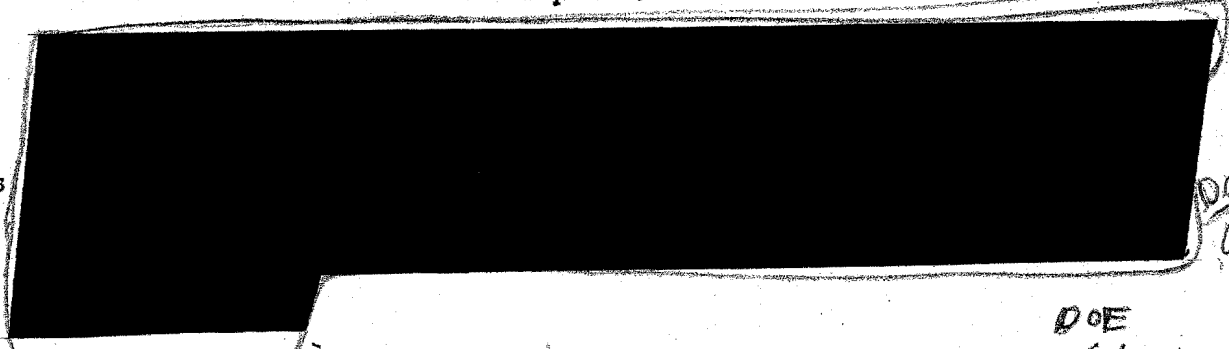
Policy on Aliens
At this time, Dr. Rabi inquired if anything had been done on the question of the participation of alien scientists in the research program. Mr. Nichols replied that he thought the Chairman has gone over the cases; and that he did not know its present status.

Citation for Los Alamos
In response to Dr. Rabi's inquiry, Mr. Nichols stated that the Commission was preparing a Presidential citation for Los Alamos, and that copies of the draft would be made available to the GAC for review.

Pricing Policy for Fissionable Materials
Dr. Smyth said that the Commission would appreciate the advice of the GAC on a proposed pricing policy for fissionable materials (AEC 152/49). Mr. Nichols discussed the importance of establishing prices for fissionable materials.

Proposed Amendments to the Atomic Energy Act
Dr. Smyth called the attention of the GAC to the redefinition of "atomic energy" in the proposed amendments to the Atomic Energy Act -- "the term 'atomic energy' means all forms of energy released in the course of nuclear fission or nuclear transformation". He wondered if the term "nuclear" included natural radioactive materials, e.g. radium. There was no discussion on this point.

Press Speculations



DOE
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Aircraft
Nuclear
Propul-
sion
Program

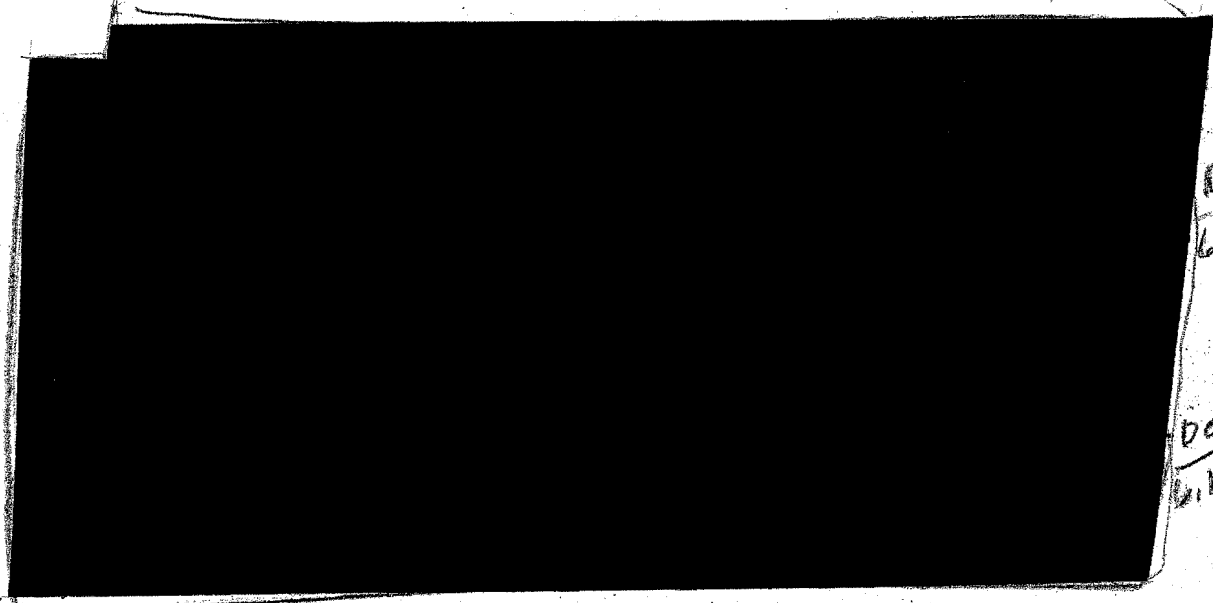
In response to Mr. Whitman's question as to what was the Commission's problem on the ANP program, Mr. Nichols said that the Reactor Subcommittee of the Joint Congressional Committee on Atomic Energy had recommended that the ANP program be accelerated. He explained the new cruise concept involving the design of aircraft operating on chemical fuel for takeoff and landing, on nuclear fuel for unlimited cruise, and on both chemical and nuclear fuel for sprints at Mach 2 over targets. The Air Force, he said, tends to look on this as making them independent of overseas bases. The proposed extra effort during Fiscal Year 1955 amounts to about \$6½ million.

Dr. Rabi remarked that such use would require large amounts of fissionable materials, and inquired whether there was a firm military requirement for airplanes of this type. Mr. Nichols said that the Air Force was firming up a requirement, but that the National Security Council would have the problem. Mr. Zuckert noted that the report of the Boeing Aircraft Company was highly favorable.

Price
of Heavy
Water

Mr. Whitman noted that heavy water was now priced at \$27 per pound. He wondered whether the Commission could sell heavy water at a lower price when production needs had been met, and when industrial reactors came into being. Dr. Smyth pointed out that there would be a continuing need for some deuterium. Mr. Nichols remarked that the Savannah River plant was being amortized over a long time. He told the Committee that the Commission was still studying this problem, but that if he were in the industrial reactor business he would consider heavy water to be in the \$20 to \$30 per pound price range.

Lithium



At 12:40 p.m. this Session was adjourned.

SECOND SESSION
(May 27, 1954)

The afternoon session was called to order at 1:30 p.m. by the Chairman. All Committee members (except Dr. Libby), the Acting Secretary, and Mr. Tomei were present. Dr. Smyth and Dr. T. H. Johnson were also present.

Research
Matters
Budget

Dr. Johnson reported that the Senate had taken action to restore the budget cut of the research program which had been made by the House. This met with the approval of those present.

Succes-
sor to
Mr.
Lillie

Dr. Johnson announced the resignation of Mr. David W. Lillie as the Chief of the Metallurgy Branch of the Division of Research. He mentioned briefly his recruitment plans, and asked for suggestions from the Committee. Dr. Fisk suggested that Dr. Bruce Old and Dr. John Howe would be good sources of information, and Dr. Wigner suggested that Dr. Frank Foote also be asked for recommendations. Dr. Fisk suggested

further that a man be obtained with about the same qualifications as Mr. Lillie had five years ago, when he came to the AEC.

