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Skyrme, Toney Hilton Royle

Slack, Alfred Dean

Smilg, Benjamin

Smilg, Harry

Smilg, Rebecca

"Smith, Paul"

Smith, R. C.

\* Smith, R. P.

~~Social Democratic Party~~

Socialist Party

Society for Cultural Relations with the Union  
of Soviet Socialist Republics

[Society for the Protection of Science and  
Learning] ~~SECRET~~

Society of Friends

Sollman, Friedrich Wilhelm Dr.

Sollman, William

Sosnin, Natalia

Sosnin, Sergei Nikolaevich

Soukhomaline, Vassili V.

Soukhomaline, Vassili V.

South Philadelphia High School

[Sovexport Film] ~~SECRET~~ (u)

[Soviet Consulate, New York City] ~~SECRET~~ (u)

[Soviet Embassy - London] ~~SECRET~~ (u)

Soviet Embassy - Ottawa, Canada

[Soviet Embassy, Paris] ~~SECRET~~ *u* *declared per state letter att'd*

Soviet Government Purchasing Commission *3-21-85*

Soviet Intelligence Service

"Soviet Russia Today"

Soviet Secret Police

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*b1 per CIA*

*Remain Classified Off Agency  
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4/2/87 3042 put DR  
3/6/96 SP6AB/JS  
FOIA 561261  
CA# 75-1121

ENCLOSURES

ADDRESSES

104 John Ave, Chicago  
Print Post

Chicago  
Name: Marshall, 207  
Street: 17th St, Chicago, Ill.  
City: E. 4th St, Chicago, Ill.

Telephone: 5-1100  
Name: (Remond Langner, HM)  
Street: 800 West, Chicago, Ill.  
City: 593 Market St, S. F., Cal.

Telephone:  
Name: Kline Fuchs  
Street: 1500 N. Dearborn, Chicago, Ill.  
City: 1500 N. Dearborn, Chicago, Ill.

Telephone:  
Name: Mary Fuchs  
Street: 44 St. Charles, Road  
City: Boston, Mass.

Telephone:  
Name: John Edward  
Street: 15 Dearborn  
City: Boston, Mass.

Telephone:  
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City: Boston, Mass.

Telephone:  
Name: John Edward  
Street: 15 Dearborn  
City: Boston, Mass.

EXHIBIT 42

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X 3042 put-pte  
4/2/87

INDEXED  
ON 9/6/96 SP6AG/JS  
FOIA 56261  
CF 75-1121

~~1~~

15 BROAD STREET, NEW YORK

TELEPHONE HANOVER 2-2480

BRITISH MINISTRY OF SUPPLY MISSION  
FORMERLY  
BRITISH PURCHASING COMMISSION

Room 2401, 43 Exchange Place,  
New York.

MOST SECRET

10th December, 1943.

Dear Chadwick,

British Tube Alloy Mission. Security.

I understand that General Groves would like formal assurance that all the members of the British Tube Alloy organisation, who are now in this country, have been cleared by the British Security organisation for work on this project.

You can inform him that special clearance is required in England for anyone who is brought into this work, even though they may already have been cleared for work on ordinary secret war projects.

This special clearance has been carried out in the case of the following:-

W. A. Akers  
G. I. Higson  
R. Peierls  
F. E. Simon  
H. S. Arms  
H. G. Kuhn  
N. Kurti  
G. O. Jones  
J. R. Park  
C. F. Kearton  
J. D. Brown  
N. Elce  
H. Smethurst  
L. B. Pfeil  
S. S. Smith  
J. Chadwick  
M. L. E. Oliphant  
O. R. Frisch  
H. S. Tomlinson  
E. W. Titterton  
H. S. W. Massey  
W. L. Webster  
K. Fuchs

I hope that this assurance from me will satisfy General Groves that all is in order.

Yours sincerely,

Prof. J. Chadwick, 201  
Room 640, Grafton Annex,  
Washington, D.C.

W. A. AKERS

# THE BRITISH SUPPLY COUNCIL IN NORTH AMERICA



TELEPHONE EXECUTIVE 2020

Box 680  
BENJAMIN FRANKLIN STATION  
WASHINGTON 4, D. C.

Room 640, Grafton Annex  
Washington, D.C.  
December 11, 1943

MOST SECRET

General L. R. Groves  
New War Department  
Room 5120  
Virginia Avenue and 21st Street  
Washington, D.C.

Dear General Groves:

I forward herewith a letter from Mr. Akers conveying an assurance that all members of our present parties have been cleared by the British Security organisation in Great Britain. I trust this will prove a statement satisfactory to you.

Yours sincerely,

*W. L. Webster*  
W. L. Webster

201

gac  
Encl.(1)

4/2/87  
3/6/96

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COMMONWEALTH SCIENTIFIC ORGANIZATION  
WASHINGTON 8, D. C.

October 22, 1947

Mr. Carroll L. Wilson,  
General Manager,  
U. S. Atomic Energy Commission,  
Public Health Building  
1801 Constitution Ave. N. W.  
Washington, D.C.

Dear Mr. Wilson:

Dr. W. W. B. Skinner of the Atomic Energy Research Establishment in U.K. is visiting U.S.A. and we have been informed that he will arrive on the 31st of October.

We have been asked to arrange for him an itinerary for the purpose of visiting the following establishments:

1. Bell Laboratories - where he intends to visit Dr. Shrockley for the purpose of discussing Crystal counters.
2. Brookhaven National Laboratories - for the purpose of discussing the technical aspects of cyclotrons and synchrotrons with Dr. Livingston.
3. General Electric Company - to discuss with Dr. Felleck the technical aspects of cyclotrons and betatrons.
4. Chicago University - to discuss the subject of neutron spectroscopy with Dr. W. L. Anderson.

With regard to the proposed visit to Bell Laboratories, Dr. Dunworth of the Atomic Energy Research Establishment will accompany him in this instance, and he will be accompanied by Dr. E. Fuchs of the same Establishment on his visit to Chicago University. We are unable, at present, to define the exact dates of the proposed visits. For your information, they will take place during the period between the 31st of October and the 30th of November.

It will be appreciated if you can give us formal clearance for Drs. Skinner, Fuchs and Dunworth for these visits so that we may proceed with the preparation of an itinerary.

Yours sincerely,

/s/ L. G. RALFE

L. G. Ralfe

LO2/bh

ALL INFORMATION CONTAINED  
HEREIN IS UNCLASSIFIED  
DATE 8/6/96 BY SP6 AG/JS  
FOIA 56,261  
C# 75-1121



C  
O  
P  
Y

November 7, 1947

W. Hobbs/agn

Mr. L. G. Ralfe  
British Commonwealth Scientific Office  
United Kingdom Scientific Mission  
1786 Massachusetts Avenue, N. W.  
Washington 6, D. C.

Dear Mr. Ralfe:

With reference to your letter of October 22, we have no objection to the visits and discussions proposed for Doctors Skinner, Pacha, and Dunworth on the basis that no Commission restricted data will be involved. We have notified the various organizations of this concurrence, with the understanding that you will arrange direct the firm dates for each visit.

