

"History"
from 3 b.s. 15

Not included
in Bailyn
collection.

History

Metallurgical Laboratory

October 9, 1942

A. H. Compton

L. Szilard

Your note concerning engineering of bismuth cooled plant, October 7, 1942.

You suggested in your note that I recommend to Mr. Moore, by Friday of this week, an engineer who could take the responsibility for designing a bismuth cooled plant and with whom I could work to advantage. I have therefore asked J. Cooper to look, on my behalf, for such a man within the current organization. I found that Mr. Cooper was embarrassed by this request because he had already been requested by Mr. Moore to look for such an engineer on Mr. Moore's behalf. In the circumstances I am at a loss how to proceed in this matter. I also doubt that I can find a first class engineer who, in my opinion, can carry the full responsibility for designing the bismuth cooled plant and who would be willing to work under another engineer's direction, as suggested in your letter.

Frankly I am uncertain whether or not I am able to accept the assignment of acting as a consultant to Mr. Moore on the design of this plant. I wish however to discuss this matter with Wigner, Christy, Young, Creutz and Anderson before giving you my final decision.

While I see very strong reasons against putting all our eggs in one basket, and have Mr. Moore responsible for the development of three different types of plants on the ground that one of these three jobs is about as much as a man can tackle, I realize that you might have some very strong reasons overriding this consideration. If so, I would very much like to learn of those reasons before I proceed further with this matter.

L. Szilard

Metallurgical Laboratory

October 7, 1942

Mr. Leo Szilard

A. H. Compton

Engineering of Bismuth Cooled Plant

In accord with instructions from General Groves, I have requested Mr. Moore to proceed at once with the engineering of a bismuth cooled power plant.

May I ask you to act as consultant to Mr. Moore on the design of this plant. One of the most useful things you could do now would be to recommend to him by Friday of this week an engineer with whom you could work to advantage and who under Mr. Moore's direction would have the immediate responsibility for designing the plant.

In accord with the directive which I have been given by General Groves, the immediate objective is to design a plant that can be ready for operation by June 15, 1943. We have in mind the dissipation of roughly 100,000 kw. This figure is, however, flexible if there should arise important advantages in a plant of larger or smaller capacity.

In case it should appear impracticable at this time to design a bismuth cooled plant to be ready by June 15, work on such a plant will cease to be of the greatest urgency. Interest in it will nevertheless continue both as a possible plant for large capacity and as a possible means of utilizing the power that is developed. Studies aimed toward such developments would be continued.

KT

cc: Mr. Moore
Mr. Allison
Mr. Doan

All embles has heavy under - the under
 heterogenous underpines. - The Ge
 14th of May Paris is lost to go
 (part of April & could be best
 pronounced (backing) over sections)

Mount de Or / order of revision
 subject moved / month later
 journals under Paris June 15th

Jan 17 Dantzig's advice sends Helian
 Kuvostin to Bordeaux - subject stays
 to see Dantzig; workshop 2000 for each of
 Ruffalk & ... / 600 capacity
 150 all who wanted bags / Bordeaux
 null / 3 days must for more programs

J.P. Hansson

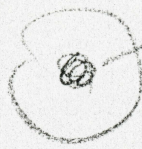
Achcraft (Machell)
 Peaves (Luna) & others
 Finnan (Jungendberg)
 J.P. Hansson no chain

H. Nelson 43:94 left
 between the 2 chance

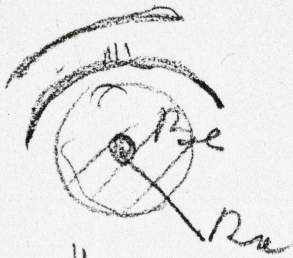
C, Be, the
 (line)
 Kumpson & Co main because singles
 Manteleser & Co // Canada

Robert; Holm's paper

eyes membrane. evidence



light brown etc



Proof of
Horsbar

100 m / 300 m

1 day + 6 days

7 days

CS₂ (up)

to paper

heterogeneous Brown - Halban often
certain heavy water etc

1937

August [Perman paper

September Halban color cubes
inhomogeneous mixture

Oct Nov news heterogeneous

Dec. 30 Grenville Ptosis
of graphite subjected to 0.006
concentration slightly
better than makes

