

April 16, 1945. Coordinating Council. Rossi spoke on the radio-lanthanum experiments for examination of the implosion.

April 17, 1945. Colloquium. Commander Birch spoke on the subject of gun assembly of fissile material with illustrative slides. Serber discussed theoretical predictions of the performance of the gun.

April 19, 1945. The Theoretical Division meeting was addressed by Bethe on design of neutron sources or fission reaction initiators, discussing specifically the Bethe-Tuck developments.

April 23, 1945. Coordinating Council. Koske spoke on the argon flash examination of imploding hemispheres and cylinders with and without lenses.

April 24, 1945. Colloquium. Frisch discussed the activities of Group 1 of the Gadget Division, specifically covering the critical assembly of Uranium 235 and the "tickling of the dragon's tail" experiments by dropping a cylinder of fissile material through a tamper material to produce a very slightly super-critical assembly.

April 30, 1945. Coordinating Council. Robert Wilson spoke on experiments for determining the multiplication constant in neutron density calculations. Serber commented on the check of the experiments with theoretical considerations.

May 7, 1945. Coordinating Council. Critchfield talked about the three potential neutron fission reaction initiators for the implosion gadget. These included the Tuck-Bethe jet "Urchin," the Serduke beryllium plug "Melon-Seed," and the N. Baker granular "Nichodemus." Johns discussed the chemistry of polonium and procedures for handling this material.

May 14, 1945. Coordinating Council. Bainbridge spoke on the results of the trial shot of 100 tons of high explosive at Trinity. Comments were made on the effectiveness of various measuring devices.

May 21, 1945. Coordinating Council. Ramsey spoke on the more recent work on the ultimate delivery of the gadget, including assembly of the parts, dropping of the gadget from a plane, and means for observing the functioning of the various parts.

May 28, 1945. Coordinating Council. Commander Bradbury spoke on the assembly of the implosion gadget as to the high explosive and alignment of parts. Allison briefly mentioned that the stabilization of the delta phase of plutonium looked good.

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June 4, 1945. Coordinating Council. Fermi spoke on planned experiments for observing the approaching implosion fission reaction experiment at Trinity, emphasizing the problems involved.

June 12, 1945. Colloquium. S. K. Allison spoke on the implosion schedule, tracing it from the invention to the expected test shot at Trinity.

June 18, 1945. Coordinating Council. Bethe spoke on the correlation of theoretical calculations from the assumed equation of state with the observed shock velocity, material velocity, and density increase using the electrical magnetic, X-ray and radio lanthanum methods of observation. The various factors already calculated and those not calculated were considered in estimating the efficiency of the gadget.

June 25, 1945. Coordinating Council. Dr. Oppenheimer mentioned the proposed dimensions of the plutonium sphere for the implosion gadget and the boron modification of the high explosive charge. Greisen spoke on the electric detonators to be used with the high explosive for the implosion gadget.

July 2, 1945. Coordinating Council. Dr. Oppenheimer mentioned the changes in the high explosive detonator. Jette spoke on the pressing of the plutonium hemispheres which would be used in the Trinity test. Dodson described the manufacture of the "Urchin" modulated neutron source, which would be used at the Trinity shot.

July 3, 1945. Colloquium. Bethe discussed the various factors and corrections to be considered in predicting the results of the proposed Trinity test.

July 9, 1945. Coordinating Council. Slotin, O. R. Frisch, Holloway, Kistiakowsky, Serber, and Oppenheimer spoke on tests and predictions relating to, and construction details of, the Trinity test.

July 16, 1945. Coordinating Council attended the Trinity test of the implosion gadget at 0530 M.W.T.

July 23, 1945. Coordinating Council. Oppenheimer mentioned some elements of the future program of this project. Bethe spoke on some observations of the Trinity test.

August 13, 1945. Coordinating Council. Herbert Anderson addressed the Council on the chemical methods for determining the efficiency of the Trinity test shot, specifically on the determination of the relation of fission products to the original plutonium metal.

