

## A SHORT HISTORY OF THE LAST YEAR

Shortly after my visit to Bush in June 1942 we learned that the War Department had been given the responsibility to develop the industrial applications of our work and that it was the intention of the War Department to appoint a contractor or firm which would jointly with the Chicago Laboratory have the responsibility for building a power unit for production purposes. While Dr. Compton was discussing with us and others the difficult question which of the firms would be most suited for this task we learned that over the head of Dr. Compton a contract had been placed with Stone and Webster for building a plant and that another contract probably would be placed with Du Pont for the chemical plant attached to the power plant. There was not a single key man in the Chicago laboratory who believed that this three-cornered arrangement with the War Department and Stone and Webster would work. Mr. Wigner and Mr. Fermi were very outspoken about this and so was everybody else whose opinion I learned to value in the light of experience of the past years.

In the meantime, under the auspices of the War Department, a similar experimental unit with an attached chemical plant was being built in the neighborhood of Chicago and a group of engineers originally selected by Murphree from the Standard Oil Company made plans for a helium cooled power unit to be built at a remote site by Stone and Webster.

In September 1942, at the time when the preparations for the



experimental unit near Chicago had gone a long way we were informed that the Executive Committee, under the chairmanship of Dr. Conant, and ~~xxx~~ we assume against the advice of Dr. Compton, decided not to build a chemical plant attached to the experimental unit but to have the chemical plant built at the remote site at a later date. This chemical plant was scheduled to operate by May 1943 and everybody at the Chicago laboratory attached great importance to having it in operation at the earliest possible date. There was not a single man in the Chicago laboratory among the many who spoke to me at that time who did not condemn in the strongest possible terms this sudden change of plan which was imposed upon us apparently for no good reason whatever.

About the end of September General Groves was appointed by the War Department to look after our work. He took the stand that all three cooling systems at that time under investigation should be developed but only such systems should be developed which could be in operation for production in the spring of 1944. At that time I asked that a committee should be appointed to look into the advantages and disadvantages of bismuth cooling but on October 7th Mr. Wigner and I were asked by Dr. Compton to act as advisors to Mr. Moore, one of the Standard Oil engineers, concerning the bismuth and water cooling systems respectively. Mr. Moore was supposed to develop all three cooling systems with the help of a group of engineers whom he would engage.

A little later General Groves decided to try to place a contract with the Du Pont Company for building a power unit and between November 2 and 6 a large group of Du Pont engineers



visited the laboratory. Mr. Wigner explained to them the water cooling system in a talk lasting about one-half hour and I explained to them the bismuth system also in about one-half hour. The helium system was explained to them in great detail by Mr. Moore.

This group after leaving Chicago came to the conclusion that the helium cooled system is the best. Next they placed the homogeneous heavy water system, third they placed the bismuth cooled system, and fourth they placed the system cooled by ordinary water which was sponsored by Mr. Wigner. Somewhat later we heard that Du Pont felt that there was only 1% probability of building a successful unit and that they wanted this to be understood in case they would be willing to take on the contract.

Thereupon General Groves we were told appointed a committee headed by a first rate chemical engineer, Lewis, of M. I. T., but otherwise composed almost exclusively of Du Pont men. This we learned on November 19, 1942 and we were asked to have a report ready by November 23rd. This report was supposed to contain about three pages about the bismuth and three pages about the water cooling. Neither Wigner nor I were heard by the committee on the merits of these two systems. Shortly afterwards we heard that Du Pont was favorably considering to take a contract and intended to build a helium cooled power unit. December 2nd was a black day in the history of humanity, but it is to be feared that it was not the first black day.

In the meantime, under the leadership of Mr. Wigner a detailed report on the water cooled unit was submitted to Du Pont and I heard on January 22nd that it was being seriously considered by Du Pont.



On February 8th Mr. Wigner urged very strongly that both types of cooling, helium and water, should be built. Soon afterwards we learned that DuPont had abandoned the idea of building a helium power unit and would build a water cooled power unit. From that time on intense work was being done at Du Pont on the design of such a water cooled power unit. An offer to send Mr. Fermi to help Du Pont with this work was politely refused. An offer by Mr. Wigner and his group to move to Wilmington and collaborate with this design was declined.

Numerous changes which were thought to be improvements were introduced by Du Pont into Wigner's design, but by the middle of June of this year, after four months of designing work, with few exceptions these changes have again been withdrawn so that the design at present is almost exactly identical with the design submitted by Mr. Wigner and his group.







in Washington a ~~board~~ permanent board of full time experts who have the full confidence of the scientists and to whom the scientists have access at any time. Without such a board the man who is in charge will not be able to pass upon the merits of the recommendations made by the scientists and the firms and will be at the mercy of the firms

At present we have compartmentalisation of information like in secret societies but unlike in as in secret societies we do not have a group in the center who knows everything but rather a group who knows very little.

Consequently we have no sound mechanism for reaching decisions and decisions are taken which we all know to be wrong and which usually lead to a loss of ~~six months or a year~~ <sup>each time</sup> ~~year~~.