Notes to have metal absence
of oxygen this substitutes for them
makes ~~the~~ country under
the ornaments (see 1934 or Jan 1946)
(no struggle!) Melby wants
to throw out Hallam & Kaworski

would you not replace them w back when
Gibbs reply about Feb 1st secret service
~~through~~ through Bureau order
placed in many contracting has made
of 2nd order months. - Hallam, Kaworski
in February Porterholes (England) with
middle of February Port
South France, - Belle Isle (Portsmouth)
3 weeks - Jul 1st holiday Grenville
order of mission geological work
under guard (morning) 1 week to
reach country. - Water 160 liters

middle of March 5-6 bars
of graphite on order
bars, Subgrade absorption
inspiration subgrade

365 1-

THE UNIVERSITY OF CHICAGO

DATE April 24, 1944

To Mr. L. Szilard

DEPARTMENT

FROM Mr. E. P. Wigner

DEPARTMENT

IN RE:

In the past the administrative arrangements of our Project have often been strongly criticized. It was often said *that* decisions are taken without proper consultation with those members of the Laboratory who know most about the questions involved and that the decisions taken were as a result recognized to be erroneous by members of the Laboratory at the time they were taken. I think this last sentence quotes you verbatim.

It seems to me that if such a criticism is made it is imperative to keep our own record clear and not to let it happen that information or suggestions which are promised or which should be forthcoming as a matter of course be delayed indefinitely.

This however is the situation with respect to your conversation with Dr. Bush. As I understand it, this conversation was not finished and he could have rightly expected further reference from you to it. By delaying such reference you give the impression that members of the Laboratory cannot be trusted to give prompt reactions and they cannot be counted upon as collaborators in administrative matters. It is hardly necessary to emphasize the damage that is done by such procedure to the standing of all members of the Laboratory who are interested in the general policies of the Project.

E. P. Wigner

EPW:s

Young

September 25, 1942

From: L. Szilard
To: J. C. Stearns
Re: Monday Conspiracy

LIMITED

Dear Stearns:

I have thought a little bit more about the question in what way we would get the Technical Committee to take a more active role in the direction of our work and I feel that I ought to report to you these considerations. You may then find out whether the general attitude represented by them corresponds to the temper of the "conspiracy" which was gathered under your chairmanship last Monday.

Let me start off by saying what I think we should avoid. I think we should avoid any formal reorganization. I believe that Fermi should remain chairman of the official Technical Committee. In the past, whenever Fermi felt that he wanted to call a meeting, he called a meeting. This did not happen very often. It usually happened only when Fermi felt that the situation was so desperate that it had to be met by a "desperate" measure. These meetings were rare but they were quite successful. The last meeting of this type we had when it turned out that Alexander's metal was impure. Fermi called a meeting and we decided to ask Ruhoff to go to Beverly and stay at Beverly. This was entirely a decision of the Technical Committee; at first, when it was presented after the meeting, Compton had some misgivings but the recommendation was finally accepted. I see no reason why this procedure should be changed.

It is true that in addition to those cases when Fermi felt that a meeting ought to be called, there are many cases where others feel that a number of decisions ought to be taken which are not taken. The question

is, how can we arrive at those decisions and see to it that the decisions are carried out? A necessary condition is that if a decision is reached, it should be formulated in writing, and the signatures of the members of that Technical Committee should be attached to it.

This purpose could be achieved in various ways. It could be achieved, for instance, by means of a large number of individual conversations and telephone calls. This is possible, but impracticable. I would much rather see it handled in the following way:

If anybody in our organization feels that he is frustrated in his work, or that trouble will arise in the future because an issue is not properly discussed and decided, he should persuade one of the members of the Technical Committee that the question should be taken up by the members of the Technical Committee. I intend to propose to the members of the Technical Committee that we should ask two persons who were so far not associated with the Technical Committee to serve as "aids" and assist the members of the Technical Committee in this work. Any of our research men who prefer to approach these "aids" rather than a member of the Technical Committee can do so and a recommendation made ^{by} either of these "aids" should have the same effect as a recommendation made by any individual member of the Technical Committee.

