WAR DEPARTMENT
UNITED STATES ENGINEER OFFICE
MANHATTAN DISTRICT
CHICAGO AREA OFFICE
P. O. BOX 6140 A
CHICAGO 80, ILLINOIS

IN REPLY
REFER TO

EIDM CGD-1

5 March 1944

Subject: American and British Work with P-9 Piles.

To: Brig. Gen. L. R. Groves, P. O. Box 2610, Washington, D. C.

201

1. Inclosed herewith is a memorandum from Dr. Compton to the undersigned showing his feelings on the extent of collaboration with the British and the size of the P-9 pile program to be followed in the future.

2. This memorandum gives a more detailed statement of policy than my report on the status of P-9 piles.

A. V. Peterson

A. V. PETERSON,
Major, Corps of Engineers,
Area Engineer.

1 Inclosure:
Copy ltr. 3/1/44

Fc

MUC-AC-1018

Metallurgical Laboratory

March 1, 1944

To: Major A. V. Peterson

From: Arthur H. Compton

In re: American and British Work with P-9 Piles

Will you please transmit to Colonel K. D. Nichols and General L. R. Groves the following statement regarding the relation of American and British work on P-9 and other piles.

SUMMARY

1. In my judgment, negotiations with the British should be based upon the following assumptions:

(a) There is no adequate justification for constructing a P-9 pile in order to produce 49 for the present war.

(b) The United States will proceed in the immediate future with a program of development and construction of power producing piles, primarily for post-war naval use. It is possible that these may include P-9 piles.

(c) The British will find it necessary also to undertake the construction of piles to strengthen their post-war position.

It is recommended that collaboration with the British be based on the following principles:

(a) In all of its vital aspects our program should be complete without reference to the work of the British.

(b) Interchange of information should be complete with regard to the fundamental physics and chemistry of the pile process, the properties of 49 and other products, and with regard to the design and construction of power piles in successful operation, as long as the British are themselves actively at work in these fields. Interchange should not occur regarding the 49 separation or decontamination processes, the metallurgy of 28 or 49, or the design and construction of piles in course of development.

(c) Critical materials required for pile construction should be sold to the British at a fair price if it is not practicable for us to monopolize the raw materials or if the sale does not jeopardize our own supply.

B. Construction of P-9 pile for ~~the~~ 49 production unwise at this time.

2.a. Our studies have indicated rather clearly that it will not be possible to develop and put into operation a slurry pile nor any other homogeneous type pile with which we are acquainted, in time for use in this war. It appears possible that some production of 49 could be obtained if a lattice type pile using P-9 were to be initiated within a few months. For purposes of increased 49 production, however, it is doubtful whether construction of such a lattice type P-9 pile would be as advantageous as adding units to the existing graphite piles under construction.

b. The present outlook with regard to the Hanford operations is so encouraging that I see no value in introducing a P-9 pile at this time for the purpose of insurance.

3. Effort spent by the Americans at this time on a P-9 pile designed for 49 production to be built by the British would probably retard the completion of Hanford so much as to be a net loss in our production program. After about July 1st, this situation may be reversed because the men concerned with research and design will no longer be so actively concerned with the Hanford operations.

C. If pile is built now, Americans should build it.

4. If a lattice pile is to be of maximum help in this war, the pile should be erected by the Americans who have had experience in the field. This is the only way in which the needed speed can be obtained. The American advantages include:

(a) Experience with the Argonne P-9 experimental pile.

(b) Experience in connection with Hanford on problems of corrosion, cooling, etc., which are closely similar to those arising in the P-9 work.

(c) Engineering experience with piles, including water supply and other auxiliaries.

(d) Sites already developed in Washington and Tennessee on which to place units.

5.a. The British might help the Americans if such a program were undertaken ~~either~~ by transfer of some of their men working in this field, e.g., Pierre Auger, French physicist. They could also continue scientific studies related to the P-9 pile, supplementing our study of certain aspects of this work. If this were done, interchange of the scientific information in the fields on which the Americans can use British help should be complete.

b. It is doubtful whether on the engineering aspects it would be practicable for the British to make any contribution which would counterbalance the difficulty involved in divided organizational responsibilities.