Con-
trolled
Thermo-
nuclear
Program

Dr. Johnson said that he had little to report on Project Sherwood at this time, but that he would give the GAC a report at its next meeting. In response to a question, Dr. Wigner said that he had not talked with Dr. Spitzer at Princeton about his project because he understood that he was not cleared for this subject. It was pointed out to Dr. Wigner by the Chairman and others present that this must be the result of a misunderstanding, for his position on the GAC required that he have access to everything. Dr. Johnson said that he was sure that there was no difficulty in this regard, and that if necessary he would communicate with the project leaders. (Secretary's Note: On June 17th, the Division of Research notified the project leaders in writing.)

Accel-
erators

Dr. Johnson next discussed the plans of the Division of Research to recommend that the Argonne National Laboratory be authorized to make a study leading toward the construction of a high energy accelerator in the Midwest. Dr. Zinn plans to divert about five people from their present assignments and to employ about five others from the participating universities of the Midwest for this study. Dr. Wigner inquired whether there were any plans for an accelerator at Oak Ridge. He was told that they are considering the subject, but have not progressed as far in their plans as have the Argonne people. He agreed that there was an urgent reason for allowing ANL to go ahead with their plan, but expressed the hope that something could be done for ORNL later.

Dr. Johnson reported that there were no problems on the pricing of radioactive and stable isotopes which needed Committee attention.

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After a short discussion on computers, the Chairman suggested that Computers it was the consensus of the Committee that the Research Division should give sympathetic consideration to proposals from universities involving the procurement of computers for work on Atomic Energy Commission problems.

At 2:05 p.m. this session was terminated, and Dr. Charles H. Reichardt, who had entered a few minutes earlier, began his presentation on intelligence matters.

Intel-
ligence
Matters Dr. Reichardt explained the general nature of the articles which appeared in the Red Star, an official Red Army publication. He remarked that although the Red Star is generally available to the Russian public, these articles were prepared by military people. Those present remarked on the naivety of the Red Star's sketch of the H-bomb.

Dr. Reichardt mentioned that an intelligence report had been received to the effect that large quantities of mercury had been shipped from Italy to the USSR. He said that although this report was being checked into further, similar reports in the past had not proved to be true.

Dr. Reichardt announced that the Bethe panel would be convened in July or August to go over the USSR tests. In answer to a question, he stated that no further USSR tests had been detected.

At 2:25 p.m. Dr. Reichardt left, and Mr. Strauss, Dr. John Bugher, Mr. Kenneth Davis, Mr. Nichols, and Mr. A. Tammaro joined the meeting. Dr. Johnson and Dr. Smyth remained.

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Inter-
national
Scienti-
fic Con-
ference

Mr. Strauss reviewed the status of the President's proposal for an international scientific conference on the peaceful uses of atomic energy, and furnished the Committee with copies of the State Department proposal to the Russians on the pool of fissionable materials (AEC 226/36). He mentioned that he had asked Dr. Rabi to function as the chief preliminary organizer for the international conference, and that he hoped the GAC could make suggestions as to place of meeting, timing, procedural steps, and anything else which would help make the conference successful.

Nehru
Proposal

Mr. Strauss discussed the Nehru proposal to cease testing atomic and hydrogen weapons. He asked the GAC to consider what the advantages and disadvantages would be to a favorable or unfavorable decision on this subject.

Dr. Rabi wondered whether it would ever be possible to negotiate with the USSR, and expressed his opinion that weapons tests are important. Mr. Nichols remarked that it would become difficult for the AEC to get funds from the Congress for weapons tests if there were any indication that the Nehru proposal is to be accepted. He stated as an example that he was worried about the proposed 3,000 pound thermonuclear warhead and believed that it should be tested at the appropriate time.

Dr. Rabi agreed that the Committee would advise the Commission on this subject.

Dr. Beckerley entered the meeting at 3:20 p.m. for his talk on Classification Matters. Mr. Tammaro and Mr. Davis remained.

Press
Specula-
tions

Dr. Beckerley presented the GAC with copies of the various articles which had appeared in the press since certain deletions had been made

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from the Alsop H-bomb article submitted September 18, 1953. It was his belief that most of the speculations grew from the deletions in the Alsop article.

He concluded by saying that his resignation was for personal reasons, and did not follow from internal AEC strife as some press stories had reported.

Dr. Beckerley left the meeting at 3:35 p.m. At this time, Gen.

Reactor
Matters

D. J. Keirn, Col. N. L. Krisberg, Col. R. L. Wassell, Col. Melvin Neilsen, Mr. J. C. Robinson, and Mr. E. N. Bower entered. Mr. Tammaro and Mr. Davis were also present.

Status
of ANP
Program

Gen. Keirn pointed up the importance which the Air Force puts on the achievement of the ability to reach every point on the earth from continental bases. He said that it now appeared that one could do this through the concept of "nuclear cruise".

Col. Krisberg then gave a very clear presentation of the possibilities of combining nuclear and chemical fuels into a single power plant. He described a liquid metal turbojet engine designed to be powered by nuclear fuel alone, by chemical fuel alone, or by both nuclear and chemical fuels.

He illustrated the concept of nuclear cruise as follows: take-off and climb to 35,000 feet on chemical fuel alone, unlimited cruise on nuclear fuel at about Mach .9 until near the target, climb to 50,000 feet and sprint over target for up to 600 nautical miles at Mach 2 on both nuclear and chemical fuel, descend to 35,000 feet for return cruise on nuclear fuel and land on chemical fuel alone.

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Col. Krisberg pointed out that (1) the performance, both augmented and emergency, of such a plane is set by the chemical fuel and that adequate cruising performance could be obtained with a 150-megawatt reactor; (2) the temperatures involved are of the order of 1400°F and are within the range of known reactor design; (3) the controls are simple; and, (4) the shield weights are of the order of only 60,000 to 70,000 pounds.

He also noted that operational difficulties were reduced over those which would be encountered with completely nuclear fueled aircraft. He said that the take-off and landing on chemical fuel alone meant that (1) there would be no exposure of base personnel to nuclear radiation; (2) no special runways would be required as such a plane could take off from a 6600-foot runway; (3) crews could be trained without use of nuclear power; and, (4) the reactor could be cooled if necessary by moderate use of chemical fuel on the ground after a mission.

Col. Krisberg showed a slide of a six-engine, delta-winged, aircraft which he said would weigh about 290,000 pounds and which could operate as described with a 125,000 megawatt reactor and chemical fuel.

Mr. Whitman asked what would be the chemical contribution to thrust during the sprint when both nuclear and chemical fuel were used. Col. Krisberg said that this would be about 25%.

Gen. Keirn, in response to Mr. Murphree's question as to which type of reactor was considered best, stated that he thought that both the General Electric heterogeneous reactor and the ORNL-Pratt & Whitney "fireball" reactor would work. He thought that we should go ahead with

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*Mr. Daniel says
this should be
125 MW*

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the reactor experiments to see what their performances are. Col. Krisberg mentioned that the Nuclear Development Associates was studying a sodium-cooled stainless steel heterogeneous reactor which might be acceptable. He said that work on the supercritical water reactor had been curtailed.

At 4:45 p.m. Dr. von Neumann left the meeting.

Dr. Rabi asked about the time scale on the development of aircraft in which these reactors could be used. Gen. Keirn said that the time scale will probably follow the usual pattern. The Air Force has two or three study contracts at about the \$400,000 level now, but the early sixties seemed to be the best answer. Col. Krisberg said that Boeing and Convair have looked over the field, and made preliminary design studies of the "fireball" in some specific plane designs.