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August 20, 1945. Oppenheimer spoke to the Coordinating Council on the future of the Project.

September 10, 1945. Coordinating Council. Oppenheimer talked on the future of atomic power and legislation relevant thereto. Norman F. Ramsey addressed the group on the development of the combat bombs, including such items as buildings, gadget design, delivery overseas, assembly, and the like.

September 17, 1945. Coordinating Council. Mr. Waldman discussed the efficiency at Hiroshima and Nagasaki on the basis of blast measurements. Reports indicate that the efficiency of the bomb drop on Nagasaki was greater than the Trinity test. There was a showing of technicolor films of the combat drops.

September 24, 1945. Coordinating Council. Dr. Christy discussed some of the non-specific problems arising from the development and use of the atomic bomb.

September 25, 1945. Colloquium. Dr. Edward Teller discussed the "Super," describing generally the thermo-nuclear reaction and the obstacles which must be overcome to initiate such a reaction. He exhibited to the group an embodiment of the "Super" gadget which he thought might be operative.

October 1, 1945. Coordinating Council. Dr. Bradbury discussed the future of the Project until the Commission takes over.

October 8, 1945. Coordinating Council. Robert Henderson discussed the redesign of the implosion gadgets with respect to engineering improvements.

October 15, 1945. Coordinating Council. Placzek discussed the gadget using a composite of plutonium and Uranium 235. L. F. Slotin discussed measurements on a composite gadget.

October 19, 1945. Research Division Meeting. Penney spoke on observations of damage in Japan.

November 5, 1945. Coordinating Council. Serber spoke on observations of damage caused by atomic bombs in Japan. Captain Nolan spoke on the medical aspects of this situation.

December 17, 1945. Coordinating Council. Philip Morrison spoke on power piles, in particular the details of a fast neutron plutonium system using rods and a liquid coolant such as a low melting alloy.

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January 21, 1946. Coordinating Council. Colonel Warren, M.C., spoke on his observations of damage and injury at Hiroshima and Nagasaki.

February 4, 1946. The first meeting of the new Interim Council was addressed by Dr. Bradbury on the future of the Project. Among items discussed were the Navy Test; the fast neutron power reactor; the "Super;" stock piling; weapon development; Physics Division work, and the potential conference this summer.

February 11, 1946. Interim Council. Louis Slotin spoke on the high temperature, fast neutron, mercury-cooled plutonium reactor. Mark spoke on the critical mass value for such a reactor.

February 25, 1946. Interim Council. Max Roy spoke on the work of "X" Division, particularly on developments involving slow explosives for lens improvement.

February 28, 1946. Dr. Richtmyer addressed the Theoretical Division Seminar on resonance autocatalytic systems for bomb design.

March 11, 1946. Interim Council. Darrol Froman spoke on the experimental data developed on the levitated implosion gadget and elements of design of that device, including the composite gadget of plutonium and uranium.

March 12, 1946. Theoretical Seminar. Addressed by Teller on the possibility of Thermonuclear reactions in water and air.

March 18, 1946. Interim Council. Discussion of new declassification procedure.

March 25, 1946. Interim Council. Morrison spoke on "Breeders," "Converters," "Power Piles," and the like. This time Morrison did not go into details of operation, as he did several years ago.

April 1, 1946. Interim Council. Mr. H. Kolodney addressed the group on the operation of DP Site with particular reference to the processing of plutonium from the nitrate to the metal component for an atomic bomb.

April 8, 1946. Interim Council. P. Morrison spoke on dilution of fissionable materials to permit only peaceful employment thereof. He mentioned the addition of U-238 to various materials such as thorium, plutonium, and the like.

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April 18, 1946. (1000) First meeting of the "Super" conference. Mr. Edward Teller gave a brief summary of the subject matter described in LA Report No. 551. He restated the physical considerations and the design factors of the proposed embodiment intended to effect these considerations.

