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M. W. Boyer, General Manager

May 18, 1953

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

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MONTHLY STATUS AND PROGRESS REPORT, APRIL 1953 -
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 April 1953.

Enclosure:
Report

CC: J. H. Burchard

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OFFICE ▶	Adm.	Director				
SURNAME ▶	O'Neill	Dr. Bugher				
DATE ▶	5/18/53	<i>Jon</i>	<i>Job</i>	<i>5/19</i>		

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MONTHLY STATUS AND PROGRESS REPORT

Division of Biology and Medicine

MONTH OF APRIL, 1953

270

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Research Activities

Total Body Scintillation Counter for Human Subjects.

(UNCLASSIFIED) The Los Alamos Scientific Laboratory has developed a large scintillation counter for recording the total body load of radioactivity. The subject is placed within the cylindrical counter, so that essentially all emanations arising from radioactive disintegrations anywhere in the body are recorded. The instrument is sufficiently sensitive to quantitate the natural level of radioactivity in tissues of persons who have never been exposed to any special radiological hazard. Any appreciable increase in activity above this natural level is therefore easily detected.

Cardiac Effluography with Radioisotopes. (UNCLASSIFIED)

At Tulane University, an apparatus has been developed which permits a novel use of radioisotopes in the analysis of the fundamental processes in heart action. The heart of a turtle which has been previously injected with tracer potassium (the chief inorganic ion in the heart muscle) is removed from the animal and connected to a pipeline providing a constant supply of a physiological salt solution. As the heart beats, some of its potassium ion, carrying the tracer, is released from the heart muscle cells into the coronary circulation and is carried out by the circulating fluid. The apparatus (the "effluograph") provides a continuous collection of this fluid on a moving paper strip, with sufficient resolution that it is possible to separate as many as 17 samples per second for counting of the radioactivity of the released potassium isotope. This technique has provided the first means of following the release of potassium accompanying a single cardiac contraction. The time-course of the phenomenon is being correlated with that of the electrocardiogram and of the contraction itself in an effort to achieve a better understanding of the basic processes which connect these three aspects of the heart's action. It is hoped in the near future to extend these studies to mammalian hearts and to the behavior of biologically active ions other than potassium. The action of cardiac drugs may also be elucidated by this means.

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Use of Waste Fission Products for Control of Trichinosis.

(UNCLASSIFIED) The University of Michigan research group has been investigating the radiosensitivity of the trichina larva. The larvae were exposed both in infected pork or rat muscle, and after removal to tap water. Impractically high doses are required to immobilize the larvae completely, but only about 5,000 roentgens of x-rays or 10,000 roentgens of Cobalt-60 irradiation were sufficient in most instances to prevent maturation to adult forms and reproduction following their subsequent ingestions by rats. (Somewhat higher doses are required to ensure complete sterilization of the trichinae.) Examination of adult females which had been subjected as larvae to the Cobalt-60 gamma ray dosages (equivalent to calling these "sterilizing doses") showed complete disorganization of the sexual apparatus.

It is hoped that these studies may lead to a practical use of waste fission products in lowering the infectivity of trichinous pork and so contributing to the control of human trichinosis, an important public health problem.

Electron Microscopy of Irradiated Mammalian Cells.

(UNCLASSIFIED) A University of Minnesota research group recently reported promising developments in the use of electron microscopy of ultra-thin tissue sections in recording radiation damage. The early work has been on gastric and duodenal mucosa of mice, fixed rapidly in vivo with osmic acid within a minute after termination of very brief and intense x-ray exposures. The micrographs show highly localized damage to cell structures, apparently resulting from the action of ions released by the radiation; however, much additional work must be done in order to substantiate this finding.