There ensued a general discussion of the proposed budget for these programs. It was agreed that about \$8,500,000 for ORNL and about \$5,000,000 for Pratt & Whitney for the fluid fuel reactor for fiscal year 1955, and about \$5,400,000 for the General Electric heterogeneous reactor studies seemed proper. Gen. Keirn had remarked that the \$5,000,000 increase over fiscal year 1954 for the fluid fuel reactor was all that they could do for the first year even on a crash basis.

Mr. Whitman then inquired if the AEC program was tailored to a specific proposal or if it were flexible enough so that the reactor could be used for missiles, if that were desirable. Col. Wassell stated that the initial reactor experiments would occupy the next two years and at that time we would have to decide on the end use.

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In answer to specific questions, the Committee was informed that about 60-75 pounds of fissionable material were required for the fluid fuels reactor, and about 15-25 pounds were required for the GE heterogeneous reactor.

At 5:15 p.m. the ANP session was adjourned. After a 10-minute break, Mr. Davis began his presentation. The others present were the Committee (except Dr. von Neumann and Dr. Libby), the Acting Secretary, Mr. Tomei, and Mr. Tammaro.

Fuel
Element
Fabrica-
tion
Costs

Mr. Davis discussed the problem of high costs for PWR fuel element fabrication, and inquired if there were any suggestions on how such costs could be reduced. After some discussion, Mr. Murphree suggested that perhaps many reactor designers were still laboring under the impression that reactors should be designed for a minimum amount of fissionable materials rather than lowest overall costs. He thought that fabrication costs might be lowered by using more fissionable materials, cheaper structural materials even though they absorbed neutrons, and greater tolerances on design.

"L"
Category
of
Informa-
tion

Mr. Davis next discussed the problem of distributing reactor technology information to industry and to friendly foreign countries. He said that they were convinced that the bulk of reactor technology information could be placed in an area which would not require full background investigation of all persons having access to it. The Committee was in

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agreement with these views, and expressed the hope that the proposed revisions of the Atomic Energy Act would permit the establishment of such a "grey" area of information.

Materials Testing Accelerator Program

Mr. Davis reviewed the technical accomplishments of the MTA project to date. He said that this program has demonstrated that (1) a vacuum of the order of 1×10^{-6} mm of mercury could be obtained in large cavities with mercury pumps; (2) ion sources could be produced to give two amperes peak and one-half ampere average currents into a 4-inch hole with an efficiency of 35%; (3) cavity excitation in such a machine could produce 100 milliamperes currents at 12 Mev for 20 hours; and, (4) sparking and focussing problems can be solved. He said that high energy physics studies have shown that the number of neutrons per incident deuteron at 300 Mev is from 4 to 11, and that with 500 Mev we might get 25 neutrons per incident deuteron, and at 700 Mev we might get as much as 42 neutrons per deuteron.

No target is in hand, but there does not appear to be any concern about the feasibility of a suitable target.

Mr. Davis went on to say that it was planned to start up the low energy end of the 50-megacycle accelerator in October.

Dr. Rabi inquired if there were any production or reactor development interest in continuing these studies. Mr. Davis said that there was no direct interest.

The members agreed that any further interest in these studies was in the research field, and therefore expressed doubts as to the wisdom of further expenditures for the project.

At 6:35 p.m. this Session was adjourned.

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THIRD SESSION

(May 28, 1954)

The Chairman called the meeting to order at 9:30 a.m. All members except Dr. Libby were present. The Acting Secretary and Mr. Tomei were also present.

Materials Testing Accelerator Program Division or Reactor Development Division interest in MTA. The Committee members thought that this project did not warrant support by the Research Division.

Aircraft Nuclear Propulsion Program All the members agreed that the ANP program as presented made real sense for the first time. Dr. Wigner remarked that an overall study group on the technical aspects of this subject seemed to be worthwhile. It was agreed, however, that the Committee should not initiate a study, but that the Committee should request a comprehensive paper on ANP for the next GAC meeting.

"L" Category of Information The members agreed to reaffirm their support for the establishment of an area of relatively non-sensitive information which could be disseminated to certain classes of individuals without the requirement for full background investigation.

Fuel Element Fabrication Costs The consensus of the Committee was that the reduction of fuel element fabrication costs was highly desirable. Mr. Murphree felt that perhaps too much design emphasis was being placed on the use of minimum quantities of fissionable material. The members agreed.

Citation for Los Alamos Copies of the proposed Presidential citation were distributed. The members agreed to endorse it, but wished to suggest that certain changes be made in the text.

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Nehru
Proposal

The Nehru proposal to cease testing atomic and hydrogen weapons was discussed. The members unanimously agreed that weapons tests are so important to the weapons development program that the U.S. should give them up only if we received equivalent valuable consideration in return.

In order to respond to Mr. Strauss' question as to whether a violation of an agreement not to test could be determined, the Secretary was asked to secure information on this subject from AFOAT-1.

Inter-
national
Scienti-
fic Con-
ference

The Chairman pointed out the aspects of the proposed international scientific conference which he thought deserved attention. First of all, he said, such a conference would be a diplomatic maneuver in a scientific field and would focus interest on, and perhaps elicit world scientific support for, the President's proposal. He thought that it could be made a real forum for the exchange of information in the fields of biology, medicine, basic science and engineering. He suggested that an international organizing committee should do most of the work of planning the conference.

Dr. Fisk thought that the conference would seem reasonable if attention were focussed primarily on industrial and medical utilization of atomic energy, that it might possibly also include a forum on the technical implication of the President's proposal, and that it probably should not include papers on social and political matters. Dr. Warner thought that a session might be in order on what the several countries would do if they were given the fissionable material.

Dr. Wigner suggested that we consult the Marshall Plan experience before going ahead. He added that he thought real trouble was ahead if we did not require some valuable consideration in return for the material.

At 10:55 a.m., after further discussion on whether the President's Plan should be included in the Conference, this subject was postponed. A 5-minute break was taken.