Either of these two "aids" or any other member of the Technical Committee can gather in an unofficial meeting as many of the members of the Technical Committee as he can persuade to come. Whoever is thus responsible for calling such an "unofficial" meeting of the Technical Committee can take the chair himself or ask anybody of his choice to take the chair. Only certain days of the week, for instance, on Friday, 2: P.M., should there be a longer meeting of this sort. If the meeting

is to be held on any other day it should be held at 2 o'clock, and should, as a rule, not exceed 15 minutes. Whoever is responsible for the meeting will have little chance to end up with a written recommendation which carries the signature of the members of the Technical Committee unless he has prepared the meeting by informing the prospective participants 24 hours ahead just what he intends to discuss. For important decisions it may be advisable to have a week's notice. I do not propose that these should be rules. I merely say that the chances for ending up with a useful recommendation would be greatly enhanced if such an advanced notice were given.

There may be a divergence of opinion just how much time each of us should spend in meetings and similar activities, in order to get the necessary decisions. I personally feel that even if I wasted one hour a day by sitting in at meetings, if this would result in a material improvement in the mechanism of reaching decisions, I would prefer to waste an hour a day to the situation which we have had in the past, when we wasted months for lack of direction and decisions. However, this is for every man himself to decide, and I believe that if some member of the Technical Committee does not wish to spend much time in meetings, it will still be possible to keep him informed of what is going on by means of those two "aids" of the Technical Committee, whom I think should be asked to help in this task. They could explain to the members who were absent just what the discussion was about, what point had been reached, and if, then, any of these members of the Technical Committee feels that he cannot add his signature to the recommendation which has been adopted, he is free to ask for an "official" meeting of the Technical Committee under the chairmanship of Fermi. Such an official meeting will then be attended by all members of the Technical Committee.

-2-

If any of us should turn out to be a busybody, who calls meetings unnecessarily and without proper preparation, he will soon find that most of the other members of the Technical Committee remain absent from the meetings which he calls, and he will soon realize that his meetings serve little purpose, since he will still have to see the members of the Technical Committee individually in order to get their signatures which are necessary for an official recommendation.

It is also in my mind that if in the course of time, after having seen various members of the Technical Committee and either of the two "aids" act in the chair at meetings, we might find that one or the other is suitable and willing to act more and more in this capacity, and finally, the Technical Committee might ask him to devote his full time to this activity. I do not think it would be wise to make such a request to anybody at the present time. Perhaps the one or the other "aids" of the Technical Committee might turn out to be the best candidates for this type of activity some time in the future.

I wish to use this occasion to make a plea to all those who were assembled last Monday. If there is anybody among us who does not believe the chances for putting our house in order are good enough to make it worthwhile to try it and try hard, will he then regard himself as an honorary member of those Monday gatherings? His presence is most welcome, and he can help to keep the "conspiracy" informed of what is going on in the Technical Committee and the Planning Board. Will he give a chance to the rest of us to try to see what we can do?

A question has been raised by Zinn last Monday which I now believe is capable of a satisfactory solution. But before putting

forward a specific suggestion it is perhaps useful to try and clarify a more general question. It seems to me that the men who assembled last Monday, under your chairmanship, should not think of themselves as an illegally constituted "Senate" or "House of Representatives" of the Project, but rather as a "party" or, if you wish, a "conspiracy". We are all agreed, I believe, that if it is a "conspiracy" it should be an "open conspiracy".

We have to gather those who are more or less agreed on the main aims to start with, and we cannot gather in one meeting too many if we want to have a really democratic discussion in which every man may make a full statement of his views. The most important point is that we should be able to reach decisions and act upon these decisions. The consideration not to hurt anybody has to be secondary to this aim. We can resolve, however, not to hurt anybody unnecessarily, and in this spirit I wish to make the following proposal:

Let us have two meetings each week. Those who met last Monday should meet every Monday, and the other group leaders about equal in number should meet every Tuesday. Mr. Stearns and members and "aids" of the Technical Committee should keep the Tuesday gathering informed just as well as they should keep the Monday gathering informed about what is going on. From any formal point of view at least then there will be perfect equality, and in a week or two difficulties in character and temper of the two gatherings may disappear. It means additional work for Mr. Stearns and some members of the Technical Committee, but if we are not willing to put in additional work there is no hope for us and we may as well give up.

History

36.3. 15

Metallurgical Laboratory

October 9, 1942

A. H. Compton

L. Szilard

Your note concerning engineering of bismuth cooled plant, October 7, 1942.