April 19, 1946. (1400) Fourth meeting of the "Super" conference. Mr. Lansdorf continued his discussion on the compression of the various materials. Edward Teller then discussed the experimental program which was believed necessary in the preparation of a "Super."

He mentioned a program for the study of a 14 Mev neutrons released in the nuclear reaction and the cross-sections for various processes concerning these neutrons and the materials employed in the "Super." Furthermore, the various reactions involved in the "Super," such as tritium plus tritium, helium

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plus deuterium, hydrogen plus deuterium, and the like, as well as the nitrogen plus nitrogen reaction should be studied. Cryogenic experiments should be studied. Cryogenic experiments should be carried out for all the materials employed in the proposed device. These experiments should include considerations of the thermal equations of state; the ortho to para conversion; pressure equations of state; heat production in tritium at low temperatures by beta ray emission and so forth. An engineering program was also suggested to cover all engineering and design phases connected with the device. The test program should cover the operation of the assembly device for fission reaction; the fission reaction plus the "primer;" and full scale tests. A further program should be instituted to investigate other suggestions on the initiation of a deuterium plus deuterium reaction such as the jet method proposed by Ulam, etc.

April 20, 1946. (1000) Fifth meeting of the "Super" conference. Mr. Edward Teller presided. The meeting was a general discussion period concerning the possibility of peaceful applications of the deuterium plus deuterium reaction. General schemes were proposed all of which were very far-fetched and presented numerous practical difficulties.

April 29, 1946. Interim Council. Mr. McDibben spoke on the new 8 million volt electrostatic generator proposed for construction at this site. He mentioned new design features and the manner of incorporation of old features into the device.

May 20, 1946. Interim Council. Colonel Seeman spoke on the organization of the U. S. Army and our place therein.

May 27, 1946. Interim Council. Bradbury spoke briefly on the radiation accident occurring on May 21, 1946, indicating that no critical assembly experiments were to be continued until safer methods were developed, and that the involved plutonium sphere was so "hot" that it will not be handled for some time. J. W. Stout spoke on the developments in slow explosives, particularly barium nitrate-plastic compositions, for use in explosive lenses.

June 3, 1946. Interim Council. Milo Sampson spoke on the material and shock velocities in the proposed levitated sphere assembly. Velocities of 4.18 mm per microsecond for the material, and 4.59 mm per microsecond for the shock were measured employing the pin method for velocity determination.

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LIST OF REPORTS PREPARED BY FUCHS

Atomic Energy Commission records indicate that Fuchs had prepared the following list of reports. (This list was not intended to be complete but to illustrate contributions of British in the atomic bomb project.)

<u>Name</u>	<u>Title of Report</u>	<u>Rpt. No.</u>	<u>Classification</u>	<u>Date</u>
Fuchs, K.	Shock Attenuation in Rods	LANS-402	Secret	7-26-46
	Efficiency for Very Slow Assembly	LA-596	Secret	8-2-46
	Effect of Evaporation of Free-Surface Velocities	LA-441	Secret	10-30-45
	Initiator Theory, III. Jet Formation by the Collision of Two Surfaces	LA-325	Secret	7-11-45
	Penetration by Jets Produced by Cavity Charges	LA-328	Secret	7-14-45
	Theory of Initiators II, Melon Seed	LA-300	Secret	6-1-45
	Rarefaction Wave from a Plan Free Surface in an Explosive	LA-227	Secret	2-16-45
	Jet Formation in Cylindrical Implosion with 16 Detonation Points	LA-216	Secret	2-6-45
	Formation of Jets in Plane Slabs	LA-195	Secret	12-27-44

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The files of AEC Retired Records, Oak Ridge, Tennessee, contain copies of numerous reports authored by members of the British Mission which were furnished to the U. S. group. Those authored by Fuchs are listed below:

"The Optimum Pressure and Back Pressure in a Diffusion Plant" by K. Fuchs (undated, British file MS-92.)

