



This document consists of 4 pages and 0 figures No. 7 of 19 copies, Series A

SECRET

NOTES ON MEETING OF FRIDAY, JULY 28, 1944

AMU
(CF-44-7-465)(N-1729-W)

10:30 - 12:00

209-Eck CENTRAL RESEARCH LIBRARY DOCUMENT COLLECTION

Present: Messrs. Szilard, Allison, Wigner, Feld, Hogness, Kratz, Young, Creutz, Vernon, Ohlinger

At one of the earlier meetings, an outlined program was presented to indicate the general consensus of the group as to the classification of design possibilities for piles for future consideration by the Laboratory (MUC-LAO-18). The meeting today was for the purpose of reviewing this outline and eliminating as many of the unlikely possibilities as were feasible. Mr. Ohlinger opened the discussion with a brief resume of the type of plants presented at pile meetings to date.

Under the heading of POWER PRODUCTION, we have heard discussed:

<u>By</u>	<u>Power</u>	<u>Type of Pile</u>
Fermi	3,000 kw (1,000 kw mechanical power)	Small, homogeneous P-9 slurry pile consuming 49
Wigner	54 - 280 megawatts	"Pulsating" homogeneous slurry pile using enriched material
Szilard	250,000 kw	Fast chain enriched pile using bismuth-lead alloy as the coolant

and very briefly

Vernon	---	High temperature gas cooled pile
Wigner	---	Endothermic chemical reaction for removing the heat directly
Ohlinger	---	Direct electrical removal of the energy



CLASSIFICATION CANCELLED
 DATE 4-14-58
 For The Atomic Energy Commission
H. F. Canale
 Chief, Declassification Branch

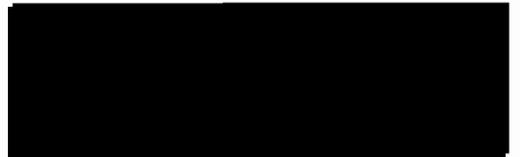
Under the heading of ISOTOPE PRODUCTION, we have heard discussed:

<u>By</u>	<u>Power</u>	<u>Type of Pile</u>
Szilard	250,000 kw	Fast chain reaction with enriched material using bismuth-lead coolant
Fermi	1,000,000 kw	Mother plant to produce 49 for consumption in small power plants. Might be (1) Hanford type, (2) P-9 moderated heterogeneous or homogeneous pile, (3) fast chain type
Weinberg	60,000 kw	Water moderated enriched pile as conversion unit to produce 49
Weinberg	10,000 kw	P-9 homogeneous enriched pile as conversion unit to produce 23
Wigner	2,750 - 3,300 megawatts	"Pulsating" homogeneous slurry pile

Under the heading PILES AS RADIATION SOURCES, we have heard discussed:

Morrison	1,000 kw per day	Beryllium or beryllium oxide moderated pile consuming 49
----------	------------------	--

Referring again to the outline, the question of pursuing a design for a pile for the production of power clearly becomes a question of obtaining the authority to actually design and build such a pile, and unless we actually receive an order for a power producing pile of some intensity, there does not appear to be much justification in pressing a design for this type unit other than to satisfy ourselves that it can be done. Furthermore, a review of all the designs presented to date on piles for power production shows a necessity for enriched material or pure 49 in almost every case.



(The only exception appears to be Mr. Szilard's bismuth-lead cooled slow chain piles moderated either with graphite or beryllium which have been mentioned but not discussed at any of the meetings.) Accordingly, it becomes apparent that if we are to build a power producing pile we must first have an adequate source of ^{49}Pu . As long as ^{49}Pu is being deflected into military channels, there is very little need to consider power piles. In a post-war program, it still becomes necessary to develop the production of ^{49}Pu on a much larger scale in order to realize the full potentialities of atomic power as ultimate power. Therefore, it would appear desirable to press the development of better and more efficient designs for the production of isotopes and let the power production piles coast along. Even the high flux piles for radiation sources for experimental purposes will probably require the use of enriched material and so this further justifies greater efforts on the piles for production of isotopes.

Referring to section I of the outline, part A 1, large stationary piles and medium mobile piles have been discussed and are quite feasible but the small mobile piles, even with the smallest piles which can be conceived using the fast chain reaction, require so much shielding that they are hardly practical for planes or cars. Referring to part B of section I, it has been indicated that the direct utilization of energy by electrical removal or by absorbing the heat directly in the working fluid does not offer too great possibilities for efficiency and practical utilization of the energy. The more preferable utilization appears to be by indirect removal by circulating either the metal or a separate coolant.

Referring to section II of the outline, part A, enough work has been done and reports written on the homogeneous and heterogeneous piles moderated with P-9 that no reports or designs have been presented at any of the meetings. It is still generally accepted that P-9 moderated piles (or piles moderated with P-9 diluted by about 5% ordinary water) comprise one of the four general types of piles to be considered for the production of ^{49}Pu . Whether graphite would be considered for future piles for isotope production depends upon the results achieved at Hanford. Even then, improvements on the Hanford type pile will undoubtedly be necessary for future graphite moderated piles, as indicated by Mr. Young and others.

Beryllium or beryllium oxide moderated piles of the heterogeneous type look very promising for isotope producing piles utilizing ordinary tubealloy. This is the second of the four types to be considered and it is expected at some meeting in the near future that Mr. Allison will present a design and discussion of this type pile.

The third type of pile and one which was not often mentioned previously because it appeared too optimistic to expect a reproduction factor



greater than one, is one using ordinary water as the moderator. This arrangement may be further enhanced by the use of a seed at the center of the water moderated pile which would utilize P-9 and ordinary or enriched tubealloy. At a future meeting, Mr. Szilard will discuss his "seed" type water moderated pile.

The fourth type of pile which looks very interesting but lacks experimental information on many of the constants is one utilizing the principle of a fast chain reaction and accordingly having no moderator.

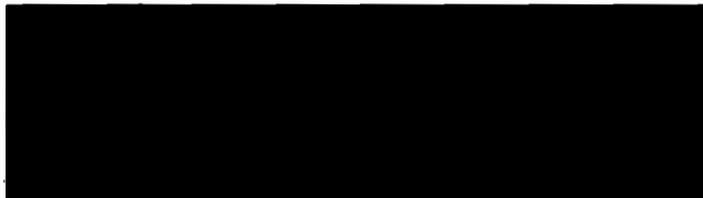
One type of pile which still might be considered, although its use does not look too promising at this time is the hex pile. Mr. Anderson will present this at some time in the near future for consideration by the group.

In all the above it appears evident that the use of high temperature metals as coolants and the use of beryllium as a moderator are important considerations. Accordingly, it was suggested that the beryllium program which has been started should be pressed vigorously and encouragement given to Mr. Allison's recent directive to investigate the properties of liquid metal coolants and their various effects on other metals.

Mr. Weinberg's conversion unit for producing 23 in case 49 should prove ineffectual for military use is the only design we have for this purpose. Since it and most designs for this purpose would probably use the reflector around the pile, Mr. Friedman has been asked to present a discussion on reflectors, both slow and fast.

A general discussion of the pros and cons of the four promising designs and the best method of pursuing this work followed and wound up by Mr. Allison's promise to write up and present at the next meeting (late in August) a series of tentative directives for pursuing the investigations on future pile design work by various groups as they are released from their present duties.

JJP





RECEIVED
APR 14 1958
Class Doc Acct S.
United States
Atomic Energy Comm.
ORO