Sincerely yours,

Carroll L. Wilson  
General Manager

cc: C. L. Wilson  
cc: W. A. Burke - Attached  
Copy of letter from  
L. G. Ralfe to Carroll L. Wilson  
Dated October 22, 1947

ALL INFORMATION CONTAINED  
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DATE 3/6/96 BY SP6 AB/JS  
FOIA 56,261  
CA 75-1121

SECRET

COPY

(Stamp) MEMORANDUM

T. O. JONES

August 6, 1957

D. DEAN

On this date, Mr. Keller (presently in Dr. Fidler's Office - assigned to Declassification, Oak Ridge, Tennessee.) requested a security check of the following individuals:

- Dr. W. B. Lewis (Dir. of Research, Chalk River)
- Dr. R. E. Peierls (British)
- Dr. K. Fuchs (British)

Mr. Keller explained that they want to invite the above individuals for a conference on declassification; Dr. Lewis to come down from Canada and Dr. Peierls and Dr. Fuchs to come over from Britain. The meeting will probably be held here in Washington, and undoubtedly in AEC Headquarters. The purpose of the meeting is to coordinate the British and Canadian declassification with our own.

Mr. Keller stated that Mr. Derry and Mr. Wilson approve of the meeting, and that Mr. Wilson is signing the letter of invitation.

A check of the Washington Records indicates:

Dr. R. E. Peierls & Dr. K. Fuchs - were both members of the original British Mission that came over in 1943. Both are German born but became British citizens. The members of this Mission were never investigated by the U. S. government, their special investigation as conducted by the British government was accepted by General Groves as ND clearance.

Dr. W. B. Lewis - No Record in either CFCO or in 1 Files.

A check will be made at Oak Ridge, Tennessee to see if any record exists there of the clearance of Dr. Lewis.

- (Handwritten) Distribution
1. Jones
  2. Reading
  3. Record Section

(Handwritten) Check at O. Ridge revealed No Record on W. B. Lewis (per phone conversation - Fowler/Dean)

D. Dean

ALL INFORMATION CONTAINED  
HEREIN IS UNCLASSIFIED  
DATE 3/6/96 BY SP6AG/JS  
C# 75-1121  
FOIA 56,261

EXHIBIT #6

SECRET

Admiral Dingrich

C. A. Rolander, Jr.

BRITISH MISSION

Symbol: GRS-PS: FAB

Attached herewith is a compilation of the Canadian staff, scientific and technical, and UK staff, scientific and technical, who participated in the atomic energy program under the former Manhattan Engineer District from 1943 to early 1946. Included, insofar as possible, is a statement as to the installations visited and degree of access afforded to this group. General Leslie R. Groves was assured by the British Supply Council in North America that all the participating members of the British Mission in the U. S., engaged on work of interest to the MED, had been cleared by British Security prior to their departure for the United States. This assurance was accepted by General Groves as sufficient clearance for participation in the Manhattan Project.

The information included in the attachments was prepared from records available in the Security Files. Although these records give a general picture as to the fields of activity in which the British Mission participated, they do not provide detailed information as to their particular specialties, nor do the records clearly indicate what familiarization the British Group may have had with other programs in which they did not actually participate but undoubtedly became acquainted by reading technical reports available to them. An example would be the familiarization with the HEU activities through technical reports made available to the Los Alamos Laboratory. A more detailed study should be made through the examination of the Los Alamos history, technical series, work notebooks and other reports, most of which are a part of the field records.

The attachments were discussed with John A. Derry who checked them for accuracy. The statements concerning the access to classified information provided the British Group were discussed with Ralph C. Smith regarding Los Alamos; A. V. Peterson regarding Oak Ridge; and Harold Fidler concerning Berkeley.

With reference to the members of the British Mission, Attachment #2, it is noted that George Placeck has become a naturalized U. S. citizen and is presently at Princeton University, and J. Carson Mark has received his first papers and is employed at Los Alamos. Lew Kowarski and Bertrend Goldschmidt have returned to France and are presently staff members of the French Atomic Energy Program.

Attachments - 2

See report from R. C. Smith to  
T. O. Jones, 18 Sept. 1945  
Subject British Mission Personnel

SECRET

DISTRIBUTION:  
 COPY 1 - Adm Dingrich  
 COPY 2 - Record Section  
 COPY 3 - Reading File  
 COPY 4 - VACB File  
 Cops 5,6, & 7 - retained in VACB File

BERKELEY

Records reflect that there were no prohibitions on the access of the British Group on the work being done by the Radiation Laboratory in connection with the Y-12 Program. However, while no limitation did exist, it was felt that the British Group had more information concerning the overcoming of space charge, use of magnetic shields, the physics of the source unit and ionizations, and much less information on the collectors, on the chemistry, the regulators and controlling units. The British Group, especially Massey and Buneman, practically directed the work of the theoretical group which studied the fundamental physics of the electro-magnetic method of separation of isotopes. There is no question that Dr. Oliphant and Dr. Massey, who succeeded Oliphant as head of the British Group at Berkeley, discussed high matters of policy with E. O. Lawrence. They took an important part in such decisions as the degree of enrichment desired and the correlation of the alpha and beta enrichment with K-25. It is believed, however, that no member of the British Group had access or any knowledge of Latimer's work on K-10 chemistry. It is believed that the British Group generally had little knowledge concerning the work performed by J. O. Hamilton with the 60" cyclotron, either on health problems or on special bombardments for the Chemistry Divisions at Los Alamos and the Metallurgical Laboratory. James Moore of the British Group spent about two months with Hamilton learning the operation of the 60" cyclotron, and when he returned to England he took with him a set of blueprints for the cyclotron. He had no access to the specific work being performed for the MED Project with the cyclotron.

OAK RIDGE

It is difficult to ascertain the amount of information obtained by the British Group who visited or remained at Oak Ridge or to determine the amount of classified information made available to them. It is believed, however, that as a group they had access to all information at Y-12 with only a very limited familiarization with K-25, K-10 and S-50. It is to be noted that some of the British Group only made a tour of the area, while others spent varying lengths of time working in the area.

LOS ALAMOS

Inasmuch as it was the policy of the laboratory to make all information available to this group at Los Alamos, and as the British personnel had general access to the Document Room, various local sites, and the organized meetings of the local project, it is believed that the group had substantially complete knowledge of the gun assembly and implosion assembly of fissile material, the actual design of the aerial bombs employing these principles, the possible future developments, including the "Super" or Thermo Nuclear Reactions, the auxiliary equipment at the various local sites including the Water Boiler. The British Group probably did not obtain detailed information concerning the final chemical work at Los Alamos, however, the general aspects were known to them because they would be discussed in colloquiums or staff meetings. The exact extent of the technical knowledge about sites other than the Los Alamos project by British personnel at Los Alamos cannot readily be determined since work directly

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- 2 -

relating to Los Alamos activities such as basic physics as well as pile design which members of the Mission would use in their daily work is undoubtedly known to them. Such items as Hanford chemistry would have reached the group by inference only since the laboratory as such did not have detailed access to such information. During their stay at Los Alamos, they also had access to the general physics and chemistry principles involved in the operation of the Chicago and Hanford piles, the physical construction of these piles, but only a minimum of the engineering details. They had, however, complete access to all general theoretical work on pile design. It is assumed that they had rather complete knowledge of the mass spectrometer application used in the calutron and gaseous diffusion process for separating uranium isotopes.