"Cascade of Cascades in the DS Scheme" by K. Fuchs and R. Peierls (undated, British file MS-83.)

"Cascade of Cascades in the DS Scheme, Part 3, Non-Orthodox Connections Between Sub Cascades" by Fuchs (undated British file MS-96.)

"The Rabbit Machine" by K. Fuchs and R. Peierls (undated, British file MS-81.)

"Simplified Formulae for the Membrane Pair with Supports" by K. Fuchs and P. D. Preston (undated, British file MS-51A.)

"Note on the Control of the Branching Ratio in the 'Rabbit' and Back Feeding" by K. Fuchs (undated, British file MS-93.)

"Fluctuations in a Diffusion Separation Plant" by K. Fuchs (undated, British file MS-64.)

"Losses in the Rate of Production due to Withdrawal of Cells for Maintenance" by K. Fuchs (undated, British file MS-17.)

"Fluctuations and the Efficiency of a Diffusion Plant, Part 3, the Effect of Fluctuation in the Flow of N-2" by K. Fuchs (dated June 8, 1944, British file MSN-12.)

"Fluctuations and the Efficiency of a Diffusion Plant, Part 4, the Effect of Density Fluctuation" by K. Fuchs (undated, British file MSN-16.)

"On the Effect of a Time Lag in the Controller of Plant Stability" by K. Fuchs (undated, British file MSN-3.)

"Note on the Effect of Fluctuations on the Efficiency of a Diffusion Plant" by K. Fuchs (undated, British file MSN-6.)

"Effect of Fluctuations on Plant Efficiency, Part 2, Fluctuations in the Rate of Production" by Fuchs (undated, British file MSN-10.)

It is indicated in this file that manuscripts with British file numbers 15, 16 and 17 had been forwarded to M. Benedict of Kellogg by Fuchs. (65-58805-394, pg. 9 and 10)

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Investigation by the Albuquerque Office in February, 1950, at Los Alamos disclosed that index cards in the document room of D Division give the following title of papers written by Fuchs in some cases in conjunction with others. The dates of these papers are set out when given and the co-worker on the paper, if any, is indicated below: (u)

The Stability of the Rabbitt Machine; 4/10/42, B 106
Shock Hydrodynamics; 10/28/44, LA 165
Shock Attenuation in rods; 7/26/44, LAMS 402
Separation of Isotopes; 4/10/42; B 49
Rarefaction Wave from a Plane Free Surface in an Explosion; 3/16/45
Perturbation Theory in One Group Neutron Problems; 1/5/49, EM 1482
Penetration by Jets Produced by Cavity Charges; 7/14/45, LA 328
Oblique Detonation Waves; LAMD 87
Notes on the Expansion of U Sphere Inclosed in a Container; EM 145
Measurement of Nuclear Bomb Efficiency by Observation of the Ball of Fire at early stage; 2/20/46, LA 516
Los Alamos Tech Series Vol. 7, Part III, Chaps. 11-14 Blast Wave; 8/15/47, LA 1022
Los Alamos Tech Series Vol. 7, Part I, Blast Wave; LA 1020
Los Alamos Tech Series Vol. 7, Part IV, Blast Wave; LA 1023
Los Alamos Tech Series Vol. 7, Part II, Blast Wave; LA 1021
Jet Formation in Cylindrical Implosion with 16 Detonation Points; 2/6/45, LA 216
Isotope Separation with Complex Molecules; 4/10/42, B 39
Initiator Theory III Jet Formation by the Collision of Two Surfaces; 7/11/45, LA 325
Gland Problems; 6/29/42, B 73
Formation of Jets in Plane Slabs; 12/27/44, LA 195
Fluctuations in a Diffusion Separation Plant; 11/20/42, B 105
Finite Width of Single Membrane; 4/10/42, B 45
Equilibrium Time in a Separation Plant; 4/42, MA 47 A
The Equation of State of Air at High Temperatures; 9/18/43, EM 83
Efficiency for Very Slow Assembly; 8/2/46, LA 596
Effect of Separation of Isotopes of Compound Molecules; MS 44 A
Effect of Packing on Critical Radius of the Sphere; 4/10/42, B 48
Effect of Evaporation on Free Surface Velocities; 10/30/45 LA 441
Effect of Boundary Layer for Swept Membranes; B-31
Effect of a Scattering Container on the Critical Radius and Time Constant; EM 70
The Critical Radius and the Time Constant of a Sphere Imbedded in a Spherical Scattering Container; EM 144
Critical Radiation and Time Constants for Finite Reflector 7/24/42 B 81
Comparison of the Variation Theory and End Point Results for the Tampered Spheres; 1/18/45, LA 205

