

M. W. Boyer, General Manager

July 16, 1952

John C. Bugher, Director, Division of Biology and Medicine

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MONTHLY STATUS AND PROGRESS REPORT, JUNE 1952 -  
DIVISION OF BIOLOGY AND MEDICINE

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Transmitted herewith is the Monthly Status and Progress Report for  
this Division covering the month of June 1952.

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Report

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SURNAME ▶	O'Neill <i>[initials]</i>	Brown <i>[initials]</i>	Dr. Bugher			
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MONTHLY STATUS AND PROGRESS REPORT

Division of Biology and Medicine

MONTH OF JUNE, 1952

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Research Activities

Radiation Protection through Cross Circulation. (UNCLASSIFIED)  
An extensive study of the effects of ionizing radiation on parabiotic rats has been completed under an AEC project at the New England Deaconess Cancer Research Institute in Boston. Experiments were performed by joining together two animals of the same sex and of comparable age and weight. A fairly complete interchange of circulating blood was thus provided between the animals, and varying dosages of ionizing radiation were given to only one member of the joined pair. The results of the experiments clearly demonstrate that there was no pathologic evidence of injury produced in the non-irradiated animal such as might be mediated by circulating substances, and that some protection was provided by the non-irradiated animal via the blood stream to the irradiated one of the pair.

Study of Sub-Human Primates in Aircraft. ( ) Members of the Division met at Oak Ridge with Oak Ridge National Laboratory and U.S. Air Force (School of Aviation Medicine Primate Laboratory at Austin, Texas) personnel to discuss a cooperative study on the effects of various levels of radiation to occupants of nuclear aircraft.

The need for a long-term experiment with sub-human primates was recognized. However, in view of the magnitude of the project, it was agreed that some preliminary data were required to cope with the problems of such an experiment and to eliminate the necessity of transporting animals several times between Austin and Oak Ridge. It was planned therefore to initiate a pilot project at Oak Ridge as soon as possible using the Bulk Shielding Facility. Data obtained from the study would be useful in guiding ORNL research on

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shielding and to the Air Force Group at Austin, Texas, in setting up the long-term program.

Tentative designs were approved for the experiment at Austin, Texas, in which artificial sources would be used, and for the pilot experiment to be conducted at Oak Ridge.

Tissue Equivalent Chamber. (UNCLASSIFIED) The AEC-Columbia University research group recently reported the completion of a prototype dosimeter which will measure multiple types of radiation. The device, known as a Tissue Equivalent Chamber, is constructed out of plastic material that has approximately the same ratio of hydrogen, nitrogen, carbon, and oxygen as body tissues. Thus, the physical response of the chamber to radiation is similar to that which occurs in body tissue. Employed as an "all-purpose" integrating chamber measuring X-rays, gamma rays, and neutrons, it will be possible to measure dosages with a much greater degree of accuracy than with present instruments. This characteristic will make the new instrument of such value to health physics and biological programs.

In order to make this instrument available commercially at an early date, the Radiation Instrument Branch plans to initiate an engineering development contract. Several major instrument companies have already expressed an interest in undertaking this work.

Studies of Metabolism of Bone-Seeking Elements. (UNCLASSIFIED) In order to better understand the metabolism of bone-seeking elements and to evaluate dosage-distribution patterns and their biological effects, a series of investigations are under way under the AEC-Massachusetts Institute of Technology project. These include:

- a. Analyses of the relationship between radioactive body content and the clinical history of 30 human cases who received certain radioactive substances more than 22 years ago. It was found in this particular group studied that neoplasms were the sole cause of death attributable to stored radium and mesothorium. These neoplasms were produced by internally deposited radium in concentrations between 0.7 - 23 micrograms fixed radium. The latent period for the production of these tumors varied from approximately 8 to 30 years.

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- b. Use of Ca-45. Such techniques as bone grafting of a "hot" graft to a "cold" host, and vice versa; and intravenous injections of labeled Ca-45 are employed. The results of the data are still tentative, but one set of experiments shows the disappearance of Ca-45 from the serum is exponential, with the specific activity of the bone in a puppy exceeding the blood specific activity at 2-3 hours after injection.

#### Radiation Instruments Program

Instrument Evaluation. (UNCLASSIFIED) Continuing emphasis is being given to improving and extending the utility of standard instruments in the radiation detection field. Recent steps to coordinate these efforts were:

- a. AEC offices and contractors at St. Louis, Oak Ridge, and Savannah River were visited. Discussions were held to outline the Commission-wide coordination plans, and to assure close liaison on instrumentation matters between the respective areas and the Division.
- b. In cooperation with the Industry Evaluation Board of the Department of Commerce, a detailed study has been prepared of critical radiation instruments and components to evaluate the industrial capacity and physical security of companies producing critical items.

Meeting of Steering Committee (Electron Tube Program).  
(UNCLASSIFIED) The Steering Committee for the Special Electron Tube Development Program will meet with technical personnel from the AEC national laboratories in New York on July 29, 30, and 31.

The Committee functions to give technical guidance on the feasibility of developing special electron tubes, and negotiating plans with industry for production and development studies. The requests received for tubes to be used in specialized ways vary, and may not always be of general interest to other AEC installations. However, the Committee endeavors to meet the special demands and arranges the work with the contractor for only a limited

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production of the item needed. The production of photomultiplier tubes for use with scintillation counters is an important item in this program. These are presently provided under a contract with Radio Corporation of America, and negotiations also are underway with the Allen B. DuPont Laboratories.

Radiation Instruments Catalog. (UNCLASSIFIED) The 1952 Radiation Instruments Catalog now being compiled will include up-to-date material on new companies and instruments. Catalog information has been requested from 82 manufacturers of radiation instruments and allied equipment on submission of data, characteristics, and photographs of new instrument models. The edition will be published in loose-leaf form which will permit periodic revisions to keep pace with the expanding field. Distribution will be limited to AEC installations and contractors directly engaged in the atomic energy program. The catalogs will not be available for purchase as in the past.

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