There is included below examples of certain fields of weapon research in which the Britishers listed were particularly outstanding:

- O. R. Frisch      -- Critical mass work on weapons.
- J. L. Tuck        -- Experimental work on explosives, relating to weapon assemblies, jet work for super assembly.
- R. E. Peierls     -- Theoretical work on implosion and was a top theoretical adviser on most phases of Los Alamos research activity.
- W. G. Penney      -- Bomb after effects work and under water explosion.
- E. W. Titterton   -- Complete charge of electronics group, designed experimental detonation circuits and numerous circuits relating to weapon and weapon components testing.
- W. G. Harley      -- One of those responsible for design and field testing of explosive lens components used in the weapon.

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October 24, 1944. Colloquium. Captain Ackerman, A.U.S., spoke on preparing shapes masses of high explosives for implosion spheres.

November 21, 1944. Colloquium. Dr. Manley spoke on integral studies particularly on tamper measurements.

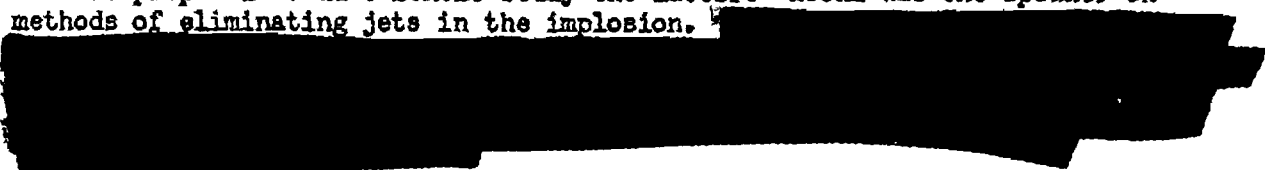
November 28, 1944. Colloquium. Dr. Nicholas Baker discussed nuclear reactions of heavy elements and particularly the various results obtained when a neutron comes in contact with heavy nuclei, such as Uranium 238.

December 12, 1944. Colloquium. Dr. Oppenheimer mentioned the three alternative methods for implosion. These include: (1) Christy compression of a solid sphere; (2) Neddermeyer low velocity implosion to avoid jets; (3) The shaped charge assembly or rearrangement of fissile material. The speaker was Critchfield who discussed initiator for the neutron reaction. He mentioned the Alvarez gamma-Neutron source, the deuterium - deuterium reaction as an initiator, as well as the developed procedures of Ayers and Robinson.

December 19, 1944. Colloquium, addressed by Dodson. Subjects discussed were (1) Radio lanthanum experiments on the Christy compression procedure; (2) Foils of active material for neutron measurements; (3) Sensitive neutron detectors; (4) polonium chemistry, and (5) procedure for separation of radio lanthanum from source material.

December 26, 1944. Colloquium. McDaniels spoke on measurement of the fission and neutron capture of Uranium 235 and Plutonium 239. Considerable discussion was given to the attempted coordination of the experimental results with the theoretical predictions.

January 2, 1945. Colloquium. Dr. Oppenheimer briefly mentioned the Christy solid sphere implosion, the shaped charge assembly of fissile material, and the proposal to have E.R.L. study the latter. Koski was the speaker on methods of eliminating jets in the implosion.



January 16, 1945. Colloquium. Bethe spoke on jet theories in the implosion gadget. Experimental analysis by Tuck of the British Mission and

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calculations by Fuchs of the British Mission were included in the discussion.

[REDACTED]

January 22, 1945. Coordinating Council addressed by Teller on the subject of autocatalytic methods of explosively releasing energy from fissile material.

February 5, 1945. Griesen talked on the X-ray technique of implosion examination, particularly as to its limitations and shortcomings.

February 26, 1945. Colloquium. Seybolt addressed group on shaping of uranium by casting, rolling, and pressing and by Balke on powder metallurgy.

March 5, 1945. Coordinating Council. Dr. J. R. Oppenheimer outlined the future program of gadget study, emphasizing the freezing of designs in guns and implosion assemblies.

March 6, 1945. Colloquium. Mr. Penny talked on the subject of damage by the blast effect of a gadget.

March 12, 1945. Coordinating Council. [REDACTED]

March 19, 1945. Colloquium. Mr. Marley spoke on the subject of explosive lens design and results for producing spherical implosion wave.

March 26, 1945. Coordinating Council. Dr. Weisskopf spoke on the subject of the proposed study of the explosive fission reaction efficiencies by observation of the blast wave, neutron emission, X-ray (particularly the delayed), and the fission products. Latest critical mass values were announced.

April 2, 1945. Coordinating Council. Seybolt spoke on the shaping of Uranium 235, specifically casting, and Jette on the processing of plutonium metal and the allotropic forms of the material, mentioning the toxic dust hazards in the processing.

April 9, 1945. Coordinating Council. Peierls spoke on results of implosion theoretical study.

April 10, 1945. Colloquium. Teller spoke on autocatalysis of fission chain reactions.

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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.

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.

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.

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 "Breeder," "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. M. 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.

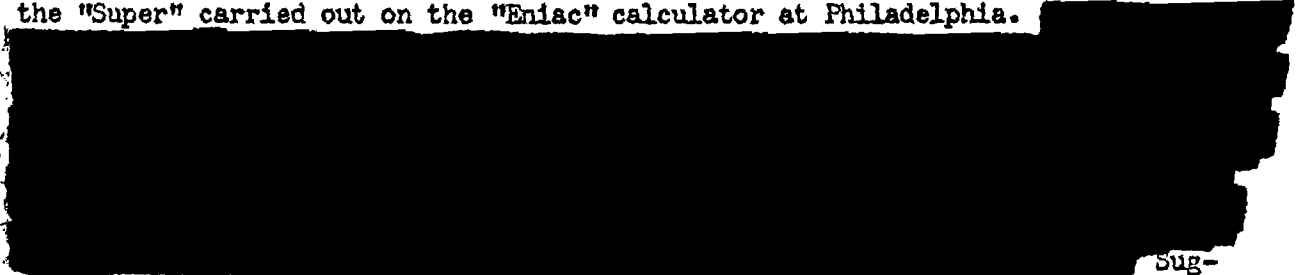
April 8, 1946. Interim Council. P. Morrison spoke on dilution of fissionable materials to permit only peaceful employment thereof. He mentioned the addition of U-238 to various materials such as thorium, plutonium, and the like.

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 affect these considerations.

April 18, 1946. (1400) Second meeting of the "Super" conference. Teller presided.



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



Sug-  
gestions were made by various people in attendance as to the manner of minimizing the rise in entropy during compression.

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 par 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	LAMS-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 6, 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-15.)

"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-5.)

"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; 1/3/49, 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; 8/13/47, 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 (u)

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." (65-58805-183, pg 11-12)

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

IN REPLY REFER TO:

SV:CAR

19 MAR 1950

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 thermomuclear 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 Hammack  
Acting Director  
Division of Security

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

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SV:GAR

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Federal Bureau of Investigation  
U. S. Department of Justice  
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Francois Hamack  
Acting Director  
Division of Security

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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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The bulk of this material was declassified about two years ago for the Cohen volume in the NNES, 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

Thus Fuchs

should probably have had no certain knowledge of which barrier was adequate.

However, Fuchs apparently did transmit the fact, according to his own confession, that the barriers would be made of "sintered" nickel.

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5. After considering the foregoing the Committee does not feel that we should release any further material about barriers than has been done to date.

