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TO : H. D. Bruner, M.D.
Chief, Medical Branch, DBM

DATE: September 16, 1959

FROM : H. A. Stanwood, Jr., Assistant Director
for Administration, DBM

SUBJECT: THE ROLE OF AEC LABORATORIES

In follow-up of Dr. Dunham's comments re the AEC-supported laboratory program forecasts, I am attaching the following for your reconsideration:

1. Lawrence Radiation Laboratory - Berkeley
2. Brookhaven National Laboratory
3. Argonne Cancer Research Hospital
4. University of Rochester
5. Oak Ridge Institute of Nuclear Studies
6. University of California - Los Angeles

Specifically, each of the attached laboratory forecast summaries requires the following:

1. A brief history of the genesis of the laboratory and its progress.

2. Some expansion of the material on the current programs, anticipated changes, and their 10-year future.

Unfortunately, the deadline date has already passed and I must have the material by Thursday noon, September 17, to enable me to incorporate it in the total package. I have available a few previously prepared summaries and historical references which may be of use to you in this assignment.

Att.

B. Brookhaven National Laboratory

1. Brief History and Genesis.

The Brookhaven National Laboratory is a national research center. Its function is to carry out fundamental and applied research in the nuclear sciences and related subjects as an integral part of the Atomic Energy Commission's nationwide program. It was established in 1949 as a cooperative undertaking by nine northeastern universities (Columbia, Cornell, Harvard, Johns Hopkins, Massachusetts Institute of Technology, Pennsylvania, Rochester and Yale).

Among the stated objectives are: "Study and exploitation of the physical, chemical, and biological effects of nuclear radiations," and "the use of nuclear tools such as neutrons, charged particles, gamma rays, and isotopic tracers in all branches of scientific research."

A program of nuclear medicine is promoted by the Medical Department. It includes application of atomic components in the treatment and diagnosis of disease and in the elucidation of fundamental biological processes. During 1959 a medical reactor (the first designed for medical use only) was brought into operation. Rapidly, the research and service activities are being oriented around this special facility.

2. Current Programs and Changes Expected within Ten Years.

By utilizing radiation sources designed for other than medical purposes, preliminary studies have been carried out on newly developed irradiation methods. Central among the newer procedures has been the employment of sharply localized short-range and short half-life particle

radiation made possible by neutron bombardment of localized isotopes with particular characteristics. Researches inherent in this field of activity necessarily involve investigations of precise isotope localization, kinetics of distribution and redistribution, metabolism of organic compounds, functions of inorganic compounds, and the effect of excited atoms on the stability of large molecular complexes. Advantage is sought of special situations applicable to medical practice, such as neutron-capture therapy of glioblastoma multiforma. For such purposes, advantage is taken of anatomical and physiological conditions such as the blood-brain barrier situation, as well as of particle range and rate of radioactive decay.

Associated with the neutron-capture therapy developments are studies of treatment procedures employing pure neutron and pure gamma radiations - also selected mixtures of these. Such refined RBE studies enable meaningful analyses of the mechanism of radiotherapeutic action. Other associated activity areas made special by availability of the medical reactor are activation (induced radioactivity) analyses and trace element (manganese, copper, and other) investigations.

Tritium-labeling studies (largely initiated at Brookhaven) have yielded basic information about DNA synthesis, chromosome replication, tissue regeneration, durability of specialized cell types, and secretory function. The techniques (including use of carbon-14) have such remarkable possibilities that many other developments and discoveries are to be expected.

Because of interest, technical competence, and particular opportunities as well as special facilities, preliminary attention has been given to very high intensity (pulse-type) and very low intensity (environmental-type) irradiation. Within the scope of the first are unique treatment opportunities for dealing with cancer and other late effects, and within that of the latter (radioepidemiology) are opportunities to determine the influence of low-level irradiation exposure increments to population groups resulting from general atomic energy developments. Inherent are potentialities for analytical consideration and investigation of the nature of degenerative diseases of many types (arteriosclerosis, nephrosis, cirrhosis, neoplasia, sterility, anemia, and others).

Bearing in mind the unique facilities, the special competence, and the unusual associations available at the Brookhaven Laboratory, it appears necessary to take cognizance of the following:

(1) That every effort will be made to discover, utilize, and test therapeutic advantages provided by a medical reactor.

(2) That impressions about therapeutic advantages, based on clinical experience, will become advanced within the coming ten-year period.

(3) That, despite the necessary remoteness, opportunities and advantages are provided at Brookhaven that cannot be duplicated at more than a few locations even if unlimited funds were available.