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The "T" Division progress reports for 1944, LAMS 177, 11-44, contain articles apparently by Fuchs, Podger, and Stark entitled "Two Dimensional Problem" the first sentence of which reads - "...Pressure exerted by the detonation in Comp. B on a steel liner has been calculated for various angles of incidence of the detonation wave." (85-58805-163, pg 11-12)

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UNITED STATES
ATOMIC ENERGY COMMISSION
WASHINGTON 25, D. C.

IN REPLY REFER TO:

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Honorable J. Edgar Hoover, Director
Federal Bureau of Investigation
U. S. Department of Justice
Washington 25, D. C.

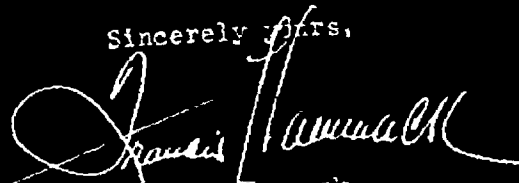
Dear Mr. Hoover:

Reference is made to your letter of March 2, 1950
addressed to the Acting Chairman of the Atomic Energy
Commission reporting the substance of a statement made
by Emil Julius Klaus Fuchs to Dr. Michael W. Perrin.

This statement, as well as Fuchs' statement as reported
in your letter of March 2, 1950, was reviewed recently
by a Committee of Senior Responsible Reviewers to consider
the effect on the AEC declassification policy. This Com-
mittee has prepared a report containing in part an evalua-
tion of the extent of information passed over by Fuchs
and an abstract diary of those conferences and meetings
on thermonuclear weapons attended by Fuchs while at Los
Alamos.

There is attached for your information the pertinent
portions of this report believed to be of interest to
your Bureau.

Sincerely yours,



Francis Hannack
Acting Director
Division of Security

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UNITED STATES
ATOMIC ENERGY COMMISSION
WASHINGTON 25, D. C.

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Honorable J. Edgar Hoover, Director
Federal Bureau of Investigation
U. S. Department of Justice
Washington 25, D. C.

Dear Mr. Hoover:

Reference is made to your letter of March 2, 1950 addressed to the Acting Chairman of the Atomic Energy Commission reporting the substance of a statement made by Emil Julius Klaus Fuchs to Dr. Michael W. Perrin.

This statement, as well as Fuchs' statement as reported in your letter of March 2, 1950, was reviewed recently by a Committee of Senior Responsible Reviewers to consider the effect on the AEC declassification policy. This Committee has prepared a report containing in part an evaluation of the extent of information passed over by Fuchs and an abstract diary of those conferences and meetings on thermonuclear weapons attended by Fuchs while at Los Alamos.

There is attached for your information the pertinent portions of this report believed to be of interest to your Bureau.