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 of the composite and levitated bombs. 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 the idea of the levitated 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.

The  
other presently conceived thermonuclear weapon, the "Alarm Clock" \*\*

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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.

"b. 11 March 1946 Darol Froman spoke at the Interim Council 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. Those attending included Messrs. Bretscher, Fuchs, Mark, and Titterton.

"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 "Breeders," "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.

"c. 18 April 1946 (1400) Second meeting of the "Super" conference. Mr. Edward Teller presided.

"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

Mr. Lansdorf discussed the compression properties of deuterium and deuterium plus tritium mixtures.

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Suggestions were made by various people in attendance as to the manner of minimizing the rise in entropy during compression. In attendance were Messrs. Tuck, Bretscher, and Fuchs.

"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 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. 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:

"Froman presided at the Coordinating Council, briefly mentioning some characteristics of the cyclotron. Taschek spoke on the fission cross section of  $U^{238}$ ."

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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3/6/86  
CLASSIFIED BY SP6 AG/JS  
DECLASSIFIED BY X-1  
FOIA 56,211  
CA# 75-1121

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Wormwood Scrubs Prison  
London, England

List of some of the reports prepared by EMIL JULIUS KLAUS FUCHS personally or in collaboration with other scientists while working under the over-all control of the Manhattan Engineer District, and which reports were of a confidential and official classified character:

*Bracketed info is no longer  
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SP 6 BJA/RBG 5/23/84  
# 241,073*

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<u>Title of Report</u>	<u>Rpt. No.</u>	<u>Classi- fication</u>	<u>Date</u>	<u>Copy Furnished by Dr. Fuchs to Raymond Indicated by "Yes"; or "No," (meaning not de- livered); or Excerpted Information Furnished to Raymond Indicated by "Excerpt"</u>	<u>Probable Place Where Delivered</u>	<u>Initials</u>
Shock Attenuation in Rods	LAMS-402	Secret	7-26-46	No.		
Efficiency for Very Slow Assembly	LA-596	Secret	8-2-46	No.		
Effect of Evapora- tion of Free- Surface Velocities	LA-441	Secret	10-30-45	<i>Excerpt from summary</i>	London	K.F.
Initiator Theory, III. Jet Formation by the Collision of Two Surfaces	LA-325	<i>SU</i> Secret	7-11-45	No.		
Penetration by Jets Produced by Cavity Charges	LA-328	Secret	7-14-45	No.		
Theory of Initiators II	LA-300	Secret	6-1-45	No.		

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Title of Report	Rpt. No.	Classi- fication	Date	Indicated by "Excerpt"	Probable Place Where Delivered	Initials
Rarefaction Wave from a Plan Free Surface in an Explosive	LA-227	Secret	2-16-45	No.		
		Secret	2-6-45	U		
Formation of Jets in Plane Slabs	LA-195	Secret	12-27-44	Excerpt from summary	Boston	K.F.
				Excerpt from memo	Boston	K.F. U

second brackets under  
 per DOE ltr dtd 7/22/96.  
 SP6 AG/JS 7/31/96

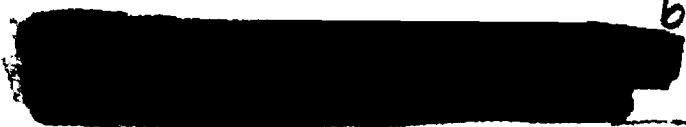
Title or Other Identification

"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.)



Probably Yes.	Banbury	K.F.
No.		
(U) Probably Yes.	Banbury	K.F.
Excerpt	Banbury	K.F.
63 per DOE No.		

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Title or Other Identification

Probable Place Where Delivered Initials

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

Yes Banbury K.F.

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

Yes Banbury K.F.

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

? New York K.F.

"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 6, 1944, British file MSN-12.)

Yes New York K.F.

"Fluctuations and the Efficiency of a Diffusion Plant, Part 4, the Effect of Density Fluctuation" by K. Fuchs (undated, British file MSN-15.)

Yes New York K.F. <sup>Ju</sup>

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

Yes New York K.F.

"Note on the Effect of Fluctuations on the Efficiency of a Diffusion Plant" by K. Fuchs (undated, British file MSN-5.)

Yes New York K.F.

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

Yes New York K.F.

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 SP6 96/55 7/31/96.

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Title or Other Identification

The Stability of the Rabbitt Machine;  
 4/10/42, B 106

?

Bombing

K.F.

Shock Hydrodynamics; 10/28/44, LA 165

No.

Shock Attenuation in rods; 7/26/44, LAMS 402

No.

Separation of Isotopes; 4/10/42; B 49

Can't identify  
MS 12A yes

Bombing or London

K.F.

Rarefaction Wave from a Plane Free  
 Surface in an Explosion; 3/16/45

No.

Perturbation Theory in One Group Neutron  
 Problems; 1/3/49, HM 1482

No.

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Penetration by Jets Produced by Cavity  
 Charges; 7/14/45, LA 328

No.

Oblique Detonation Waves; LAMS 87

No.

Notes on the Expansion of U Sphere  
 Inclosed in a Container; HM 145

Yes

Bombing or London

K.F.

Measurement of Nuclear Bomb Efficiency  
 by Observation of the Ball of Fire at  
 early stage; 2/20/46, LA 516

Excerpts from  
memo

London

K.F.

Los Alamos Tech Series Vol. 7, Part III,  
 Chaps. 11-14 Blast Wave; 8/13/47, LA 1022

No.

Los Alamos Tech Series Vol. 7, Part I,  
 Blast Wave; LA 1020

No.

Los Alamos Tech Series Vol. 7, Part IV,  
 Blast Wave; LA 1023

No.

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Initials

Los Alamos Tech Series Vol. 7, Part II, Blast Wave; LA 1021

[REDACTED]

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

Glend Problems; 6/29/42, B 73

Formation of Jets in Plane Slats; 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, BM 83

Efficiency for Very Slow Assembly; 8/2/46, LA 596

Effect of Separation of Isotopes of Compound Molecules; MS 44 A

63 per <sup>DO</sup>No.

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<u>No.</u>		
<u>Excerpt from my Boston</u>	<u>Boston</u>	<u>K.F.</u>
<u>Yes</u>	<u>Lantern or Barbury</u>	<u>K.F.</u>
<u>No.</u>		
<u>Excerpt</u>	<u>Barbury</u>	<u>K.F.</u>
<u>U Excerpt from my way</u>	<u>Boston</u>	<u>K.F.</u>
<u>Probably first part only</u>	<u>Barbury</u>	<u>K.F.</u>
<u>Yes(?)</u>	<u>Barbury or Lantern</u>	<u>K.F.</u>
<u>can't identify</u>		
<u>No.</u>		
<u>No.</u>		
<u>Yes</u>	<u>Barbury or Lantern</u>	<u>K.F.</u>

<u>Title or Other Identification</u>	Copy Furnished by Dr. Fuchs to Raymond Indicated by "Yes"; or "No," or Excerpted Information Furnished to Raymond Indicated by "Excerpt"	(meaning not delivered);	Probable Place where Delivered	<u>Initials</u>
Effect of Packing on Critical Radius of the Sphere; 4/10/42, B 48	<u>Yes</u>		<u>London (1)</u>	<u>K.F.</u>
Effect of Evaporation on Free Surface Velocities; 10/30/45 LA 441	<u>Excerpt from memory</u>		<u>London (2)</u>	<u>K.F.</u>
Effect of Boundary Layer for Swept membranes; B-31	<u>Yes</u>		<u>London (1)</u>	<u>K.F.</u>
Effect of a Scattering Container on the Critical Radius and Time Constant; B 70	<u>Yes</u>		<u>London (1)</u>	<u>K.F.</u>
The Critical Radius and the Time Constant of a Sphere Imbedded in a Spherical Scattering Container; B 144	<u>u</u> <u>Yes (?)</u>		<u>Banby</u>	<u>K.F.</u> <u>u</u>
Critical Radiation and Time Constants for Finite Reflector 7/24/42 B 81	<u>?</u>			
Comparison of the Variation Theory and End Point Results for the Tampered Spheres; 1/18/45, LA 205	<del>Probably Excerpt</del> <u>No.</u>			
The "I" 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."	<u>No.</u>			

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no longer classif. per DOE ltr.  
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Klaus Fuchs  
26th May 1950.

