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This document consists of 2  
pages and 2 figures  
dated May 17, 1943  
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A. H. Compton VERIFIED UNCLASSIFIED  
H. L. Anderson J.A. BESWD OS-6 TSM 12/1/93

Notes on Physics Division Meeting - May 14, 1943

1981

Compton, Smyth, Fermi, Allison, Anderson, Wigner and Szilard were present.

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Introductory remarks made by Compton on long range physics program:

- 1) Experiments designed to answer questions about operating plants now being planned.
  - a. The water cooled pile
  - b. The heavy water pile
  - c. The best possible pile in light of our knowledge in about one year, making use of possibilities offered by bismuth and beryllium.
- 2) Experiments on the properties and use of the products 49, 23 and fission products.
- 3) Work on nuclear physics to clarify our general understanding.
- 4) Training physicists

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Statement by Fermi as to the present physics program designed to answer questions about Site "W" pile.

- 1) Iron shield measurements are in progress at Argonne.
- 2) Exponential experiments on the water cooled lattice.
- 3) Testing of materials, metal and graphite.
- 4)  $\eta$  effect: The only reason that a pile now looks thermally stable is because of the  $\eta$  effect and it would be desirable to know more about this effect. We would like to be sure that the "W" pile will be thermally stable and this depends a good deal on how pure we can be that our interpretation of the  $\eta$  effect is correct.

Suggestion by Wigner to carry out a heating experiment on the West Stands pile, but Fermi exhibited some pessimism about doing such exponential experiments due to the difficulties in keeping things sufficiently constant in the course of the heating. Some possibility in carrying out a measurement of the  $\eta$  effect with the thermal neutrons fission column at Argonne. Fermi commented that

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our explanation of the  $\eta$  effect, then in connection with Teller's theory on the effects of chemical binding, we would really be in a good position to predict heating effects in general.

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- 5) Radioactivity problems: The activity ejected into the water from aluminum, the range of the magnesium atoms was calculated theoretically to be  $7 \times 10^{-5}$  by Teller with agreement from Fermi and Wigner. Experiments being planned at Argonne on this matter; also on water activity; Columbia River water should be tried; also radioactivity on graphite, in particular the product of long-lived carbon isotope.

Section II

The D<sub>2</sub>O Program

- 1) For oxygen cross-sections experiment being planned comparing Be and BeO. Also an experiment comparing CO<sub>2</sub> and C. The container for CO<sub>2</sub> is now in the shop.
- 2) For the deuterium cross-section experiment is being attempted to compare the cross-section for the reaction  $Li^6(n, \alpha)H^3$ . With a reaction  $D(n, \alpha)H^3$  the difficulty is to get sufficient activity. Segre carried out the only experiment at present available and was emphatic to say that the experiment is bad.

Compton commented that at present the decision is not to use deuterio carbons but to use D<sub>2</sub>O, so possibly the only interest is in the capture of D<sub>2</sub>O. Fermi commented that the critical cross-sections are so poorly known that they may be three or four times higher than they are reported to be.

At present some 25 pounds of heavy water are in Allison's hands. More is coming in all the time and soon we will have to consider the problem of storage and transfer. When 100 pounds to one ton become available, an exponential experiment might be carried out with the Argonne pile and, according to Compton, we might expect 1000 pounds on August 15 and one ton on October 1. More accurate experiments could be carried out then. When somewhat more than five tons are available, a chain reaction should be attempted and this probably might be expected in January. The general problem as to whether this last stage should be carried out at Argonne or at Site "X" was discussed. Wigner, Compton, Smyth and Fermi all agreed that there would be considerable technical advantage to carrying this out at Site "X". Fermi expressed some doubts as to the difficulties to experimental physics which could be introduced because of the organization at "X".

Compton remarked that our relations with the Canadians might be reopened and in that case we would have to consider what the problem would be with the heavy water the Canadians could do. Fermi was asked to recommend as to how the heavy water program should be carried out. It was decided to reconvene at 1:30 Thursday of next week.

Respectfully submitted,

HLA:ms

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