You suggested in your note that I recommend to Mr. Moore, by Friday of this week, an engineer who could take the responsibility for designing a bismuth cooled plant and with whom I could work to advantage. I have thereupon asked Mr. Cooper to look, on my behalf, for such a man within the Dupont organization. I found that Mr. Cooper was embarrassed by this request because he has already been requested by Mr. Moore to look for such an engineer on Mr. Moore's behalf. In the circumstances I am at a loss how to proceed in this matter. I also doubt that I can find a first class engineer who, in my opinion, can carry the full responsibility for designing the bismuth cooled plant and who would be willing to work under another engineer's direction, as suggested in your letter.

Frankly I am uncertain whether or not I am able to accept the assignment of acting as a consultant to Mr. Moore on the design of this plant. I wish however to discuss this matter with Wigner, Christy, Young, Creutz and Anderson before giving you my final decision.

While I see very strong reasons against putting all our eggs in one basket, and have Mr. Moore responsible for the development of three different types of plants on the ground that one of these three jobs is about as much as a man can tackle, I realize that you might have some very strong reasons overriding this consideration. If so, I would very much like to learn of those reasons before I proceed further with this matter.

L. Szilard

History

Metallurgical Laboratory

October 9, 1942

A. H. Compton

L. Szilard

Your note concerning engineering of bismuth cooled plant, October 7, 1942.

You suggested in your note that I recommend to Mr. Moore, by Friday of this week, an engineer who could take the responsibility for designing a bismuth cooled plant and with whom I could work to advantage. I have therefore asked Mr. Cooper to look, on my behalf, for such a man within the current organization. I found that Mr. Cooper was embarrassed by this request because he had already been requested by Mr. Moore to look for such an engineer on Mr. Moore's behalf. In the circumstances I am at a loss how to proceed in this matter. I also doubt that I can find a first class engineer who, in my opinion, can carry the full responsibility for designing the bismuth cooled plant and who would be willing to work under another engineer's direction, as suggested in your letter.

Frankly I am uncertain whether or not I am able to accept the assignment of acting as a consultant to Mr. Moore on the design of this plant. I wish however to discuss this matter with Wigner, Christy, Young, Creutz and Anderson before giving you my final decision.

While I see very strong reasons against putting all our eggs in one basket, and have Mr. Moore responsible for the development of three different types of plants on the ground that one of these three jobs is about as much as a man can tackle, I realize that you might have some very strong reasons overriding this consideration. If so, I would very much like to learn of these reasons before I proceed further with this matter.

L. Szilard

Metallurgical Laboratory

October 7, 1942

Mr. Leo Szilard

A. H. Compton

Engineering of Bismuth Cooled Plant

In accord with instructions from General Groves, I have requested Mr. Moore to proceed at once with the engineering of a bismuth cooled power plant.

May I ask you to act as consultant to Mr. Moore on the design of this plant. One of the most useful things you could do now would be to recommend to him by Friday of this week an engineer with whom you could work to advantage and who under Mr. Moore's direction would have the immediate responsibility for designing the plant.

In accord with the directive which I have been given by General Groves, the immediate objective is to design a plant that can be ready for operation by June 15, 1943. We have in mind the dissipation of roughly 100,000 kw. This figure is, however, flexible if there should arise important advantages in a plant of larger or smaller capacity.

In case it should appear impracticable at this time to design a bismuth cooled plant to be ready by June 15, work on such a plant will cease to be of the greatest urgency. Interest in it will nevertheless continue both as a possible plant for large capacity and as a possible means of utilizing the power that is developed. Studies aimed toward such developments would be continued.

KT

cc: Mr. Moore
Mr. Allison
Mr. Doan

31
November 25, 1942

A. H. Compton

L. Szilard

Compartmentalization of Information and the Effect of Impurities of 49.

We had repeatedly discussed, in an abstract way, the harmful effects of compartmentalization of information. In view of the present interest in the effect of impurities of 49 I should like to put on record for your information the following facts:

I realized this summer that the strong α emission of 49 would lead to a strong neutron emission from impurities which are expected to be present. Upon Teller's return from the summer conference in Berkeley, I went to see him and asked him whether this point had been considered and whether, in view of this fact, it would not be wise to put more emphasis on autocatalytic methods of explosion which I had discussed with him in the past. Teller replied that he personally is placing considerable emphasis on the autocatalytic method, *but that the group did not consider it as important.* Teller, as you know, is an old friend of mine and I found him occasionally embarrassed when I tried to discuss with him things which he did not feel free to discuss with me. For this reason I interpreted his reply as meaning that the situation was well in hand, and that there was no need for us to discuss it. Consequently, I changed the subject of our conversation and did nothing further in the matter. Teller, on the other hand, as it now turns out, interpreted my changing of the subject as meaning that I was going to look into this question, and that it was not necessary for him to do anything about it.