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FOOT 54, 261  
CH 75, 1121

Wormwood Scrubs Prison  
London, England

I, Emil Julius Klaus Fuchs, a prisoner in Wormwood Scrubs, a penal institution in London, England, do hereby make this statement, freely and voluntarily, with no promises or threats having been made to me, and I have been specifically informed that I do not have to make any statement of any kind whatsoever.

This statement is made to Hugh H. Clegg, who has been identified to me as an Assistant Director, and to Robert J. Lamphare, who has been identified to me as a Special Agent, both being identified as officers of the Federal Bureau of Investigation, United States Department of Justice of Washington, District of Columbia, U.S.A. I am making this statement in the presence of the two aforesaid officers and William James Skardon, whom I know to be an officer of the Security Service of the United Kingdom.

I was born in Russelsheim, Germany, on December 29, 1911, and became a naturalized citizen of the United Kingdom on August 7, 1942. I came to England arriving on September 24, 1933. In May, 1941, I accepted employment at the University of Birmingham in England as a scientist on atomic energy research development. When I learned of the purpose of this research work, I decided and planned to furnish information concerning this work to and for the benefit of the Union of Soviet Socialist Republics, hereinafter referred to as the Soviet Union, and, in order to effectuate this plan, in early 1942 I personally contacted an individual in England, whom I knew to be active in communistic affairs/favorable *and being* to the Soviet Union. I made known to him my availability and readiness to furnish confidential and classified information and my occupational affiliation which gave me access to such types of information relating to atomic energy research. The person so contacted arranged for me to meet another individual, also in England, whom I later personally met in 1942. On one occasion in 1942 I met this latter individual, known to me as Alexander, at the Soviet Embassy in London, England. During my meetings with Alexander, I furnished to him in 1942 information including written data concerning atomic energy research which I knew to be classified and confidential, and for the purpose of such information being furnished to the Soviet Union as an aid in promoting atomic energy research and

*Klaus Fuchs*

development in and for the Soviet Union. Through and at the instigation of Alexander, I established personal contact with a woman whose name I do not know and whom I met near Banbury in Oxfordshire, England, sometime in 1942. I delivered confidential and restricted information to this woman, for the continued benefit of the Soviet Union, from 1942 until near the end of 1943. My atomic energy research employment was under the auspices of the British Government.

When I learned in 1943 that I was being officially assigned to go to the United States as a part of an official British Mission to work with the Manhattan Engineer District on atomic energy research development, I informed my contact, the aforesaid woman, of this assignment and she subsequently informed me how to make contact in the United States with an individual for the purpose of continuing my activities of furnishing, for the benefit of the Soviet Union, additional confidential information relative to atomic energy research in the United States. Her instructions were to the effect that I should on a certain day at a specified place in New York City, New York, U. S. A., meet an individual who would be wearing gloves and would have an additional pair of gloves in his hands, while I would have a ball in my own hand. This meeting was, according to her instructions, to be made on a street in New York City at a stated time. If the meeting was not effected initially as planned, a further meeting would be attempted at a designated later date.

In keeping with instructions, I proceeded by ship to the United States with other members of the official Mission from England, arriving at Newport News, Virginia, on December 3, 1943. Within three or four days I arrived in New York City, taking up residence first at the Taft Hotel, later at the Barbizon Plaza Hotel, and later at an apartment at 128 West 77th Street. I took up employment as a scientific consultant as a part of the British Mission, assigned to the Manhattan Engineer District, and engaged in research development and activities relating to atomic energy.

As agreed upon during the meeting with the aforementioned woman in England, I went to the designated meeting place on the lower East Side,

*Klaus Fuchs*

Manhattan, New York City, New York, where, to the best of my recollection, around Christmas 1943, I met an individual at the time and on the day previously agreed upon. He was wearing gloves and carried an additional pair of gloves in his hand and I had a tennis ball in my hand. We exchanged designated identification words and I gave my correct name and he used the name of Raymond in making initial introductions. Raymond expressed his pleasure at being chosen for such an important assignment. He suggested to me to make certain, in keeping future meeting assignments, that I was not being followed. During this or the next succeeding meeting with Raymond, atomic energy and the development of an atomic bomb were discussed by referring to these terms in a general way.

I was motivated in keeping this meeting by a desire to aid the Soviet Union. I considered Raymond's status as an agent intermediary, acting for and in behalf of the Soviet Union in keeping with the plans aforementioned, which were initiated in England.

At and during this first meeting with Raymond in New York City, we agreed upon an early subsequent meeting and the time and place for such meeting, in order that I could furnish to Raymond highly confidential and classified documents or information concerning atomic energy research and development under the control of the Manhattan Engineer District.

A subsequent meeting between Raymond and myself, in keeping with arrangements, was held in Manhattan, New York City, in the vicinity of the Queensboro Bridge approach as we walked under this bridge during this meeting, which was held after dark. This meeting occurred during the early part of 1944.

On another occasion during the first half of 1944, I met Raymond, by prearranged agreement between us, on the street near a subway station, possibly the "Museum" station on Central Park West in New York City. Raymond usually suggested the meeting places, but I believe I suggested this meeting place because it was near my place of residence on 77th Street.

Another time, by prearranged agreement, in 1944 I met Raymond in the Bronx, New York City. This meeting was near a cinema, I believe,

*Klaus Fuchs*

on Grand Concourse in the vicinity of 159th Street or 161st Street.

I believe I recall another personal contact between Raymond and myself in Queens, New York City, in 1944.

There were held about five or six meetings between Raymond and myself in New York City during the period from sometime shortly after my arrival there in December, 1943, to sometime prior to my departure in August, 1944, from New York City for Los Alamos, New Mexico, for official assignment on the atomic energy project there.

There was one other arrangement for my meeting with Raymond in 1944 in Brooklyn, New York, on a street location near some large buildings and where there was heavy traffic. This designated place may be on Eastern Parkway, but the meeting did not occur as I failed to see Raymond, although I was there.

At all the meetings between myself and Raymond no other person accompanied me and I observed no one who seemed to know Raymond. Most of these meetings between Raymond and myself were arranged by us to occur after dark.