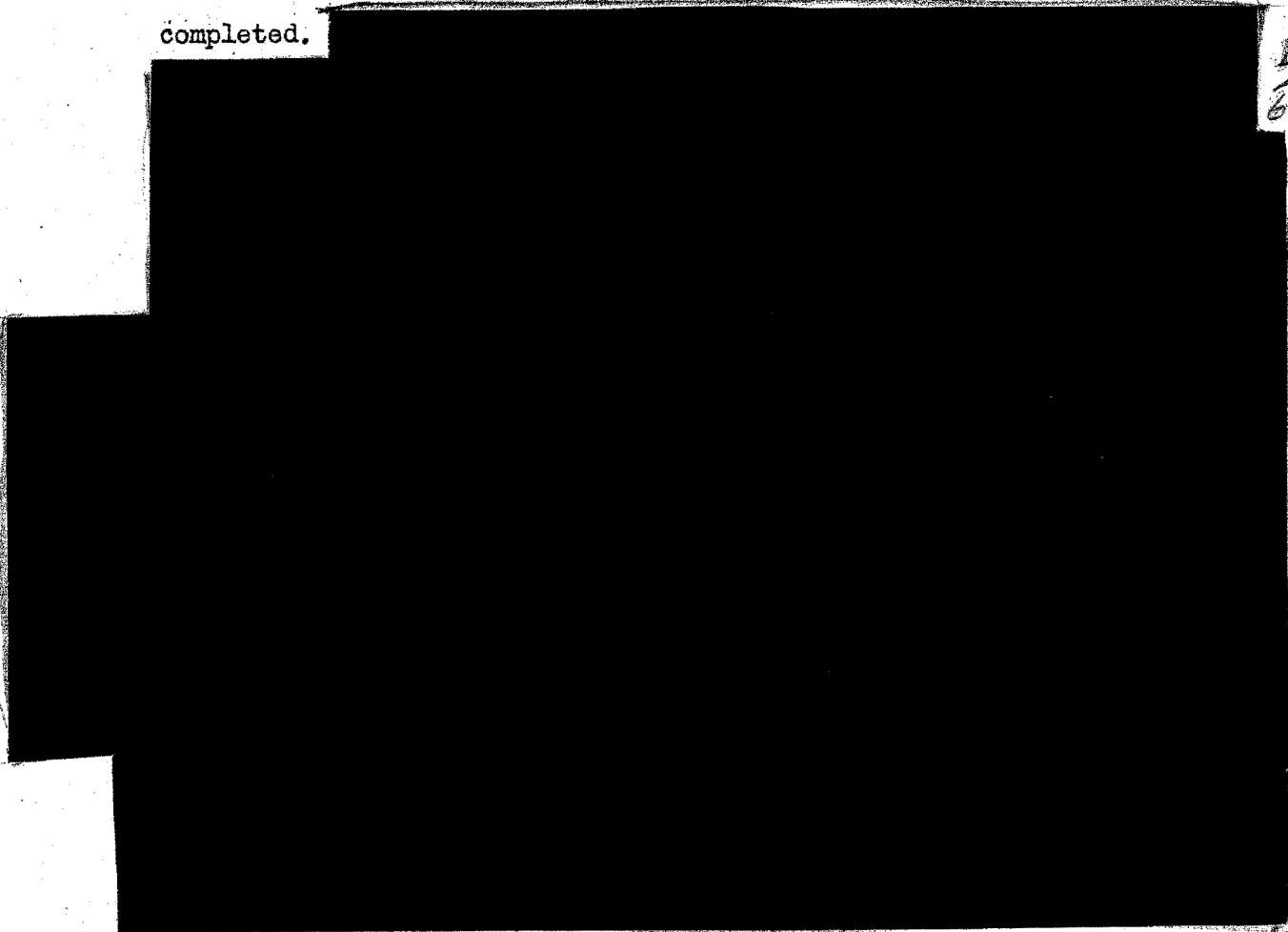
At 11:00 a.m. the following individuals joined the Committee: Gen. Weapons Matters K. E. Fields, Dr. Herbert York, Dr. Carson Mark, Dr. Paul Fine, Dr. Alvin Graves, and Col. E. T. Dorsey.

Dr. Graves presented the preliminary results of the CASTLE tests. Preliminary CASTLE Results The results are presented below in tabular form.

*DOE
6.1a*

*DOE
6.1a*

Dr. Graves then explained the general features of the Pacific test area and the general weather conditions prevailing during the spring of 1954. He pointed out that favorable weather conditions do not occur often for such tests, and that it is necessary to work flexibility into the test plans. He went on to say that the barge technique was good, and that it provided sufficient flexibility to allow the CASTLE tests to be completed.



Dr. Mark then described the plans at Los Alamos for future weapons.

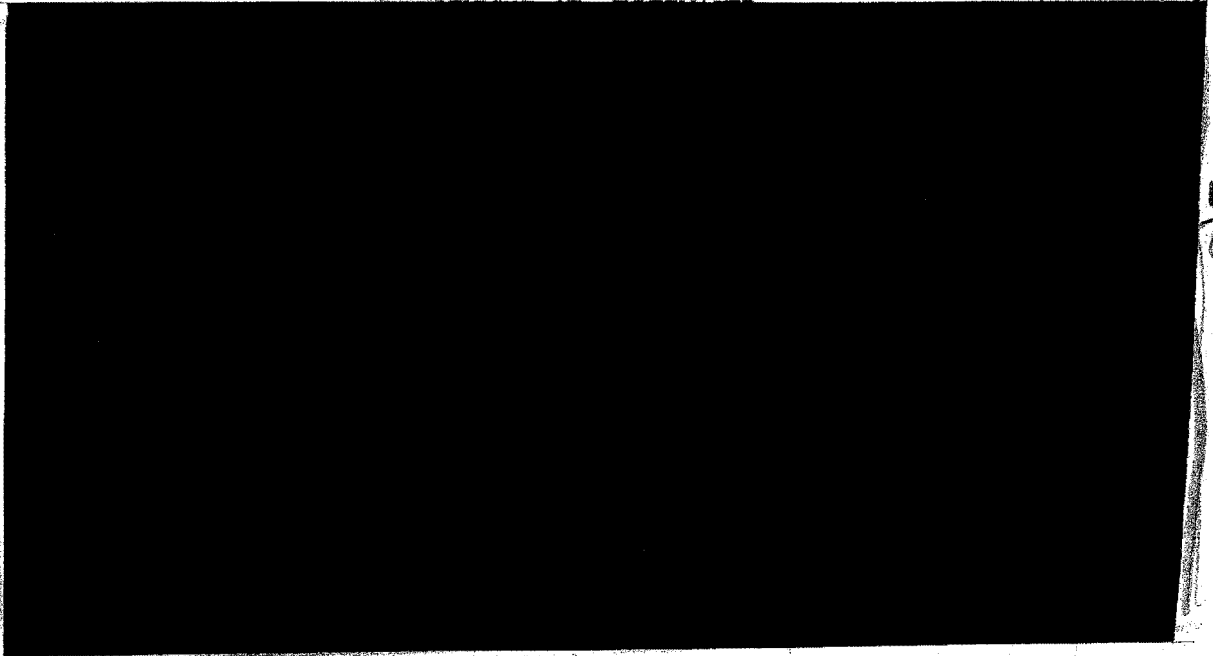
Future
Program
at Los
Alamos

He discussed their experiments on fast neutron interactions with lithium-7. He estimated that the contribution from lithium-7 might be as much as .75 atoms of tritium for each 14 Mev neutron.

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Dr. Mark gave the following statistics for the four classes of weapons based on the CASTLE tests:



FOURTH SESSION
(May 28, 1954)

At 1:35 p.m. the session on Weapons Matters was resumed with the same attendance.

In response to a question by the Chairman as to what would happen if no further tests could be held, Dr. Mark said that the 3,000 pound thermonuclear weapon would cause concern until and unless tested. Dr. York agreed and also pointed out that in the development of very small weapons, more tests may be needed therefore than for large weapons.

Liver-
more
Program Dr. York gave a brief summary of the present and tentatively proposed program at Livermore. He said that the development of a 3,000 pound thermonuclear weapon was the goal but that they would be looking at a 1,500 pound weapon as a possibility. 

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Doc
6/1003

[REDACTED]

DOE
6/6

He said that Livermore might try to test a full-scale 3,000 pound weapon at REDWING (Spring 1956).

DOE
6/6

[REDACTED]

DOE
6/6

Dr. von Neumann inquired about the possibility of 10 KT weapons. Dr. York said that while there were no plans for a nuclear test of this size weapon, Livermore personnel thought that there was a chance that a weapon of this size could be done with hydrides. Dr. York said that some hydride chemical studies were in progress at Livermore.

Dr. York then discussed the possibility of developing small diameter, small yield weapons. He said that Livermore had looked at three such devices and proposed to test one or two next spring. He mentioned the following as distinct possibilities.