D. If British build pile now we probably should cooperate.

6. I see no military justification for encouraging the British to build a P-9 pile for producing 49 as a part of the program for the present war. If the British proceed, nevertheless, with the building of a pile, we must accordingly assume that this is not primarily for the purpose of winning this war, but to establish a better post-war position. It should be for the State Department and the War Department to determine jointly what collaboration should be given with the British in such an enterprise. Following are some considerations applicable to this case:

(a) Americans now have a great advantage in scientific knowledge and engineering experience in connection with our pile work, including the P-9 pile. We must anticipate that the British will find it necessary to develop their own pile program, whether for 49 production or for power. We should consider whether our collaboration with them, if they undertake this work, will be to our advantage or disadvantage.

(b) In industrial practice, it has frequently been found desirable for a strong industry to collaborate fully on a research level with a weaker industry in development of new products of common interest. An example is the General Electric-Westinghouse collaboration on mazda lamps. Similar considerations would indicate possible real advantages in scientific collaboration between the Americans and the British which would outweigh the disadvantages of making available to them the new information which we obtain. It seems doubtful whether this collaboration should extend to engineering and production experience.

(c) It is clear, however, that our nation should not rely upon any other nation for the development of any vital part of a program such as this. Our country should develop all essential aspects of the work, whether or not such development is carried on by the British.

(d) At this stage the most important asset that can be built up for the post-war period is "know-how." Our position will thus be strengthened by maintaining in the United States the best knowledge and experience. One important way of contributing to this end is to sell critical materials to the British at such a price as to make it poor economy for them to establish their own production plants.

E. Americans will need to develop their own pile program.

7. The interests of the United States will require the development of the pile program in at least two directions: (1) The improvement and extension of 49 production, and (2) the utilization of power from the pile process. The first of these is an extension of our present work, the second is more immediately directed to the interests of the Navy.

8. If the present Hanford project proves to be successful in the production of 49, it will be the first responsibility of Dupont and the Metallurgical Project to develop the process there in use to obtain from it the maximum production. It is doubtful whether any alternative process should be undertaken for production purposes until this process shall have had a thorough trial. In the meantime, experimental development of alternative processes may well go on; but this should probably fall short of construction of plants (of more than semi-works size) based on alternative processes. After Hanford is in satisfactory operation, alternative 49 production processes will be of very little interest.

9.a. For power production, it is evident that a new type of pile will be needed. As soon as the pressure from immediate war problems is released, vigorous attention should be given to a program of development along this line. Only thus can we be sure to keep ahead of foreign competition in a field on which the national safety may depend. The program should include scientific and developmental work and also construction of experimental models of working units.

b. It may well happen that our studies will indicate that such power producing units will involve the use of P-9. Other possibilities include graphite piles, the use of beryllium tubes surrounding tubealloy, the use of bismuth cooling and of helium cooling, and of tubealloy enriched with 25 or 49. The choice of the preferable type can be made as a result only of careful scientific and engineering studies. In order that we may retain our leading position we should not delay in undertaking an active program in this direction.

c. It is to be expected that when power producing units are in operation, 49 will be produced as a by-product. With this in mind, the extensive development of processes designed solely for the economical production of 49 is of limited value. It would not be wise, however, at the initial stages of the program of power development to complicate the problem by requiring 49 production as a part of the pile operation. Thus a power unit for propulsion of a ship should not need to consider whether the 49 that is produced can be recovered.

10. There remains another immediate occasion for construction of an experimental P-9 pile in connection with our war program. A unit that could be erected at Clinton in accord with the recommendations made by the Metallurgical Project's P-9 committee in August, 1943, would accomplish three results:

(a) It would supply an experimental means of reaching the high radiation levels of the interior of the Hanford piles. This would make possible following in the laboratory effects on material that will occur in the Hanford unit and for which we have at present no method of investigation. The Argonne 200 kw pile will go part way in this direction, reaching perhaps 1/10 the radiation level of the Hanford unit. A more powerful pile at Clinton of from 5,000 to 50,000 kw capacity, will equal or exceed the level of the Hanford graphite units.

(b) Operation of such a pile would give valuable experience in the problems to be met working with P-9 large scale units.

(c) Some production, of the order of 5 per cent of the total 49 supply, would be added to that coming from Hanford.

11. Consideration needs thus to be given to the choice of the type of pile most useful now in promoting the national interest. Within a month or two it is expected that the research and development for Hanford will be far enough along that the members of the Metallurgical Project can take time to consider in detail the factors underlying this choice. They will then be asked to prepare a proposal for consideration by the government.

In the meantime, any negotiations with the British should be made having in mind the desirability that the Americans should proceed their own program of development of new piles.

G. H. C.

KT
cc: A. V. Peterson (3)
File (2)