I believe this illustrates well under what strain the scientists are being put, and how compartmentalization of information poisons the discussion, even in those fields which are not explicitly excluded from discussion.

I do not believe that the question of impurities in 49 should be taken tragically, but it is a fact that if Teller and I could have talked freely, the question would have been raised three months ago, immediately following the summer conference in Berkeley.

L. Szilard

CC: E. Teller

All embryos has hairy mother - ha mother
heterogeneous measurements - the he
14th of May Paris is lost ^{the sea}
(1st of April of unidentified
phenomenal (backing))

Mont de Or / order of revision
sold at auction / month later
January under Paris June 15th

Jan 17 Bantoy's advice sends Nelson
Kunowitz to Bordeaux - I'd at steps
to see Bantoy; but shop soon for each of
Ruffalk & unidentified / 600 capacity
150 all who wanted bags / Bordeaux
will / 3 days must for more programs

J.P. Thompson

Cochran (Bretton)
Peters unidentified
Finman unidentified
J.P. Thompson no chair

B. Nelson 43:94 left
between the 2 chance

C, Be, Bro
Kunowitz no main unidentified singles
Mantel no // unidentified

Hogston

Apr 27th 1940 meeting

Colonel Adamson
Commander Harver

Oct 11 Suchs wrote
to P.S.R. os

May 10 a meeting
Dr. Suchs's letter to P.S.R. Hubert
May 11

May 14 report to Suchs
by Repram on pr,
dbs,

July 18 - 1941
Wray - to Suchs calling
off
inhibit in

June 15 1940
Letter ~~to P.S.R.~~ to P.S.R. - ~~Hubert~~

His long

*Compton
not sent*

Aide Memoir

October 30, 1942

L. Szilard

The following is a record of some of the conversations which I had with A. H. Compton in the course of this week. This record is prepared from memory and has the purpose of clarifying my relationship with the Metallurgical Laboratory. It is meant to explain my reasons for changing this relationship and to define the basis upon which a new relationship can be built.

Monday, October 26th, Compton asked to see me. I assumed that the purpose of the interview was to discuss the organization of the engineering work since I shortly before received a memorandum from him which dealt with this subject. I told Compton that it was my understanding that Lewis from M. I. T. had been asked by him to take charge of the engineering work and that accordingly I felt that the decision of this subject might be postponed until there was a chance to see what ideas Lewis had on the subject but that I could state right away in what way I felt I could be most useful in connection with the development of the bismuth cooled power unit. This was what I proposed:

Creutz's present group should be used both for the technological work both on the bismuth cooled and water cooled power units and requests for specific work should come to him from me and from Wigner. Mr. Foote should be added to this group so that metallurgical experiments on bismuth cooling could be performed. In addition to this I wanted to have the help of from one to three engineers and two draftsmen and I proposed that I would take charge of the work of these men and prepare designs following step by step the technological work on the bismuth cooled power unit. I further proposed to keep Mr. Moore and Mr. Lewis or any of the other engineers informed of the development of these designs. This would serve the purpose that if they are able to improve on these designs or move faster towards a process design, they should be able to go ahead

and perhaps produce a finished design before I am ready to submit my own design. Nevertheless my own aim would be to end up with a process design somewhat more detailed than the Moore-Leverett design of the helium cooled unit.

Mr. Compton replied that in his opinion this arrangement would not work and that my presence in the laboratory would make it very difficult for him to organize the collaboration of the physicists with the engineers and other matters in the laboratory. He therefore asked me to leave Chicago and perhaps to go to Columbia and work there in loose connection with the Chicago laboratory. He proposed that upon the expiration of my present contract with the University of Chicago January 1, 1943 another contract would be made with me that would secure me an adequate salary. Finally, he asked me to arrange matters so as to leave the Metallurgical Laboratory within 48 hours so as to make it easier for him to reorganize the technological division and make other corresponding changes in the organization.