[REDACTED]

DOE
6/6

The Committee then decided to consider the fall-out problem.

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Fall-out
Problem

At 2:10 p.m., Dr. J. C. Bugher and Capt. W. L. Guthrie of the AEC; Gen. A. R. Luedecke, Dr. H. S. Scoville, Col. H. H. Kaesser, and Capt. R. H. Maynard of the AFSWP; and Dr. Lester Machta of the Weather Bureau entered. Gen. Fields, Dr. Graves, Dr. Mark, and Dr. Fine remained for the discussion. In addition to the Committee, the Acting Secretary and Mr. Tomei were also present.

[REDACTED]

From available data it appears that in an area of over 5,000 square miles of ocean, a dose of 500 r would have been obtained in the first 50 hours from shot-time; and in an area of over 1,000 square miles, a dose of 2,000 r would have been obtained in the first 50 hours. It was pointed out that the natives on the island of Rongerik received 150 r before being evacuated.

[REDACTED] *DOE*
G. (100)

Dr. Bugher then mentioned that the particles which fell out on the Japanese ships were about 300-350 microns in size. Dr. Graves said the particles from the barge shots were 10-50 microns in size, and more soluble than the particles from the other shots. The smaller particles fall slower, and therefore the 500 r area is smaller and the 200 r area larger from the barge shots.

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Dr. Scoville said that the fall-out extrapolated from the Nevada shots very well. Dr. Machta observed that about 25% fall-out had been obtained in Nevada on the much smaller tests.

[REDACTED]

DOE
6.11.63

Generally, at shot time the wind was 35 knots WSW from 0 to 55,000 feet, and 40 knots East from 65,000 to 95,000 feet. Capt. Maynard pointed out that this sharp reversal of wind favored heavy fall-out from 65,000 feet and below on small areas.

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6.11.63

[REDACTED]

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6.11.63

[REDACTED]

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6.11.63

Mechanism
of
Fall-
out

There was considerable discussion of the scavenging action of such material. It was generally agreed that a great deal more study was involved before the mechanism of the fall-out was understood fully.

[REDACTED]

DOE
6.11.63

Bad
Weather
Shots

He said that there was no

indication of a correlation between the IVY-George shot and unusual weather events. He stated that it was his opinion that no type of weather would precipitate the fission products from a 50-100 KT weapon, but that essentially all the activity from a 10 KT or less weapon would be brought down by a rainstorm.

Gen. Luedecke, in answer to Dr. Rabi's question, said that the Department of Defense did not have any plans to find out what the process is when the fireball just touches the ground. He confirmed this by saying that no one seemed to be worried about an air drop from the fall-out or rain-out standpoint when the fireball did not touch the ground.

Gen. Luedecke, in response to a question by Dr. Fisk, said that our present concept of the use of a 10-megaton weapon was to fire it at ground level under proper wind conditions. Dr. Machta said that the general wind conditions over the U.S. and over Europe were roughly similar to that described for the Pacific area.

Employment of Large Weapons

At 3:55 p.m. all visitors except Dr. Mark and Dr. Fine left the meeting.

Los Alamos Program

Dr. Mark then discussed the planned weapons development program at Los Alamos. He said that they were trying to design weapons of above 1 KT yield.

DOE
6.11.49

[REDACTED] The 16-inch system, he said, is considered as about the right size for air defense.

Dr. Mark said that Los Alamos had had no experience with plane geometry.

DOE
6.11.49



DOE
6/16

Dr. Mark said that Los Alamos Scientific Laboratory was not doing any flat plate experiments. Dr. Fine told the Committee that Livermore was doing such work at Inyokern and at Los Alamos.

At 4:15 p.m. the session was adjourned for 15 minutes, during which period the Committee left to see a film on CASTLE.

At 4:30 p.m. the Committee returned to meet with Dr. S. G. English.

Detection
of USSR
Tests

Dr. English advised the Committee that it was the statement of AFOAT-1 that tests within the USSR-controlled territory of 50 KT or larger could be detected with 100% certainty if the explosion were an air, surface, or shallow subsurface shot. He said that they can detect a 10 KT or larger shot with 90% certainty if it were exploded in air, on the surface, or in the shallow subsurface. They also state that they could detect a contained 50 KT shot with 75% certainty.

At 4:45 p.m. this Fourth Session was adjourned.

FIFTH SESSION
(May 29, 1954)

The Saturday session of the Meeting was called to order by the Chairman at 9:30 a.m. All Committee members (except Dr. Libby), the Acting Secretary, and Mr. Tomei were present.

Dates,
Next
Meeting

After some discussion, during which Dr. Wigner and Dr. Buckley stated that they probably could not attend, the Committee voted to have the 41st Meeting of the GAC at Sandia and Los Alamos, New Mexico, on

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July 12, 13, and 14, 1954; this meeting to replace the Weapons Subcommittee meeting that had been scheduled to be held at those places at that time.

The Chairman then suggested that the Committee review the various items which had been discussed at the earlier sessions so that proper advice could be given to the Commission.

Nehru
Proposal

The members agreed with the Chairman that the Committee should reiterate their belief that weapons tests should be continued.

Inter-
national
Con-
ference

The Chairman stated that he thought that the proposed international conference should be directed mainly at technical matters, and that the social and political aspects should take their natural place. Dr. Fisk agreed that the technical matters should dominate the program, and suggested that there might be a place on the agenda for statements from each country on what they would propose to do with any special materials which might be allocated to them from the President's proposed international pool.

Dr. Wigner stated that while he was enthusiastic for the President to have made his statement, he would go along on a technical conference; he had reservations on any other type of meeting. He expressed his belief that the Marshall Plan experience should be consulted before we plunged again into a program which did not involve a quid pro quo from the receiving country.

Mr. Whitman was enthusiastic about the President's Plan and about the conference, and stated that he was happy to support a bold attempt. Dr. Buckley inquired if scientists were the proper people to be discussing

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such matters. Mr. Murphree also did not like the idea of mixing technical and political matters at an international scientific conference.

The Chairman then suggested that the Committee advise Mr. Strauss that the GAC was of the opinion that the conference should be a technical one. He further suggested that each member state his own views to the Commission when they joined the Committee.

Press
Speculations

The members agreed that they had no comments on the speculations which had appeared in the press on hydrogen weapons development.

Successor
to
Dr.
Beckerley

Dr. Wigner suggested that someone who has been in the AEC program be brought in for the position of Director of the Office of Classification. The Chairman agreed that this was a good principle, and asked that individual members give their views to the Commission.

Fall-out

The Chairman stated that he was impressed by the very able presentation on fall-out and that his views on this subject had changed.

Dr. von Neumann reported that preliminary results from Project Aureole confirmed the results reported by the Division of Military Application. He stated too that a large (say > 50 kiloton) weapon exploded at an altitude of, say, $1\frac{1}{2}$ fireball radii or more would probably not produce a local fall-out, that the same explosion near to the ground would produce heavy local fall-out, and that a small explosion (say < 10 kiloton) at any conventional height (below the rain-bearing layers of the atmosphere) was likely to be "rained out" to 50% or more. He mentioned that over all of Europe the probability of rain within the next six hours is between twenty and thirty percent, and the probability of rain within the next forty eight hours is almost a certainty.

Dr. von Neumann also pointed out that studies had shown a very direct proportion between weapon yield and acreage covered by the fall-out.

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-27-

The Chairman inquired whether lethality were the best criterion of damage. Dr. von Neumann thought that forced evacuation of an area was a very important consideration.