Decrease of Vital Factor within Bacterial Cells. (UNCLASSIFIED)

Under an experiment at ORNL a decrease of ATP (adenosinetriphosphate) was noted inside the cells of bacteria which were exposed to 60,000 roentgens of x-irradiation. Experiments show that although synthesis of this vital material continues, changes produced in the cell through irradiation permit leakage of ATP to the exterior. Addition of metabolites like pyruvate, succinate, or glutamate to the medium, or a lowering of the temperature, tended to decrease this loss of ATP to the external medium. ATP is necessary for cell metabolism, and these secondary effects of irradiation could influence general cell death.

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Civil Defense

FCDA-AEC Briefings. (UNCLASSIFIED) A classified briefing for Governor Val Peterson, newly appointed FCDA Administrator, and eight of his top staff was held on April 8. The briefing was conducted by Chairman Dean and followed generally the pattern of previous White House and Cabinet briefings, the purpose being to acquaint Mr. Peterson with AEC programs and developments pertinent to the national civil defense effort.

A reciprocal meeting was arranged by liaison offices of both agencies on April 23 at which time the FCDA program and objectives were explained to the Commission. Mr. Justice E. Chambers (in Governor Peterson's absence) gave a presentation depicting the possible magnitude and effects of an atomic attack on the U.S. He described the obstacles faced by FCDA in attempting to minimize casualties and damage and their proposed program for carrying out their responsibilities in event of attack.

Designation of AEC Representative on Protective Construction. (UNCLASSIFIED) In response to an invitation by the Administrator, FCDA, to designate an AEC representative to meet with FCDA staff members on the problem of guidance on certain measures of protective construction, Chairman Dean on April 22, 1953 named R.L. Corbis, Chief, CILB. Professor H.L. Bosman will be available for consultation pending Mr. Corbis's release from duties with the Test Organization at NPG.

Loans of Radiation Detection Instruments and Radiation Sources. (UNCLASSIFIED) Loans for use in civil defense radiological training courses were approved during the month, as follows:

- Instruments - Texas State Civil Defense agency
- Co⁶⁰ Sources - Washington State Civil Defense agency
- California " " " "
- Texas " " " "

Also, instruments were provided on loan to Program 22 of the Civil Effects Group, at the current Nevada test operation. This program is sponsored by the FCDA and includes evaluation of radiological defense survey methods by means of actual field training exercises.

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GENERAL

Tripartite Conference on Permissible Doses. ()

On March 30-31 and April 1, 1953 the Fourth Tripartite Conference on Permissible Doses was held at Harrison, New York. Twenty-one delegates, including five from the United Kingdom and four from Canada, were present. In general, out of this meeting arose a better understanding and agreement between the participating countries than had previously been noted. It was possible to eliminate much of the confusion on standards of measurement which the three countries have been using and to confirm or strengthen standards in current use. It appeared that perhaps some of the standards in use in this country are on the conservative side, such as the permissible level for radon concentration in mines.

Industrial Health Conference. (UNCLASSIFIED) In connection with the 1953 National Industrial Health Conference, held this year at Los Angeles, the Division of Biology and Medicine sponsored a one-day meeting on industrial health problems of special interest in AEC operations. The range of subjects discussed included radiation dosimetry, experimental studies of inhalation of radioactive dusts by animals, aspects of the industrial medical programs at Hanford and at ORNL, beryllium toxicity, the treatment of liquid metal burns, and therapeutics on radiation injury. AEC and contractor personnel were also well represented both by attendance and participation in sessions of the American Association of Industrial Physicians and of the American Industrial Hygiene Association. The radiation protection section of the AIHA voted to continue its identity as a specialized section of the AIHA and initiated plans for one or more sessions on radiation protection at next year's Industrial Health Conference.

Radiation Instrument Catalog. (UNCLASSIFIED) During April, 423 copies of the 3rd Edition of the Radiation Instrument Catalog were distributed to AEC offices, AEC operating contractors, other government agencies, and contributing manufacturers. Invitations to submit information on new products for the first supplement to the Catalog have been sent to 93 manufacturers of radiation instrument equipment.

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