Sincerely yours,

Francis Bammack
Acting Director
Division of Security

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This document consists of 12 pages
No. 10 of 3 Copies, Series 12

EVALUATION OF FUCHS CASE
BY COMMITTEE OF SENIOR RESPONSIBLE REVIEWERS

1. The Committee of Senior Responsible Reviewers has examined Info Memo 273/9 (Perrin Report) as well as Info Memo 273/10 (Fuchs statement) and discussed the technical evidence in these documents. An evaluation of the evidence is presented in the following sections:

A. Diffusion Plant

2. Fuchs stated that he had turned over during the first period (1942 to Dec. 1943) those documents in the "MS" series which represented his own work at Birmingham. There appear to be 21 documents in this category, of which 9 have been declassified to date. Four of these 21 "MS" reports (MS 7A, 63, 85, and 97) deal with early work on neutron diffusion theory and either have been declassified or have remained classified because of relatively unimportant numerical constants therein assumed. The remainder of the reports from the Birmingham period deal largely with early theoretical work on diffusion processes.

3. It seems that Fuchs turned over all the diffusion plant information known to him at the time he left the New York British office. Fuchs stated his activities during the second period (December 1943 - August 1944) included passing over copies of all the reports prepared in the New York office of the British Diffusion Mission, namely the reports in the "MSN" series. This series contains 18 reports. All of these reports are concerned principally with the gaseous diffusion process and deal largely with theoretical design considerations relevant to the utilization of that process. Most of this material was developed independently by Fuchs and collaborators in Britain, and by Cohen and by Benedict in this country.

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HEREIN IS UNCLASSIFIED

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The bulk of this material was declassified about two years ago for the Cohen volume in the KNES, which has not yet appeared in print. It is pertinent to note that three independent studies gave essentially the same results, thus suggesting that the calculations could probably have been performed independently and successfully in Russia.

4. As far as barriers are concerned, the documents which Fuchs turned over in the "MS" and "MSN" series deal essentially with theoretical aspects and do not contain significant information regarding their fabrication or actual performance. It should be emphasized that while

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5. After considering the foregoing the Committee does not feel that we should release any further material about barriers

6. The last report in the "MSN" series (MSN-18 "Adaptation of K-25 Plant for Partial Operation on the Cascade of Cascades Principle-- Flowsheets VIII a, b, and c") is the only one which contains production figures for the K-25 plant. These are used for illustrative purposes in the report without specifically stating that they are production figures. However, it would be reasonable to expect that a reader of the report would conclude that the flowsheets in the report represent actual plant performance. From the evidence available to the Committee there appeared to be some uncertainty whether MSN-18 was actually one of the reports Fuchs turned over. The Committee feels that this matter might well receive further investigation.

B. Los Alamos

7. For the evaluation of the Los Alamos aspects the Committee had the advice of Drs. Bradbury, Manley, Smith and Teller of the Los Alamos Laboratory. It is apparent that the information regarding weapons which Fuchs turned over to the Russians was very complete.

8. With respect to the Trinity (plutonium implosion) type weapon, it is clear that the essentials of the bomb in adequate detail were turned over either while Fuchs was at Los Alamos or later. It is also apparent that considerable information was turned over regarding gun-type weapons.

9. As far as more recent implosion type weapon developments are concerned, Fuchs did not know at the time of his departure what the actual design of the Sandstone bombs would be.

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However, he was familiar with the ideas and early operating designs

It should be recalled that Fuchs' status in the laboratory was that of a highly esteemed scientist and that he participated in all major conferences of the theoretical division while at Los Alamos. It is not clear from the Perrin statement whether Fuchs turned over bomb at all or whether he gave more than an indication of the composite bomb and its economic features.

10. In regard to thermonuclear weapons, the extent of Fuchs participation in the work at Los Alamos Laboratory is indicated by the excerpts quoted in the Tab to this report. Fuchs apparently transmitted essentially the ideas contained in the report on the April 1946 "super" conference at Los Alamos (documents LA 551 and LA 575); he was present and a principal participant in this conference.

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was not known to Fuchs when he left Los Alamos (June 1946), nor was it well known to any other member of the British Mission.