Dr. Fisk suggested that the Committee point out their interest in fall-out studies from both offensive and defensive points of view. The Committee agreed that the staff seemed to have considered the problem very well, but that these studies on fall-out, dosage, rates of decay, etc., should continue.

The members agreed with Mr. Whitman's suggestion that the Committee should recommend that the Commission get out some authoritative information on the fall-out problem as soon as possible. All agreed that an incorrect statement could cause trouble but that periodic public statements on fall-out effects, similar to Mr. Strauss' statement on the CASTLE tests, would be very helpful.

The Committee then considered several aspects of the world-wide long-range fall-out problem. Dr. von Neumann mentioned that the Sunshine studies indicated that about 10,000 megatons seemed to be the limit with a concept of "tolerance" that may be too strict.

Dr. Wigner pointed out that radioactive strontium absorbed by plants soon finds its way into the life cycle of animals and men, and that a total of three or four kilograms of Pu, incorporated into the bodies of men, would give every living person a lethal dose. Dr. von Neumann remarked that strontium seemed to seek out humans but that plutonium did not; Dr. Rabi pointed out that we could not form conclusions on the basis of the Rongerik natives but that the entire ecological problem had to be faced. He suggested that studies be stepped up in this field.

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Defense Measures Dr. Fisk was impressed by the cheapness of killing (7-8¢/ton of TNT equivalent) and the large areas of destruction (500 r over an area of 5000 square miles) now possible with the large weapons. He said that the impact of these two things on our defensive program was important. He asked whether these facts were really in the minds of the Departments of Defense and State and whether the Federal Civil Defense Administration had a feeling for them.

Mr. Whitman said that he thought the "rowboat on the New Jersey shore" concept was serious. The Committee then discussed this and other aspects of the clandestine small weapon problem, and agreed that the situation was indeed serious. Dr. Rabi mentioned that while some groups were working on the problem he was not reassured. Dr. Fisk suggested that the Committee could include something on this item at the meeting with the Commissioners and General Manager.

Pricing of Fission-able Materials Mr. Whitman thought it a fine thing that the AEC was proposing to establish a pricing policy on fissionable material. He thought that it was reasonable for the AEC to put a floor on the price of these materials based on the fuel value, and to pay what the materials are actually worth to the AEC above that floor.

CASTLE Tests The members agreed with the Chairman's suggestion that the Committee express its gratification and applause for a fine job on the CASTLE tests.

Midwest Accelerator Dr. Fisk thought that the Argonne National Laboratory should be encouraged in their efforts to obtain a high energy accelerator for ANL, and that the other group should not be encouraged. Dr. Wigner agreed that the ANL accelerator should be supported, and remarked on the need for an accelerator for the Oak Ridge National Laboratory.

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The Committee then recessed at 10:50 a.m.

The Committee was joined by Mr. Strauss, Mr. Zuckert, Dr. Smyth,

Meeting and Mr. Nichols at 11:15 a.m.

with the
Commis-
sioners
and
General
Manager

Dr. Rabi reviewed the several recommendations which the Committee were prepared to make.

Dr. Rabi reported that the Committee had discussed the MTA project with Mr. Davis and others, and could discern no interest from the

Materials Production Division or the Reactor Development Division. He said that Testing neither the Research Division nor the Committee could find a reason for Accelerator the continuance of the project. Mr. Nichols said that he would reconsider Program the future of the project. (Appendix B, item 1)

ANP
Program

Dr. Rabi reported that the GAC had had an excellent discussion on the status of the ANP program, and that they were impressed with the effort. He said that the GAC would not be commenting on the military value of such a system or the wisdom of combining the chemical and nuclear fuels in the same unit. Dr. Rabi said, however, that the Committee liked the idea as a way to go.

Mr. Nichols inquired whether the Committee had looked at the Nuclear Development Associates reactor. Dr. Rabi said that the GAC did not get much detail on this and suggested that they would like to see a report on it. (Appendix B, item 2)

"L"
Category
of
Informa-
tion

Dr. Rabi said that the GAC thought that the idea of a grey area of information was a good one, and was willing to endorse it. Dr. Smyth asked if the GAC would give them a letter on this particular subject. Dr. Rabi agreed to do this promptly. (Appendix B, item 10)

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Fuel Element Fabrication Costs Dr. Rabi then reported that while the GAC did not have a positive suggestion to make on how to lower fuel element fabrication costs, they felt that not enough study is given to the importance of balancing costs against the quantity of fissionable materials used. Mr. Whitman felt the idea that fissionable material rather than dollars was the scarce item should be reexamined. (Appendix B, item 3)

Nehru Proposal Dr. Rabi reiterated the GAC belief in the importance of weapons test programs. He said that the GAC cautioned not to enter into any agreements to stop weapons tests unless such would be a really significant step in disarmament. As an example of the kind of arguments that could ensue, Dr. Rabi said that while the explosion of a large weapon could be detected it might be debated for six months or so that it was a meteor, (Appendix B, item 10)

International Conference Dr. Rabi reported that the Committee members had diverse opinions on the international conference. He said that some members felt that the conference should be a technical one during which there would be an opportunity to discuss the President's Plan. He then asked the members to express their views. (Appendix B, item 4)

Mr. Whitman said that he was enthusiastic about the technical conference-President's Plan idea and that such a meeting would be quite important. He thought that there should be technical papers dealing with the peaceful applications of atomic energy. He said that he also felt that there should be a session on how the various countries felt they could capitalize on the plan. While he was a little afraid of the international organizing committee approach, he did not feel strongly on this/ point.

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Mr. Whitman further said that he felt that such a conference should be held outside of the United States; he preferred Bermuda as the site. He said that he did feel strongly that we ought to go all out for the conference.

At this point there was some discussion of the visa difficulty involved in inviting foreign scientists to the United States for such a meeting. Mr. Strauss pointed out that the State Department would have to steer the proper course for the U.S. in this regard.

Dr. Wigner said that he thought the President's speech to the United Nations was an excellent move whether the plan were eventually implemented or not. He feared that if we did not require a clear quid pro quo there would be no clear measure of what we should give in return. In general he thought that the Marshall Plan experience should be consulted in this case. He otherwise favored a technical conference.

Dr. von Neumann favored a technical conference at a place like Bermuda. He thought that the State Department should sponsor it. He also suggested that it was desirable to have an international organizing committee, and to have the President's Plan as a part of the agenda.

Dr. Warner thought it best to keep the conference confined to technical subjects.

Dr. Fisk felt that the conference should be devoted to the industrial and medical uses of atomic energy, including isotopes; and to a forum on the technical aspects of the President's Plan. He suggested that diplomacy and negotiation be kept as a by-product. He cautioned that not too much should be expected of such a conference. He thought that Bermuda rather than Geneva would be a good place for the conference.

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Mr. Murphree felt that two types of conferences might be held. One type would be a straight technical conference, and the second type would be primarily to discuss the President's Plan. Mr. Murphree questioned the desirability of trying to cover both types of conferences in one meeting due to the different nature of the people that would be involved in the two types of discussion; a straight technical conference was favored.

Mr. Strauss wondered how the President's Plan got into the International Conference discussion, and Dr. Rabi replied that there was a question as to whether the Plan should be a part of the Conference.

Dr. Buckley felt enthusiastic about the President's Plan. However, he felt that a scientific conference was not a place to work out the implementation of the President's Plan.

Dr. Rabi felt that the President's Plan would come up at the Conference in one way or another, and therefore one should be prepared for it. He said the reason for having the meeting abroad was that the pressure for giving things would be very much less.

