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M. W. Boyer, General Manager 005171 August 11, 1953

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

MONTHLY STATUS AND PROGRESS REPORT, JULY 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 July 1953.

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Report

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MONTHLY STATUS AND PROGRESS REPORT

Division of Biology and Medicine

MONTH OF JULY, 1953

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Weapons Test Activities

Dosimetry Conference--Operation UPSHOT/KNOTHOLE. ([redacted]
A Dosimetry Conference was held on June 29 and 30 at the Naval Medical Research Institute in connection with the Spring 1953 test operations at the Nevada Proving Grounds.

Attendees included participating personnel from the AEC, the Atomic Energy Project UCLA, ORNL, Lovelace Foundation, Sandia Base, AFSWP, USNRDL, NMRI, National Institutes of Health, National Bureau of Standards, and the FCDA.

The purpose of the meeting was to interpret the various physical and biological measurements made in a variety of locations and to reach a unanimity of opinion on the probable neutron and gamma fluxes. These data are to be used in the preparation of the Weapons Test reports on the 36 projects included in the Civil Effects Test Group.

The conference was successful except for measurements of gamma rays in the presence of significant levels of neutrons. The apparent sensitivity of film badges to neutrons was not appreciated in previous experiments because the ratio of gamma to neutrons was very high. Presumably, thermal and epithermal neutrons significantly increase the film darkening.

Blast Conference--Operation UPSHOT/KNOTHOLE. ([redacted]
A Blast Conference was held on July 1 at Washington Headquarters to discuss observations made during the Civil Effects tests involving physical measurements of blast phenomena and effects carried out in the Spring 1953 atomic test series at the Nevada Proving Grounds.

Attendees included participating personnel from the AEC, the Atomic Energy Project UCLA, USNRDL, NMRI, Sandia Corporation, Ballistics Research Laboratory, Aberdeen Proving Grounds, AFSWP, National Institutes of Health, Lovelace Foundation, and the FCDA.

The purpose of the meeting was to evaluate and interpret the physical responses of materials and structures and to reach agreement on basic blast data to be used in the preparation of the Civil Effects Test Group reports. Also, to compare the accepted measurements with theoretical predictions, scale-model results, and the preliminary analyses of biological damage.

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The meeting was successful in accelerating the resolution of problems involving blast measurements. The scientific presentations indicated that progress was made in structural design and materials to resist the effects of atomic explosions; knowledge was gained and some progress made in functional design affecting the behavior of dynamic and static overpressures; but preliminary evaluation of biological damage to animals inside the shelters tested did not clearly indicate that people would or would not have survived in them.

Civil Defense Activities

Survey of Sites for AEC Headquarters Building. ([redacted] A re-study was made of several suitable sites for a proposed new AEC Headquarters Building, with a physical survey being made of the general vicinity of two of the sites. Sites recommended were selected in consultation with the Office of Defense Mobilization which has assumed the dispersal planning function, formerly the responsibility of the National Security Resources Board.

Final selection will be determined by existing criteria for Federal dispersal, as well as accessibility for employees and nearness to other Government agencies.

Research Activities

Savannah River Survey. (UNCLASSIFIED) The Academy of Natural Sciences of Philadelphia has reported the results of an extensive survey of the biological conditions of the Savannah River. A coordinated group of seven specialists using methods developed by the Academy carried out an intensive study of five areas of the river with respect to the number of algae and several animal groups present during spring, summer, and fall. The report is the first study of a coastal plain river in the United States which sets forth the pattern of aquatic life at the same region during the various seasons of the year. It also includes the most extensive lists of species from a coastal plain river yet published. The conclusions indicate that the river receives relatively little pollution in the regions studied and may be classified as a "healthy" river.

The study conducted by the Academy is a portion of a continuing survey under AEC sponsorship by the U.S. Public Health Service and the Universities of Georgia and South Carolina to determine possible changes from plant operations on the land areas and the Savannah River.

Measurements of Radioisotopes with Photographic Emulsions. (UNCLASSIFIED) The accurate estimation of maximum permissible dose levels in humans for various radioisotopes is dependent upon accurate

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methods of analyses. A research group at Massachusetts Institute of Technology has been actively engaged in improving instrumentation and methodology for determining very low amounts of radium and mesothorium in tissue. Since these studies are carried out with human patients, who have, unknowingly, ingested varying amounts of mesothorium and radium over a period of years, the assembly of data has been extremely difficult. For this reason, a great deal of dependence has been laid upon analytical data from tissue samples of cadavers or from teeth of persons known to have ingested varying amounts of radium and mesothorium. (For example, workers in the self-luminous dial industry.) One method presently under study consists simply of imbedding in photographic emulsions a known quantity of tissue containing radioisotopes under observation. Investigations are then made of the number and characteristic patterns produced by the alpha particles ~~[illegible]~~ on the ~~photo~~plate as the radioisotopes decay to stable lead. It is believed this method has a distinct advantage over the usual analytical methods due to its sensitivity at low concentrations of radioisotopes.