My reply was that my work if carried out in New York could be of very limited value only and whatever salary I received would have to be considered as a sort of a pension. Since this pension would then be paid to me for services which I had rendered in the past it would seem more logical that I should apply for a patent for the inventions which I made and which I submitted to the government before I was on the O. S. R. D. payroll and that in place of a pension I should receive a royalty from the government in consideration of the use of the inventions ^{described} ~~designed~~ in the proposed patent applications.

Wednesday, October 28th I saw Compton again and he proposed to let me have an independent organization for developing the bismuth cooled power unit which would be set up at Illinois Institute of Technology in Chicago. He said he was considering to let me have Creutz and Foote and perhaps others from the Metallurgical Laboratory and I could take on engineers and draftsmen and work on a design for the bismuth cooled power unit. I would remain on the Technical Committee and keep in general contact with various groups within the Metal-

lurgical Laboratory. He was not certain whether work on the bismuth cooled power unit would be carried on at all within the Metallurgical Laboratory.

My reply was that there are two sets of reasons why I could not accept this proposal: The first and minor set of reasons is the following: There can be put forward various reasons for my going into ["]exile in the manner which he proposed, but I am unable to accept as valid any of these reasons which were ~~put forward and which were~~ tentatively ^{mentioned by way of going in the} as possible reasons for the proposed exile ^{belonging} by various members of our project. If my presence in the Chicago laboratory caused trouble or lead to friction such trouble or friction would ^{continue} ~~still arise~~ since I would still take part in the committee meetings where controversial issues are discussed.

The second and major set of reasons for not accepting the proposal is the following: I understand that at various times my views prevailed on organizational question which were connected with our work and that these views were incompatible ^{with} ~~to~~ the way in which Compton wanted to see the work organized.

One specific example for this was the organization of the Technological Division. The creation of this division was originally proposed by me in the research committee composed of Allison, Fermi, Wigner, and myself. Compton was in agreement with the necessity of setting up such a division, but he had in mind to put Wollan in charge. For some reason or other Compton put me in charge of the Technological Division but the work of this division was then not given full support and the men taken away from this division were not replaced.

Another specific example was the unfavorable effect of my activities in the laboratory upon the functioning of an executive committee which was appointed by Compton and which was composed of Allison, Doan, Fermi, and Moore. I knew nothing of the existence of such a committee though I heard that it was planned to have monthly meetings between representatives of our laboratory, Stone-Webster, DuPont, and the Army, and that the above-mentioned members of our laboratory were designated to act as representatives of our laboratory.

Hastory

Apr 27th 1940 meeting

Colonel Adamson
Commander Harver

Oct 11 Sachs wrote
to P.S.R. : os

May 10 arrangement
Dr. Sachs's letter to P.S.R. dated
May 11

May 14 report to Sachs
by Repram au pr
WBS

July 18 - 1941
Wray - to Sachs calling
off
inhibition

June 15 1940
Letter to P.S.R. by Wray - [unclear]

History

CONVERSATION WITH HALBAN

2-3-44

L. Szilard

On the basis of Hahn's first paper it occurred to Joliot that neutrons may be emitted in the interaction of neutrons with uranium and that this might lead to a chain reaction. He tried to demonstrate this by surrounding a piece of uranium with a radium-beryllium source in the center with a layer of ethyl bromide separate the radioactive bromine by means of the Szilard-Chalmers process and compared the intensity of the bromine activity in the presence and absence of uranium. No conclusive results could be obtained this way and Joliot turned to demonstrate the existence of fission by catching the fission products emitted from a thin layer of uranium oxide which is exposed to a photo neutron source.

In the meantime Halban began to urge Joliot to let him organize more adequate experiments for determining whether neutrons are emitted in fission. Halban used a photo-neutron source of 100 millicurie uranium and measured the thermal neutron density as a function of the radius in a uranium nitrate solution. A primary measurement completed in one day indicated a positive effect (Joliot goes on vacation) and further measurements are carried out during the following week with 300 millicurie confirmed this. A letter was then sent to the editor of Nature.

Subsequent experiments he used photo-neutrons interactive with uranium were shown capable of inducing the n, p reaction in sulphur, in carbon bisulfide.

Second paper by Halban, Joliot, Kolarsky contains a more thorough discussion of the first experiment published in NATURE.