Mr. Strauss thanked the Committee members for their advice, and said that he found it most helpful.

Director
of
Classi-
fication

Dr. Rabi said that there was an opinion within the GAC that the Commission should try to get someone from inside the AEC organization to replace Dr. Beckerley. Generally, he said, the GAC feels that the AEC does not make enough use of such people. Mr. Whitman and Mr. Murphree gave Dr. Luke a good recommendation. The names of F. C. Vonderlage (ORNL), F. de Hoffmann (LASL), and Hoylande D. Young (ANL) were mentioned by individual GAC members as the kind of people they had in mind for the job. (Appendix B, item 5)

CASTLE
Tests

Dr. Rabi expressed the Committee's appreciation for the very fine briefing on the CASTLE tests. He said that each of the members was gratified at the success of the tests. (Appendix B, item 8)

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Citation
for Los
Alamos

Dr. Rabi said that the GAC endorsed the proposed Presidential citation for Los Alamos but suggested some changes in the language. Dr. Buckley then expressed some misgivings in making a citation like this on the thermonuclear program. There followed some discussion on the possible effect that such a citation might have on the other laboratories. It was finally agreed that no repercussions from the other laboratories were to be expected. (Appendix B, item 8)

Fall-out

Dr. Rabi said that the GAC had been informed that the fall-out results were about what the scaling laws would predict. He reported that the acreage covered by fall-out by a particular activity is proportional to the yield of the weapon. He then discussed briefly the difference between the fall-out from the barge and coral shots.

In particular he pointed out that large explosions $1\frac{1}{2}$ fireballs high would cause little fall-out, while small explosions where the cloud did not go above the rain strata would cause high fall-out.

Dr. Rabi reported further that he was convinced that the explosion of large bombs makes no real changes in the weather, except for local perturbations.

He said that the GAC recommends that further studies be made toward understanding the process of fall-out and of obtaining more precise information on its extent, including the medium-range and long-range studies of the Aureole and Sunshine type.

Dr. Smyth inquired whether we should have continued studies of the ocean. Dr. von Neumann agreed, but stated that the results on the ocean are probably not as important as the land results. Also, fall-out into

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the ocean is distributed into much greater depths, hence much more diluted than that over land.

Dr. Wigner expressed concern over the plutonium concentration and Dr. Rabi agreed that this was worthy of further study. Dr. Rabi went on to recommend that at a suitable time the AEC give out information to the public and to the responsible Government agencies. (Appendix B, item 9)

Defense Measures

Dr. Rabi then stated that clandestine operations with both small and large weapons worried the GAC. Mr. Whitman suggested that a really strong effort should be made on this problem. Dr. Rabi inquired whether it was understood within the Government just how cheap these weapons are. Mr. Strauss said that the AEC shared the concern of the GAC, and that excitement is generating within the military and within the AEC.

Pricing of Fissionable Materials

Dr. Rabi said that the GAC approved, and were happy over, the direction which the Commission policy was going on the pricing of fissionable materials. (Appendix B, item 6)

Midwest Accelerator

Dr. Rabi said that the GAC approved the plan to allow ANL to study the construction of a high energy accelerator for the Midwest, but did not approve this machine for Madison. (Appendix B, item 7)

Public Announcements

Mr. Whitman and other members suggested that it would be a good policy plan to come out every two or three months with an important public release. He suggested that a statement on fall-out be released very promptly.

Monthly Reports

Dr. Wigner mentioned that he had not received the monthly reports of Commission activities in some time. Mr. Nichols advised him that the report had been discontinued, but that he would keep the GAC's need for information in mind.

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Next
GAC
Meeting

Dr. Rabi announced that the Reactor Subcommittee would meet at the Argonne National Laboratory on July 7, 8, and 9, 1954; and that the 41st Meeting of the GAC would be held at Sandia and Los Alamos on July 12, 13, and 14, 1954. He invited the Commissioners and General Manager to meet with the GAC at that time if they found it convenient. (Appendix B, page 5)

Whereupon the business of the 40th Meeting of the GAC having been completed, the meeting was adjourned at 12:45 p.m.

P. W. McDaniel
Acting Secretary

Attachments (2)

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

May 25, 1954

The following is the tentative Schedule* for the 40th Meeting of the General Advisory Committee, to be held in room 213 on May 27, 28, and 29:

May 27 (Thursday):

- 9:30 a.m. -- Executive Session
- 11:00 a.m. -- Meeting with the Commissioners and General Manager

- 1:30 p.m. -- Research Matters.....Dr. T. H. Johnson
- 2:00 p.m. -- Intelligence Matters.....Dr. Reichardt
- 2:15 p.m. -- International Conference on Peaceful Uses of Atomic Energy.....Commissioners, General Manager, Dr. T. H. Johnson, Dr. Bugher, Dr. Hafstad and Mr. Hall
- 3:00 p.m. -- Classification Matters....Dr. Beckerley
- 3:15 p.m. -- Reactor Matters.....Dr. Hafstad and Mr. Davis

May 28 (Friday):

- 9:30 a.m. -- Executive Session
- 11:00 a.m. -- Weapons Matters.....Gen. Fields, Dr. Fine, Dr. York, Dr. Mark, Dr. Froman and Dr. Graves

- 1:30 p.m. -- Weapons Matters.....Gen. Fields, Dr. Fine, Col. Dorsey, Dr. Scoville, Dr. Bugher and Dr. Machta
- 4:30 p.m. -- Adjournment

May 29 (Saturday):

- 9:30 a.m. -- Executive Session
- 11:00 a.m. -- Meeting with the Commissioners and General Manager

Paul W. McDaniel
Acting Secretary

*Changes in Schedule may be found necessary in advance of or during the Meeting. The offices of the Commissioners, the General Manager, and the Secretary will be informed of any changes.

DISTRIBUTION: Commissioners (5)
General Manager (2)
Secretary, AEC (16)
Secretary, GAC (14)

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

June 3, 1954

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

Dear Mr. Strauss:

Herewith is the summary report of the 40th Meeting of the General Advisory Committee, held in Washington on May 27, 28, and 29, 1954.

All members with the exception of Dr. Libby were in attendance. Dr. Libby was unavoidably absent since he was out of the country.

We wish to thank the Commission and its staff for their cooperation in supplying background information for the subjects to be considered. We particularly wish to thank the Division of Military Application for providing for the presence of Drs. Graves, Mark, and York, who greatly aided our deliberations in the presentation of the results of the CASTLE tests, and the tentative programs of the weapons laboratories for the future. Our discussions were greatly helped by the attendance of Gen. Luedecke, Dr. Scoville, Col. Kaesser, and Capt. Maynard of the AFSWP, and Dr. Machta of the Weather Bureau, who gave us much valuable information in regard to radioactive fall-out under various conditions of weather and height of burst.

Herewith are our recommendations:

1. Materials Testing Accelerator Program. In our discussions with the Division of Reactor Development, and from a very able presentation of Mr. W. K. Davis, we came to the conclusion that there exists no demand for MTA from either the Production Division or the Reactor Development Division. Neither of these Divisions foresees MTA as an important and economical tool for increasing the amounts of fissionable material.

This circumstance made us consider the MTA program as a program for the Research Division. The Committee was of the opinion that on this basis it could not recommend that we go forward with the MTA program as a part of our research efforts.

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2. Aircraft Nuclear Propulsion Program. The Committee had an excellent briefing on this subject from Gen. Keirn, Col. Wassell, and Col. Krisberg.