Radiation Injury and Possible Subcarcinogenic Effects. (UNCLASSIFIED) In the Department of Oncology of the Chicago Medical School, it has been demonstrated that mice, following local subcarcinogenic doses of beta irradiations of 800 reps to the skin, followed by repeated application of croton oil, will develop latent tumor changes. Plaques of thallium 204 were used to provide the source of beta radiation. To gain a better understanding and control of both radiation injury and possible subcarcinogenic effects, this group is now concerned with the tumor changes induced in relation to the area exposed.

Phagocytosis and Radioresistance. (UNCLASSIFIED) Investigators ~~at the University of Los Angeles~~ Atomic Energy Project, University of California at Los Angeles, have been studying the relation between the activity of the phagocytes of the reticulo-endothelial system of rats and rabbits, and the resistance of these animals to radiation injury. The R-E system consists of special cells in liver, spleen, lymph, and bone marrow which have the capacity of engulfing and storing small particles. It is possible to stimulate the phagocytic activity in this system by the intraperitoneal injection of vaccines or by intravenous administration of India ink. If this is done prior to irradiation, so that the system has time to respond and proliferate before the exposure, a considerably increased resistance to X-rays or to cobalt-60 gamma rays is found. In addition to the contribution of these findings to the understanding of the mechanism of natural radioresistance, the method may be of experimental use in providing a means of increasing survival after irradiation so that the late affects may be studied.

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Effects of Radiation. (UNCLASSIFIED) Experiments at Argonne National Laboratory have been continued on the effects of radiation on animals. In attempts to determine which of the many cell types making up injected bone marrow or spleen are responsible for recovery of irradiated animals, the relative importance of granulopoietic and erythropoietic cells has been evaluated by using equivalent amounts of bone marrow and spleen from normal mice; mice having chronic abscesses and ulcers; and mice subjected to repeated hemorrhages. These tissues were injected intraperitoneally into mice exposed to 900 roentgens. The preliminary observations show a 70 per cent survival with normal bone marrow, 66 per cent survival with bone marrow showing hyperplasia of the granulopoietic elements, and 92 per cent survival with bone marrow showing hyperplasia of the erythropoietic elements.

Under other experiments with mice, the observation of luxuriant growth of bone in intraperitoneal bone marrow transplant raised the question of the role that bone tissue plays in recovery of mice from lethal doses of irradiation. Approximately 50 per cent survival has been obtained when small pieces of either rat or mouse bone carefully freed of marrow were implanted intraperitoneally into irradiated animals. Although it seems unlikely that the extremely small amount of marrow left on the pieces of bone could be responsible for the recovery, additional studies will be made for verification.

Toxicity studies were made of plutonium 239 with dogs, and of the eight animals examined, the following data are now apparent: (1) The highest dose used, 5.33 microcuries/kilogram, was below the acutely lethal level, and the lowest dose used, 0.67 microcuries/kilogram, was above the tolerance level. (2) After intramuscular injection some of the material remains at the injection site and may lead to severe lesions in the area. (3) Gross liver damage was observed in four of the five animals that lived 569 or more days after the intramuscular injection of 5.0 microcuries/kilogram. (4) Skeletal changes were seen in all animals that lived 569 days or longer. These included demineralization of bone, pathological fractures, and neoplasia. Three malignant bone tumors appeared among the animals that received 5.0 microcuries/kilogram intramuscularly; these were detected at 674 days, 830 days, and 1,393 days, respectively. Intravenous injection of 0.67 microcuries/kilogram resulted in a malignancy 1,454 days later.

Radiation Instruments Program

Scintillation Counter Symposium. (UNCLASSIFIED) A meeting was held recently of the Joint Subcommittee on Nuclear Instruments of the Institute of Radio Engineers and the American Institute of Electrical

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Engineers to initiate plans for the Fourth Scintillation Counter Symposium. Tentatively, the symposium is scheduled for January 26-27, 1954, in Washington, D.C., and will be sponsored jointly by AEC, National Bureau of Standards, AIEE, and the IRE. A Symposium Committee, consisting of leaders in the field of scintillation counting, was established to prepare for the forthcoming event. Based on the results of the 1952 conference (with attendance of 400 scientists and engineers), it is anticipated that there will be considerable interest in the scheduled symposium which will review progress in the scintillation counter field.

General

Treatment of Polycythemia Vera--Cardinal Stepinac. (UNCLASSIFIED) Arrangements were made for Dr. John H. Lawrence, Director of the Donner Laboratory of Medical Physics (University of California Project--Berkeley), to travel to Yugoslavia to render medical aid to Aloysius Cardinal Stepinac who is suffering from polycythemia. Cardinal Stepinac has been exiled in the village of Krasic since his release from prison (1946-1951) where he was sentenced after accusal of plotting against the Communist-Tito regime. Recently, the U.S. Consulate in Zagreb, reportedly acting under instructions of the State Department, ascertained that the Cardinal's condition was serious and that he was suffering from polycythemia, a disease of the red blood cells.

The assistance of Dr. Lawrence was requested by Archbishop John J. Mitty of San Francisco representing the National Council of Archbishops of the Roman Catholic Church. Dr. Lawrence has done extensive research on the treatment of polycythemia with radioactive isotopes and is a recognized authority in this field. Release was obtained from the Commission of a sufficient quantity of Phosphorous 32 for medical treatment, and Dr. Lawrence left for Yugoslavia on July 23, 1953.

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