List the following <sup>latest</sup> examples

1) the tentative decision taken last fall to concentrate on the He cooled power unit, <sup>reached by a group of all type appointments</sup>

2) the decision to build a 1000 KW <sup>air cooled</sup> power unit rather than to build a 10000 KW water cooled power unit at X. This decision will leave us without a pilot plant and we shall have to build the production plant at W without the benefit of previous experience with a pilot plant. This decision was taken without consulting

Mr Wigner who is the father of the W system and I was so far not able to find anybody <sup>in the Chicago Laboratory</sup> who was consulted about this decision.

3) the decision ~~to submit certain methods for manufacturing P9 to firms other than D~~ <sup>not</sup> taken against Ureys advice to

4) <sup>the postponement of a</sup> ~~the delay in making~~ decision concerning the design of the P9 power unit which has so far led to a <sup>month</sup> delay.



We lack at the center of our organization in Washington a man high up in the WDA man who can act as a full time director and who has a background that would enable him to appreciate the point of view of the scientists and make use of their advice. GG's enthusiasm and his courage in spending vast sums of money must be gratefully acknowledged but a man of his background is not able to make full use of the knowledge accumulated by the scientists. Consequently he is not able to stand up to the firms and his inability to stand up to Dupont is ~~the~~ matter of wide comment. It is manifest that <sup>abilities</sup> GG does not have the full confidence of the scientists, though many of us agree ~~are willing to say~~ that "he is as good as a man of his background ~~and~~ can be expected to be "



What would help us would be a full time director in charge of this work who has a background very different from the usual background of military men and who has the full confidence of the scientists. This man of ~~course~~ would have to be given a high rank in the War Department and could <sup>perhaps</sup> ~~usefully~~ collaborate with General Groves provided <sup>it were for</sup> he ~~would~~ rank above him. ~~It would be~~ <sup>quite</sup> necessary for such a man to have a board <sup>full time</sup> of experts to advise him. This board ~~of course ought to~~ <sup>could</sup> include Compton, Urey, Lawrence, and Oppenheimer, but it <sup>seems</sup> ~~would be necessary~~ that most of the members of the board <sup>ought to</sup> should reside in Washington in order to be able to keep close touch with the War Department. If these experts had the full confidence of the scientists and would keep in close touch with them they would be able to decide controversial issues of a technical nature and advise the War Department accordingly. Then it would be possible for the government to run these projects <sup>instead of letting the business</sup> ~~as they should be run.~~ <sup>run them.</sup>

If you should study the history of the past year you would find that a number of avoidable mistakes were made which lead to a loss of four to eight months. When I say avoidable mistakes I mean mistakes which were clearly recognized as such by the scientists at the time when they were made. In <sup>many</sup> ~~most~~ of these cases there <sup>may have been</sup> ~~was a~~ clear recommendation on the part of Dr. Compton and Dr. Urey and these recommendations <sup>may have been</sup> ~~were~~ disregarded.

If I may remind you of an earlier case of this sort <sup>illustrate how such a blunder goes</sup> ~~which you can judge from your own experience~~ I might mention Dr. Compton's request to you early in 1942 when he asked to be given authority to make provisions about the purification

No course attached to the project

P.T.D.



*O am sure you can not blame* 7  
*at any time excepting*

and production of our materials. You refused him this authority and I am sure that you cannot blame him for having accepted your refusal. In such cases there is always a question which is the lesser evil, to accept the decision which ~~one~~ <sup>one</sup> knows is wrong or to put up a fight which may cause so much bitterness that the ultimate result may even be worse. ~~and that damage the work in the long run~~ <sup>since the alternative of putting up a fight</sup> ~~any would also~~

~~the~~ *examples of avoidable*  
In the following I shall with your permission give you a ~~list~~ <sup>few</sup> list of mistakes of this type as an illustration of what I have in mind; *I have chosen older examples which can be discovered retrospectively since they*

1. The appointment of Stone and Webster as a contractor for building a power unit at the end of June 1942 over the head of Dr. Compton. We were at the time fully aware of the fact that Stone and Webster was not able to give us the engineering help we needed and that there was no hope of building a power unit successfully in cooperation with Stone and Webster. ~~General Groves cannot be blamed for this decision since at that time he was not concerned with our work. This decision lead to a loss of about five months in the engineering-designing work.~~

*arouse no longer any feelings however they were occasional in which Gen Groves was not let involved since at that time he was*

2. The decision arrived at in September 1942 against a unanimous opinion of the Chicago laboratory and against the recommendation of Compton to stop the construction of a chemical separation unit in the Argon forest which was scheduled to operate in May 1943 and to start a construction of such a unit at site X. This decision will lead to a loss of six months. ~~General Groves cannot be blamed for this decision since he did not take part in it.~~

*was not concerned with the work*







I shall be <sup>happy to be</sup> at your disposal  
at any time if you should wish  
to go through the history ~~of~~ of  
the past year for the purpose  
of reviewing the situation  
from the point of view of avoiding  
in future the repetition of ~~the~~  
~~various~~ <sup>various</sup> mistakes by reviewing the causes  
that led to avoidable mistakes in  
the past.