Upon my official assignment with members of the British Mission, under the overall control of the Manhattan Engineer District in New York, I, with other scientists, was engaged in research in connection with the development of certain methods for the production of fissionable material. In connection with this, I prepared certain classified documents as part of the British Mission prior to my departure for Los Alamos, New Mexico, in August, 1944. I personally furnished all of the original drafts of these documents directly to Raymond, with the intent and purpose that he serve as an intermediary in the eventual transmittal of such documents to and for the benefit of the Soviet Union. These documents were delivered to Raymond by me in groups of one or more at most of the aforementioned prearranged meetings, which I had with Raymond in New York City during 1944.

In addition to the foregoing during my meetings with Raymond, as

*Klaus Fuchs*

above mentioned, I furnished to Raymond information which had come to my knowledge, by virtue of my official employment and work under the overall control of the Manhattan Engineer District. This information, which I furnished to Raymond, included the fact that a large production plant was to be built in the Southeastern part of the United States for the production of fissionable material, and that this plant was to use two different processes, which I named, in the production of fissionable material. I also orally advised Raymond of the identities of certain leading research personnel on atomic energy projects.

In keeping with official instructions received by me, I was transferred to Los Alamos, New Mexico, where I arrived on or about August 14, 1944, for work on the atomic energy project there under the control and overall supervision of the Manhattan Engineer District. At Los Alamos I was provided a place of residence on the United States Government restricted area in a dormitory and took up employment as a physicist in the Theoretical Division of the Laboratory. By virtue of my work, my associations in connection with my work and the availability of confidential and classified official documents, I developed, received and had access to confidential, classified information of an official character. I remained in such employment at Los Alamos until about June 16, 1946. During this period of official employment I made a visit to the home of my sister, Mrs. Kristel Heineman, and her husband, Robert Heineman, on Lakeview Avenue, Cambridge, Massachusetts. I arrived at my sister's home on or about February 13, 1945, and remained there on a visit until about February 22, 1945.

Shortly after my arrival in Cambridge I was visited by Raymond, who asked me for additional information concerning my work at the Atomic Research Project at Los Alamos. I told him I would prepare in writing this material and made arrangements to meet him a few days later in Boston. At the agreed upon time I did meet Raymond in Boston, Massachusetts, at a place fairly near the Charles River and near a large public-type of building, reasonably close to what is known as North Station. I there delivered to Raymond a written report, which I had prepared in longhand consisting of about six or more pages, in which I had set forth confidential

*These arrangements were made without the knowledge of my sister and her husband, who were not present during my discussion with Raymond and had no knowledge of its purpose*  
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*Klaus Fuchs*



and classified information and data which I had received in connection with my employment at Los Alamos. This dealt with the whole problem of making an atomic bomb from fissionable material as I then knew the problem. This document included information known to me regarding the method of detonating an atomic bomb and other highly secret and technical information regarding the construction of an atomic bomb. I wrote this statement in my own handwriting and in English, and I intended that it should be delivered by Raymond through channels so as to reach physicists in the Soviet Union who would understand the technical language of the report.

I again met Raymond in Santa Fe, New Mexico, in June of 1945, the arrangements for this meeting having been made at the Boston meeting, mentioned above. We met on Alameda Street, and I then got my car and we drove out a lane to a deserted spot where we continued our meeting. At this meeting I delivered to Raymond a written report, which I had personally prepared in longhand. This included a description of an atomic bomb, which was to be tested at Alamogordo, a sketch of the bomb and its components with important dimensions indicated, and a written description of the various important technical aspects of the bomb. I orally informed Raymond, while we were in the car, the types of explosive to be used in the detonating of the bomb, the fact that the Trinity test was to be made, with the approximate site indicated, and information as to the intensity of the explosion measured in relation to TNT explosive force.

By prearrangement I again met Raymond in Santa Fe a few months later, I believe possibly in September. At this meeting I delivered to Raymond another written report, which detailed information concerning the Trinity test, which had been held at Alamogordo. I also furnished in the report certain other technical information which I had obtained from my work on the Atomic Research Project at Los Alamos. I fully intended in transmitting this report to Raymond that he should, in turn, transmit it so as to reach the Soviet Union.

I returned to England in the summer of 1946 and took up employment at the Atomic Research Project at Harwell, England. After my return to England, I was again in contact with persons whose real identities I do not know, but whom I contacted with the intent of furnishing to the Soviet Union information concerning atomic research developments. To these persons I furnished additional information concerning atomic research, which I had

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came in possession of, both in the United States and England, including certain research being made on the problem of detonating a hydrogen bomb. My last contact in this respect was in February of 1949.

I have examined photographs shown to me by Assistant Director Hugh H. Clegg and Special Agent Robert J. Lamphere, both of the Federal Bureau of Investigation, and I have identified two of the photographs as the individual I knew under the name of Raymond. I have indicated my identification by signing my name and the date on the reverse sides of these two photographs.

I have personally and carefully read this statement consisting of seven single-spaced, typewritten pages and I do hereby state that all the above information is true and correct to the best of my knowledge and belief.

Signed this the 26th day of May, 1950.

Klaus Fuchs

Witnesses:

Hugh H. Clegg  
Hugh H. Clegg, Assistant Director  
Federal Bureau of Investigation

Robert J. Lamphere  
Robert J. Lamphere, Special Agent  
Federal Bureau of Investigation

William James Skardon  
William James Skardon, Officer  
Security Service, United Kingdom

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3/6/96 506 AC/J3  
FOIA # 56,261  
C# 75-1121

Wormwood Scrubs Prison  
London, England

I, Emil Julius Klaus Fuchs, a prisoner in Wormwood Scrubs, a penal institution in London, England, do hereby make this statement, freely and voluntarily, with no promises or threats having been made to me, and I have been specifically informed that I do not have to make any statement of any kind whatsoever.

This statement is made to Hugh H. Clegg, who has been identified to me as an Assistant Director, and to Robert J. Lamphere, who has been identified to me as a Special Agent, both being identified as officers of the Federal Bureau of Investigation, United States Department of Justice of Washington, District of Columbia, U.S.A. I am making this statement in the presence of the two aforesaid officers and William James Skardon, whom I know to be an officer of the Security Service of the United Kingdom.

I was born in Russelsheim, Germany, on December 29, 1911, and became a naturalized citizen of the United Kingdom on August 7, 1942. I came to England arriving on September 24, 1933. In May, 1941, I accepted employment at the University of Birmingham in England as a scientist on atomic energy research development. When I learned of the purpose of this research work, I decided and planned to furnish information concerning this work to and for the benefit of the Union of Soviet Socialist Republics, hereinafter referred to as the Soviet Union, and, in order to effectuate this plan, in early 1942 I personally contacted an individual in England, whom I knew to be active in communistic affairs favorable to the Soviet Union. I made known to him my availability and readiness to furnish confidential and classified information and my occupational affiliation which gave me access to such types of information relating to atomic energy research. The person so contacted arranged for me to meet another individual, also in England, whom I later personally met in 1942. On one occasion in 1942 I met this latter individual, known to me as Alexander, at the Soviet Embassy in London, England. During my meetings with Alexander, I furnished to him in 1942 information including written data concerning atomic energy research which I knew to be classified and confidential, and for the purpose of such information being furnished to the Soviet Union as an aid in promoting atomic energy research and

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development in and for the Soviet Union. Through and at the instigation of Alexander, I established personal contact with a woman whose name I do not know and whom I met near Banbury in Oxfordshire, England, sometime in 1942. I delivered confidential and restricted information to this woman, for the continued benefit of the Soviet Union, from 1942 until near the end of 1943. My atomic energy research employment was under the auspices of the British Government.