C. Other Projects

11. Officially Fuchs had little information concerning other phases of the U. S. Project, e.g., the Hanford project. (This is true of all the members of the British mission as far as Hanford is concerned.) It would be pertinent to know what Fuchs gave away of such additional information as he may have learned. From the Perrin report of his confession it would appear that the information in this category which he turned over was relatively minor. The possibility that Fuchs might have made additional disclosures to the Russians should, however, be borne in mind. In addition the extent of information concerning the U. S. project made available to Fuchs as a result of the Technical Cooperation Program should be considered. Although the Perrin report does not indicate these other sources of information to be involved, it would be valuable to have further information on this point.

12. The statements to Perrin indicate that as far as pile technology is concerned, including British work, Fuchs did not pass a great deal of information to the Russians.

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D. Fundamental Nuclear Information

13. It was noted that Fuchs had not transmitted any information relative to the fission process itself, except for such specific information as the spontaneous fission problem (Pu 240). This may possibly be interpreted to mean that fundamental nuclear data were not needed by the Russians because of their own efforts in this field, or because the information was being furnished to them through other sources.

E. General

14. Detailed examination of the Perrin report and the documents mentioned on the information transmitted by Fuchs has proved very illuminating and has given in general terms a most valuable summary of the situation. Naturally additional questions come to mind. It would be very helpful in evaluating fully our present position if more detailed technical information on transmittals by Fuchs could be obtained. Particular areas in which more detailed information would be useful include thermonuclear weapons, reactors and such diffusion plant problems as barriers, conditioning, etc.

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FUCHS PARTICIPATION IN THE THERMONUCLEAR WEAPON
PROGRAM AT LOS ALAMOS

(The following abstract was prepared by Dr. R. G. Smith, of Los Alamos Laboratory, from his files. Dr. Smith was present at the meetings described in this abstract)

1. In a report dated April 3, 1946, from Colonel Seeman to Major General Groves, on the subject of participation of British Mission Personnel in the Los Alamos program, the following technical meetings are reported at which Mr. Fuchs was in attendance:

"a. 4 March 1946 The Interim Council was addressed by Fuchs of the British Mission on the theory of the gadget. Mr. Titterton also attended the meeting.

"c. 12 March 1946 The Theoretical Seminar was addressed by Teller on the possibility of Thermonuclear reactions in water and air. Attending were Messrs. Bretscher, Fuchs, Mark, and Skyrme.

"d. 25 March 1946 Dr. Bradbury presided at the Interim Council and discussed briefly the postponement of Operation Crossroads. Morrison spoke on "Breeder's," "Converters," "Power Piles," and the like. This time Morrison did not go into details of operation as he did several years ago. Present were Messrs. Fuchs and Tuck."

2. In the report of May 3, 1946 on the British Mission, Colonel Seeman listed several meetings at which Mr. Fuchs was in attendance.

Among these are:

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"a. 1 April 1946 Mr. M. Kolodney addressed the Interim Council on the operation of LP Site with particular reference to the processing of plutonium from the nitrate to the metal component for an atomic bomb. Messrs. Fuchs and Mark attended.

"b. 18 April 1946 (1000) First meeting of the "Super" conference. The meeting was held at Mr. Bradbury's office. Mr. Edward Teller addressed the meeting and gave a brief summary of the subject matter described in LA Report No. 551. He restated the physical considerations and the design factors of the proposed embodiment intended to effect these considerations. In attendance were Messrs. Tuck, Fuchs, and Bretscher.

"d. 19 April 1946 (1000) Third meeting of the "Super" conference. Messrs. Metropolis and Turkevich discussed numerical calculations on various phases of the "Super" carried out on the "Eniac" calculator at Philadelphia. These solutions