_____ and Halban discuss such things as using a heterogeneous mixture of uranium oxide and water and also other slowing down materials such as carbon and heavy water. In August the experiment later published by Halban, Joliot, Kovarsky and _____ is performed. In September Halban calculates in homogeneous mixtures of water and uranium oxide. In the meantime the war broke out and in October measurements are started on heterogeneous mixtures of water, uranium and oxide. In December an experiment is performed on 8 tons of graphite for the purpose of measuring the absorption of carbon. This leads to a feeling that carbon is only slightly better than water. It is realized that metal is an advantage over uranium oxide because there is no slowing down in the metal due to collisions with oxygen. These carbon lead to shift in the main interest in the direction of heavy water.

Joliot visits Dautry in December or January and finds immediate response. He is told he made a mistake not to come earlier. The Army wants to get rid of Halban and Kovarsky and Joliot is asked if he could replace them or add some Frenchmen who could gradually learn the subject and displace Halban and Kovarsky. Joliot replies that he hopes gradually to learn the subject himself and that he does not propose to add any other Frenchmen to the group. Dautry gives his full support to Joliot and Joliot has unlimited financial resources at this disposal. It is decided to place a contract through the _____ Bureau (secret service) for the total heavy water output of Norway which is expected to amount to 200 liter per month and negotiations are started at once. Halban and Kovarsky are asked through Joliot whether they would be willing to be interned for three weeks during those negotiations.

Halban accepts on the condition that this be the last foolish demand which is made upon him. Halban is sent to Porquerolles (island military post in south of France) in the middle of February and Kovarsky goes to Belle Isle, Brittany. It is suggested that Joliot himself take a holiday in Grenoble to make Halban and Kovarsky feel better about their confinement. When Halban reports at Porque Rolles showing his order of mission it turns out that Porque Rolles has not been notified of his arrival and of the conditions under which he is to be held there so Halban is for all practical purposes under arrest. A guard is put in front of his door over night who keeps him awake by snoring. Next morning Halban asks to see the commander and informs him that unless the guard is at once replaced by a non-snoring one, he will send a telegram to the minister for armaments and refuse all further collaboration with the French command.

Incidentally, the original order of mission stated that Halban was sent to the island for geological survey and this was done in order to give him freedom of movement on the island; since the commander of the island was not notified directly the order or mission was disregarded. It took one week to reach Dautry who was away from Paris and matters were then straightened out.

160 liters of heavy water arrived in the middle of March. At that time about 6 tons of graphite were on order. Tanks were under construction for the experiment with heavy water. The absorption of sulphur was being measured in order to see if a suspension of uranium in heavy water could be used. An experiment was under preparation to make measurements on a heterogeneous mixture of heavy water and uranium oxide (aluminum cubes were made to be filled with heavy water). The absorption of iron and copper was measured.

On the 14th of May Joliot told Halban that Paris must be considered as lost. This was lightening out of a clear sky for Halban, who had not realized at all the seriousness of the war situation. (1st of April unlimited financial backing) Joliot told Halban that he wanted him to set up a new laboratory in the south of France, Mont D'Or. A month later Paris fell and Joliot came to the new laboratory. But two days later Dautry's aide appears and asks Halban and Kovarsky to go at once to Bordeaux with all available equipment and materials and all notes and documents. Joliot stays behind but promises he will visit Halban in Bordeaux. At Bordeaux Dautry tells Halban that this work must be saved and that he must go at once to England. He himself and Joliot refused to leave France.

An 8,000 ton coal ship which was put in charge of the Earl of Suffolk and which could take 600 persons stands by and takes all who want to go. Bordeaux is full of people but only 150 persons can be found who wish to embark. The ship waits three more days for additional passengers but none arrive. Finally as the Germans approach Bordeaux the ship has to leave.

In England there is already a committee under the chairmanship of G. B. Thompson. Halban presents his views to this committee. He talks about the possibility of using 93 or 94 in the slow neutron chain reaction. Considers the possibility of a heterogeneous system of uranium and water; believes that carbon beryllium have a chance but chiefly emphasizes the homogeneous uranium heavy water system which he prefers to the heterogeneous heavy water system.

G. B. Thompson does not believe that a chain reaction can be made with unseparated uranium. At that time _____ had already calculated the atomic bomb based on separated 235 and Simon is considering to start work on the separation of 235.