When I learned in 1943 that I was being officially assigned to go to the United States as a part of an official British Mission to work with the Manhattan Engineer District on atomic energy research development, I informed my contact, the aforesaid woman, of this assignment and she subsequently informed me how to make contact in the United States with an individual for the purpose of continuing my activities of furnishing, for the benefit of the Soviet Union, additional confidential information relative to atomic energy research in the United States. Her instructions were to the effect that I should on a certain day at a specified place in New York City, New York, U.S.A., meet an individual who would be wearing gloves and would have an additional pair of gloves in his hands, while I would have a ball in my own hand. This meeting was, according to her instructions, to be made on a street in New York City at a stated time. If the meeting was not effected initially as planned, a further meeting would be attempted at a designated later date.

In keeping with instructions, I proceeded by ship to the United States with other members of the official Mission from England, arriving at Newport News, Virginia, on December 3, 1943. Within three or four days I arrived in New York City, taking up residence first at the Taft Hotel, later at the Barbison Plaza Hotel, and later at an apartment at 128 West 77th Street. I took up employment as a scientific consultant as a part of the British Mission, assigned to the Manhattan Engineer District, and engaged in research development and activities relating to atomic energy.

As agreed upon during the meeting with the aforementioned woman in England, I went to the designated meeting place on the lower East Side,

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Manhattan, New York City, New York, where, to the best of my recollection, around Christmas 1943, I met an individual at the time and on the day previously agreed upon. He was wearing gloves and carried an additional pair of gloves in his hand and I had a tennis ball in my hand. We exchanged designated identification words and I gave my correct name and he used the name of Raymond in making initial introductions. Raymond expressed his pleasure at being chosen for such an important assignment. He suggested to me to make certain, in keeping future meeting assignments, that I was not being followed. During this or the next succeeding meeting with Raymond, atomic energy and the development of an atomic bomb were discussed by referring to these terms in a general way.

I was motivated in keeping this meeting by a desire to aid the Soviet Union. I considered Raymond's status as an agent intermediary, acting for and in behalf of the Soviet Union in keeping with the plans aforementioned, which were initiated in England.

At and during this first meeting with Raymond in New York City, we agreed upon an early subsequent meeting and the time and place for such meeting, in order that I could furnish to Raymond highly confidential and classified documents or information concerning atomic energy research and development under the control of the Manhattan Engineer District.

A subsequent meeting between Raymond and myself, in keeping with arrangements, was held in Manhattan, New York City, in the vicinity of the Queensboro Bridge approach as we walked under this bridge during this meeting, which was held after dark. This meeting occurred during the early part of 1944.

On another occasion during the first half of 1944, I met Raymond, by prearranged agreement between us, on the street near a subway station, possibly the "Museum" station on Central Park West in New York City. Raymond usually suggested the meeting places, but I believe I suggested this meeting place because it was near my place of residence on 77th Street.

Another time, by prearranged agreement, in 1944 I met Raymond in the Bronx, New York City. This meeting was near a cinema, I believe,

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on Grand Concourse in the vicinity of 159th Street or 161st Street.

I believe I recall another personal contact between Raymond and myself in Queens, New York City, in 1944.

There were held about five or six meetings between Raymond and myself in New York City during the period from sometime shortly after my arrival there in December, 1943, to sometime prior to my departure in August, 1944, from New York City for Los Alamos, New Mexico, for official assignment on the atomic energy project there.

There was one other arrangement for my meeting with Raymond in 1944 in Brooklyn, New York, on a street location near some large buildings and where there was heavy traffic. This designated place may be on Eastern Parkway, but the meeting did not occur as I failed to see Raymond, although I was there.

At all the meetings between myself and Raymond no other person accompanied me and I observed no one who seemed to know Raymond. Most of these meetings between Raymond and myself were arranged by us to occur after dark.

Upon my official assignment with members of the British Mission, on work under the overall control of the Manhattan Engineer District in New York, I, with other scientists, was engaged in a study of the principle of gaseous diffusion related to the development of the production of materials to be used in a proposed detonation of fissionable material.

I, with other scientists, prepared certain highly confidential and classified documents relating to our official assignment and referred to as the MSN Series of documents. There was a total of approximately nineteen such MSN documents prepared prior to my departure for Los Alamos, New Mexico, in August, 1944. I personally prepared about thirteen of these documents. In the process of the preparation of those MSN documents written by me, I would first prepare a draft, then on some occasions they would be sent to my immediate superior for reading, then, in turn, would be routed for duplication. In most instances, however, I would route the draft, which I prepared, directly for duplication. In all instances, when I prepared

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the draft, ~~the duplicated copies~~ and the original draft would be returned to me. ~~I would number~~ Each of the duplicated copies for control and *was numbered* security purposes, due to the highly confidential character of the contents. I would personally retain the original draft, which most of the time I had prepared in longhand, and I personally furnished all of the drafts of my own composition directly to the individual known to me as Raymond, with the intent and purpose that he serve as an intermediary in the eventual transmittal of such secret documents to and for the benefit of the Soviet Union. These documents were at times folded and at other times in package form and were delivered personally by me in groups of one or more at most of the aforementioned prearranged meetings, after the initial contact meeting which I had covertly with Raymond in New York City during 1944. *K.F.*

Also during my meetings with Raymond, as above mentioned, in New York City between December, 1943, and August, 1944, I furnished to Raymond confidential, classified official information, which had come to my knowledge by virtue of my official employment on work under the overall control of the Manhattan Engineer District, as follows: Oral information that there was to be built somewhere in the Southeastern part of the United States a large production plant or establishment to be engaged in the production of fissionable material, utilizing the gaseous diffusion process and the electro-magnetic process in such production; oral information as to officers and identities of leading research personnel as known to me at the gaseous diffusion research establishments under the Manhattan Engineer District in New York; information in writing, from time to time during these meetings between myself and Raymond, concerning the overall and general effort and activities already made and then being made, as this knowledge became known to me in connection with my own work, relative to the production of fissionable material and its potential use as an explosive in the war effort; general information in writing about the membranes and their composition, and, although I did not know the technical details, the general information was official, confidential and classified.