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"e. 19 April 1946 (1400) Fourth meeting of the "Super" conference. Mr. Lansdorf continued his discussion on the compression of the various materials. Mr. Edward Teller then addressed the meeting on the experimental program which was believed necessary in the preparation of a "Super." He mentioned a program for the study of the 14 Mev neutrons released in the nuclear reaction and the cross sections for various processes concerning these neutrons and the materials employed in the "Super." Furthermore, the various reactions involved in the "Super," such as tritium plus tritium, helium plus deuterium, hydrogen plus deuterium, and the like, as well as the nitrogen plus nitrogen reaction should be studied. Cryogenic experiments should be carried out for all the materials employed in the proposed device. These experiments should include considerations of the thermal equations of state; the ortho to para conversion; pressure equations of state; heat production in tritium at low temperatures by beta ray emission and so forth. An engineering program was also suggested to cover all engineering and design phases connected with the device. The test program should cover the operation of the assembly device for the fission reaction; the fission reaction plus the "primer"; and the full-scale tests. A further program should be instituted to investigate other suggestions on the initiation of a deuterium plus deuterium reaction such as the jet method proposed by Ulam, etc. In attendance were Messrs. Tuck, Bretscher and Fuchs.

"f. 20 April 1946 (1000) Fifth meeting of the "Super" conference. Mr. Edward Teller presided. The meeting was a general discussion period concerning the possibility of peaceful applications of the deuterium plus deuterium reaction. General schemes were proposed all of which were very far-fetched and presented numerous practical difficulties. In attendance were Messrs. Fuchs, Bretscher, and Tuck."

3. On June 1, 1946, Colonel Seeman listed in his monthly British Mission report a meeting of May 27, 1946, as follows:

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"At the Interim Council Dr. Bradbury spoke briefly on the radiation accident occurring on 21 May 1946, indicating that no critical assembly experiments were to be continued until safer methods were developed, and that the involved plutonium sphere was so "hot" that it will not be handled for some time. The main speaker was J. W. Stout on the developments in slow explosives, particularly barium nitrate-plastic compositions, for use in explosive lenses. Mr. Fuchs was present."

4. Again on July 2, 1946, Colonel Seeman's report on the British Mission includes a meeting involving considerable weapon data at which Mr. Fuchs was in attendance:

"3 June 1946 Darol Froman presided over the meeting of the Interim Council. Milo Sampson spoke on the material and shock velocities. Velocities of 4.18 mm per microsecond for the material, and 4.59 mm per microsecond for the shock were measured employing the pin method for velocity determination. Messrs. Fuchs and Mark attended."

According to that report, Mr. Fuchs permanently departed from Los Alamos on 15 June 1946.

5. On March 6, 1947, Colonel Gee reported a meeting of February 3, 1947, which was attended by Dr. Titterton of the British Mission. The report is as follows:

6. In connection with the "booster" proposal, it should be noted that as early as April 12, 1944, in a patent memorandum an implosion type device containing deuterium and tritium was suggested, with the

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statement that the efficiency of a neutron-induced chain reaction is greatly increased by the action of neutrons produced in a thermonuclear reaction ignited by said fission chain reaction. At another point in the same patent memorandum there is a statement that the neutrons released in the thermonuclear reaction can be utilized for producing fissions in the mass of fissile material used for igniting the thermonuclear reaction and thereby greatly increasing the efficiency of the fission chain reaction. Statements and examples of such devices appeared in many drafts of the proposed patent application on this subject which application was executed by the inventors in August 1946. Figure 6 of that Application Serial No. 699,096 discloses such a device with the statement that the efficiency of an implosion type explosive device may be increased by the employment of relatively small quantities of a readily obtained material such as deuterium. Mixtures of deuterium and tritium are also disclosed for this purpose in the patent application.

7. Furthermore in November, 1943, Dr. Teller conceived the idea in an implosion gadget. A patent application was filed in the U. S. Patent Office under application Serial No. 634,826 on 13 December 1945 showing an arrangement generally similar to the booster type weapon. In the application it is stated as follows:

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"As a final example mixture of deuterium and tritium gas may be considered. In addition to high compressibility and reasonably high neutron-scattering cross sections this mixture releases at high temperatures and densities neutrons produced in the thermonuclear reaction between deuterium and tritium nuclei. Some of these neutrons will react with the fissile material causing additional fission and increasing the efficiency."

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