

Letter, Arthur C. Compton to Enrico Fermi, September 14, 1942, "Establishing Site X"

4

En Route
Sept. 14, 1942

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Dear Enrico:

I am sorry that the developments of the last few days have been so rapid that there has been no chance to discuss the situation before decisions had to be made. Let me describe these developments briefly, explain the situation, and [act] as your counsel as to how to proceed from here.

You know the situation as of Friday morning, when the executive committee met with our expanded planning board. That afternoon Conant, Briggs, Murphree and Urey, on their trip to the Argonne site, raised the question with Cooper whether the chemical separation plant should not be on the site for the production unit. The point was good, that this plant was to be of comparable size with the production chemical plant, would require much the same facilities, and that duplication of buildings and equipment at the Argonne and at site X would use needless time and money. This point was precisely the one we had argued several months ago with regard to the pilot and the production power plants. It came now as a new point, however, since we had been thinking of the no. 2 plant at the Argonne as an experimental plant rather than an engineering pilot plant. This indeed it was, as far as the physics was concerned; but for the chemists it was to be a real pilot plant; their experimental stage was already in hand. So I at least had overlooked the serious delay in the chemistry program that would come from treating a pilot plant as an experimental plant.

It was obvious that we could not abandon, however, the plan of carrying through at Chicago under our immediate supervision the first power production by the chain reaction. It was equally clear that we wanted to be set to proceed with production as rapidly as possible, and this would be true if we could decide at once upon site X and build there the pilot plant buildings. I have been pressing since last April with utmost vigor for establishing site X, and have been held back by the statement that we have nothing ready to put on it. Here was my chance to get the new site established, with a concrete commitment to proceed with production. Before agreeing, however, to place plant 2 on site X instead of in the Argonne, it was necessary to see whether we could demonstrate at Chicago the power production aspect of the reaction.

On the train, Saturday, I carried through the calculation to see whether we could safely use the reaction to bring the full-sized pile up to a temperature of from 10 to 100 degrees above its initial value. As you have doubtless found for yourself, a 10 degree C rise requires roughly 1000 kilowatt hours, and exposes an operator to the unshielded pile to some 50 r of gamma rays plus several times as much neutron radiation. Figuring on placing around the pile a suitable shield of blocks of paraffin, cadmium and lead or cement blocks, this could be readily reduced to a negligible quantity for a single dose. A month after operation, a 1 kg block of metal would have an activity of 1 millicurie, which would leave it possible to dismantle the pile with no great hazard.

We should all dislike trying this experiment within the city. I should thus have been unwilling to shift pile 2 to site X unless we could erect pile 1 in the Argonne where the hazards would be minimized.

Just as I was ready to leave for the train on Friday, Capt. Grafton came into my office much perturbed. Having been gone from the office for two days, making arrangements for the construction of the main building at Argonne on a 3-shift basis starting Monday, he returned to find that on the basis of Stone and Webster's statement that they could not guarantee the new building by October 20 we had decided not to push it now. Stone and Webster had made this discouraging statement because, as they said, they could not rely on fast action by the Army. Now the Army (Capt. Grafton) said he was aiming to have it done by Oct. 12, and was all set to do it. Calling in Mr. Steinback, it appeared evident that we could count now on Oct. 20 at the latest, if the Army was given the "all clear" signal. It thus became evident that the first self-sustaining pile could be operated in the Argonne, under conditions preferable to those in the West Stands, with little if any delay. Here also we could [go] directly to the initial self heating experiment, with good prospects of completing it before the end of the year. -- This would be a great stimulus to the whole program.

I accordingly wired Hilberry to instruct Grafton to go ahead without delay.

Here we are approaching Sacramento from which this must be mailed if it is to reach Chicago before I do.

I hope you will take full charge of the work on this experiment with pile 1, using Stearns if you wish to see that the building is properly built, and Zinn, if you wish, to direct the pile construction.

It would seem to me wise to leave Whitaker in charge of pile 2, now to be at site X (definitely determined today as at the Tennessee Valley, and available with buildings erected sometime in January -- this confidential for the present).

Many other things need discussion--but these I can say when I see you.

With best regards, and best wishes for success in your "greatest of all practical physics experiments,"

Yours sincerely,

Arthur C [ompton]

MASTER

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