In keeping with official instructions received by me, I was transferred to Los Alamos, New Mexico, where I arrived on or about August 14, 1944, for work on the atomic energy project there under the control and overall supervision of the Manhattan Engineer District. At Los Alamos I was provided a place of residence on the United States Government restricted area in a dormitory and took up employment as a physicist in the Theoretical Division

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of the Laboratory. By virtue of my work, my associations in connection with my work and the availability of confidential and classified official documents, I developed, received and had access to confidential, classified information of an official character. My work while in Los Alamos was concerned with a certain highly classified aspect of the method of detonation, various implosion designs, the theory of the jets in connection with implosion, and similar confidential work as an expert physicist. I remained in such employment at Los Alamos until about June 16, 1946. During this period of official employment I made a visit to the home of my sister, Mrs. Kristel Heineman, and her husband, Robert Heineman, on Lakeview Avenue, Cambridge, Massachusetts. I arrived at my sister's home on or about February 13, 1945, and remained there on a visit until about February 22, 1945. While there, and shortly after my arrival, I was visited by the aforementioned individual known to me as Raymond. Raymond met me in my sister's residence and there was a brief visit. He asked for additional up-to-date information and I told him I would prepare in writing details of bomb construction and other technical details of this research work. I knew from my previous conversations with Raymond that he was not qualified to understand most of the technical information which I possessed, so I agreed to prepare a written statement containing such information. ~~A~~ within a few days thereafter, by prearrangement and agreement made at the home of my sister as to time and place of meeting, I did meet Raymond in Boston, Massachusetts, at a place fairly near the Charles River and near a large public-type of building, reasonably close to what is known as North Station. There and then I delivered to the individual Raymond a written statement, which I had prepared in longhand and consisting of about six or more pages, in which I had set forth confidential and classified information and data dealing with the whole problem of making an atomic bomb from fissionable material as I then knew the problem and the agreed upon, as well as prospective plans as then known to me. There was in this same document, written by me and delivered by me to Raymond, information as to the principle of the method of detonation of an atomic bomb; some information known to me as to the type of core; the principle of the lens system, which had not yet at that time finally been adopted; the size as to outer dimension of the high explosive component; the possibility of making a plutonium bomb; most of the information which was then known as to implosion; the fact that a high explosive as a type of compression was considered, but not entirely decided on; the difficulties of multiple point detonation as this was a problem on which I was working;

*These arrangements were made without the knowledge of my sister and her husband, who were not present and during my discussion with Raymond and had no knowledge of its purpose.*

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the highly spontaneous fission rate of plutonium 240; the comparative critical mass of plutonium as compared with uranium 235; the approximate amount of plutonium necessary for such a bomb; the current ideas as to the need for an initiator. I wrote this statement in English and in technical language, which, I believed, could be understood by advanced physicists in the Soviet Union, for whose use and purpose I prepared this paper.

During this covert meeting between Raymond and myself in Boston in February, 1945, we made an agreement and arrangements for a meeting between us to be had in June, 1945 at Santa Fe, New Mexico.

I returned to my work at Los Alamos, New Mexico, arriving there on or about February 25, 1945. In keeping with the aforementioned agreement and plan made in Boston, I met Raymond in Santa Fe, New Mexico, in June, 1945. This was a short time before the Trinity explosion test. Raymond indicated that, due to his other employment, he had difficulty in finding an opportunity to come to Santa Fe. We met, as per arrangements, on Alameda Street where it lies alongside the river. Adjacent to this street is a number of trees and benches. I went for the car I was using, picked up Raymond and we drove across the river bridge, turned into a lane which ended at a gate in an isolated place, and there we continued our meeting. I delivered to Raymond confidential and classified written information in a paper or document, which I had personally written in longhand. Included in this written paper were the following items of confidential, classified information: A full description of the plutonium bomb, which had been designed and was soon planned to be tested at Alamogordo; a sketch of the bomb and its components with important dimensions indicated; the type of core; a description of the initiator; details as to the tamper; IBM calculations; and the method of calculating efficiency. I orally informed Raymond, while we were in the car at the time and place indicated, the names of the types of explosives to be used in the bomb; the fact that the Trinity test explosion was to be made, with the approximate site indicated, soon in July, 1945, and that this test was expected to establish that the atom bomb would produce an explosion vastly greater than TNT and the comparative estimated force of this explosion was indicated in detail with relation to TNT. All of the information given and delivered by me to the individual known to me as Raymond, as above set forth, both orally and in writing and in the form of a sketch, was known by me to be highly confidential and classified and pertained to the principle, production, calculated effectiveness, testing

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and the development of an atom bomb. As I knew that the United States of America and the United Kingdom were allies and both at war with a common enemy at the time, I recognized and knew that the information, sketch, writings and documents delivered by me personally to the individual known as Raymond related to the national defense and the war effort. In the preparation of some of the written material, in addition to my knowledge and recollection, I referred to official files and documents of a restricted, classified type in the records of the atomic energy project at Los Alamos. This was done certainly in the preparation of the written information delivered by me to Raymond with reference to the special method of detonation, ~~certain highly technical and confidential data with reference to the treatment of the active core~~; the IBM calculations and the results of efficiency calculations. <sup>H.F.</sup>

At this meeting in June, 1945, between Raymond and myself at Santa Fe, we planned and agreed upon a further meeting to be held in Santa Fe, New Mexico, in, I believe, September, 1945. In keeping with these plans, I met the same individual Raymond again in September, 1945 at Santa Fe, New Mexico.

En route by automobile to Santa Fe for this planned meeting with Raymond, I stopped somewhere on the way in the desert, drove off the highway to a solitary place, and wrote a part of the written paper or document which I planned to deliver to Raymond and which contained highly confidential, official and classified information relating to national defense, to the preparation of improved weapons of warfare and secret processes relating to the production and efficiency of such weapons. The said written paper or document, which I prepared in longhand, contained confidential, technical, classified information as follows: The results of the Trinity test or Alamogordo atom bomb test explosion; technical work on the initiator; information as to the preassembled core; a special phase of plutonium, and the uses of a special secret alloying constituent. All of this written information I gave to the individual known to me as Raymond, in keeping with prearranged plan and with the intention that Raymond would act as an agent in the transmittal of all such information and data to and for the use and advantage of the Soviet Union in the research, development and construction of an atomic weapon in, by and for the advantage of the Soviet Union.

I have been shown by Assistant Director Hugh H. Clegg and Special Agent Robert J. Lamphere photographs of an individual which these officers of the

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Federal Bureau of Investigation have informed me were the photographs of an individual by the name of Harry Gold and I have seen these photographs and positively identified them as the photographs of the aforementioned person known to me as Raymond. I was also shown a projection of a moving picture film by these same officers of the Federal Bureau of Investigation which I have positively identified as the moving picture projection of the aforementioned individual known to me as Raymond, and these same officers have informed me that these were the projected moving pictures of one Harry Gold. These pictures or photographs were of a person identical with my contact agent of the Soviet Union in the United States of America.

I received suggestions from Raymond during the aforesaid meeting he had with me in Santa Fe, New Mexico, that, since I was to return reasonably soon to England to continue my atomic research and scientific activities with reference to atomic energy there, I should arrange to meet a certain individual on a given date and at a specified time in the vicinity of Mornington Crescent, London, England, for the purpose of continuing to furnish, through this individual as an agent of the Soviet Union, additional confidential, classified information, in order that such information might in the future, following my return to England, be transmitted to and for the advantage of the Soviet Union. Due to information which I received through public printed sources relative to alleged Soviet espionage activities in Canada, I decided not to run the risk of making the contact which had been suggested to me by Raymond prior to my departure from the United States, but, on my own initiative, I sought out other contacts which might be used for a similar purpose.

I returned to England in the summer of 1946 and took up employment in the atomic research establishment at Harwell, England. After my return to England, I was again in contact with persons whose real identities I do not know, but whom I contacted with the intent of furnishing to the Soviet Union information concerning atomic research developments. To these persons I furnished additional information concerning atomic research which had come into my possession, both in the United States and England, including information relating to certain research being made on the problem of detonating a <sup>hydrogen</sup> bomb. My last contact in this respect was in February of 1949. <sup>A.F.</sup>

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