The Committee was favorably impressed by the plan to marry the ORNL-Pratt & Whitney programs for the so-called "fireball" propulsion mechanism, which would provide atomic power for cruising and chemical power for the take-off, and both chemical and atomic power for the run over the target. Two other possibilities were suggested in the discussion. They included a General Electric device, and another proposal made by the Nuclear Development Associates. The Committee did not learn enough about these proposals to form any opinion.

However, we suggest that a study be made of the program as a whole in regard to unnecessary duplication, and the sharpening of objectives to prevent the program from going off into too many directions. These reservations should not be construed to suggest a delay in the combined ORNL-Pratt & Whitney program.

3. Cost of fabrication of fuel elements. Mr. Davis presented the question to us of whether we had any suggestions for reducing the cost of fabrication of fuel elements for reactors, particularly in the Pressurized Water Reactor.

While the Committee has no positive suggestion to make, the question arose in our discussion whether we have not been paying too much attention in our reactor designs to reducing the amounts of fissionable material for loading at the price of high cost for fabrication of fuel elements and other parts of the structure, and whether an important reduction in overall costs could be effected as a result of the application of less stringent tolerances in fabrication. The greater availability of fissionable material makes this line of development more promising than it had been in the past.

4. Scientific conference in support of the President's plan for an international pool of fissionable material. This subject was discussed at great length by the Committee without reaching a unanimous conclusion.

Since the Commission had the opportunity of hearing the opinion of each member of the Committee, I shall not try to make any summary in this report. The various suggestions will be available in the Minutes of the Meeting.

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5. Successor to Dr. James G. Beckerley. The Committee discussed a request of the Commission and General Manager for suggestions of the names of individuals who could succeed Dr. Beckerley as the Director of the Office of Classification.

The Committee, as such, did not make any single recommendation. However, individual members had certain suggestions which have already been transmitted orally to the General Manager. In general, the Committee was of the opinion that it would be wise to obtain the services of an individual already in the Commission organization, whether directly employed, or in a Commission laboratory or facility. It was the opinion of the Committee that such a policy of selection could obtain the services of very capable people, and make for closer connection between the Washington offices and the field.

6. Pricing of fissionable material. The Committee has studied the paper, "Plan for an accelerated reactor development program" (AEC 152/49), and finds it is in warm agreement with the general direction of policy which is therein outlined.

7. Accelerators. The Committee wishes to approve the desire of the Division of Research to support the Argonne National Laboratory in its proposed study of a high energy accelerator to be constructed sometime in the future.

The Committee also wishes to suggest to the Commission that the cooperation of the Midwestern scientists who are interested in high energy research be sought for the design of this machine.

8. CASTLE tests. The Committee wishes to express its highest admiration for the excellent job which was done by the personnel who carried out the CASTLE series of tests of thermonuclear weapons. It was most successful in spite of great difficulties incident to carrying out exact measurements at a remote base under very restrictive weather conditions.

The Committee naturally is very highly gratified with the results of these tests which have not only increased the power of our weapons, but opened very promising avenues of research and development for the future. In this connection, we wish to approve the suggested plan of the Commission to obtain a Presidential citation for the superb performance of the Los Alamos Scientific Laboratory.

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9. "Fall-out" problems in the employment of thermonuclear and fission weapons. This Committee has long been concerned with the question of the deposition of radioactive products which result from nuclear explosions on solid ground and in the air.

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As a result of our discussion with Dr. Bugher, Gen. Luedecke, Dr. Scoville, Col. Kaesser, Capt. Maynard, and Dr. Machta, we came to the conclusion that for the very large weapons exploded near the ground or near the surface of water, a large fraction of the radioactive material produced falls out over an area which is conditioned by the wind structure at the time of the explosion. This area scales up from the results of tests already made in Nevada from much smaller weapons; and it is almost inevitable that an atomic explosion, where a substantial portion of the fireball reaches the surface, will result in a heavy and lethal fall-out over an area much greater by a factor up to 10 than the area of blast damage. Therefore, weapons exploded at an altitude of $1\frac{1}{2}$, or greater, times the radius of the fireball will not result in a high degree of local fall-out, but in a wide distribution of fall-out over a long period of time. Although these gross effects just described appear to be understood, the details are not at all well understood, e.g. the amount of fractionation of radioactive material which falls out, and the decay time of the fall-out material in different regions. We suggest that the fall-out studies merit continued support and attention.

The Committee recommends that, when the fall-out phenomenon from low bursts is better understood, other Government agencies and the public should be informed of the facts. It is clear that if this country were involved in war, with a power which possesses thermonuclear weapons, fall-out from low thermonuclear bursts could have very serious results if we were unprepared to meet the situation.

[REDACTED]

DOE
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It is hardly necessary to point out the importance, and our present high degree of ignorance, of this problem. Some of our members pointed out the implications of the results of these tests insofar as defense is concerned. Since the effects of fall-out were strongly felt at a distance of 300 miles, present plans for point-defense of important targets may have to be re-evaluated in the light of these results.

10. Two other recommendations on the subjects of the test program, and the "L" area have already been transmitted to you, and are herewith appended for the record.

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On July 7, 8, and 9, the Subcommittee on Reactors, Materials and Production intends to visit the Argonne National Laboratory, as suggested in the 39th Meeting report.


The next meeting of the General Advisory Committee will be held at Los Alamos and Sandia on July 12, 13, and 14, 1954. We hope that some of the Commissioners will be able to join us on that occasion. 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

Attachments (2)

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

May 29, 1954

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

Dear Mr. Strauss:

Herewith is the statement of the Committee's opinion with respect to the weapons test program. This statement is an integral part of the report of the Chairman of the General Advisory Committee to the Chairman of the Atomic Energy Commission on the 40th Meeting of the GAC.

The Committee wishes to reiterate its opinion that our test program is one of the most important elements in our whole weapons program. Without it, we could not prove out the advances which are being made in the weapons laboratories to increase the magnitude, the efficiency, and the variety of weapons in our stockpile. We therefore believe that if any international arrangement were made to curtail or abolish these tests, it should only be made under such arrangements that we obtain an equivalent value, or greater, for the security of the United States.

With respect to your question as to whether a violation of an agreement could be determined, our best opinion is that if the weapon tested were in the megaton range that we would almost certainly detect the effects even though it were a deep underwater explosion. On the other hand, we are not certain at the present time whether this effect would be distinguishable from the impact of a meteor. In any event, it was our feeling that it would be much better to be certain that no test is made through some system of inspection rather than to try to prove that such a test had been made, since such a procedure would result only in long and inconclusive discussions.

Sincerely yours,


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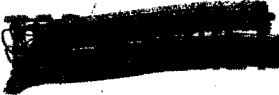
Carl Wilson 4/11/84
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H. R. Schmidt 8/12/85

By: W. Trench 3/21/86

I. I. Rabi
Chairman




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

May 29, 1954

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

Dear Mr. Strauss:

The General Advisory Committee heard with interest the plan to create a new category for information on reactor technology which does not require high security and which would be transmitted to United States industry without extensive background investigation and also to friendly nations. We believe that there is a vast body of information which could be so handled.

The Committee unanimously endorsed this plan as a helpful step towards accelerating the development of peaceful uses of atomic energy.

Sincerely yours,

I. I. Rabi
Chairman

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REVIEWED BY DATE

H.R. Schmid 8/12/85

By: W. Teuch 3/21/86

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