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Extract

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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. The group also wished to compare the accepted measurements with theoretical predictions, scale-model results, and the preliminary analyses of biological damage.

The meeting was successful. The scientific presentations indicated that progress was made in the development of 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 whether human occupants would have survived.

Civil Defense Activities

Survey of sites for AEC headquarters building. A restudy was made of several suitable sites for a proposed new AEC headquarters building, and a physical survey was made of the general vicinity of two 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. (End of [redacted] section.)

Research Activities (UNCLASSIFIED)

Savannah River survey. 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 which is the first study of a coastal plain river in the United States, 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 yet published of species from a coastal plain river. 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. The estimation of maximum permissible dose levels in humans for

various radioisotopes is dependent upon accurate 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 (e. g., 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 on the film as the radioisotopes decay to stable lead. It is believed this method has a distinct advantage over the usual analytical methods because of its sensitivity at low concentrations of radioisotopes.

Radiation injury and possible subcarcinogenic effects. 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 (roentgen equivalent physical) 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. Investigators at the University of California at Los Angeles, Atomic Energy Project, 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 there develops a considerably increased resistance to X rays or to cobalt 60 gamma rays. 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 effects may be studied.

Effects of radiation. 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-percent survival with normal bone marrow, 66-percent survival with bone marrow showing hyperplasia of the granulopoietic elements, and 92-percent survival with bone marrow showing hyperplasia of the erythropoietic elements.

In 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-percent 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 with dogs were made of plutonium 239. Of the eight animals examined, the following data are now apparent: (1) The highest dose used, 5.33 microcuries per kilogram, was below the acutely lethal level, and the lowest dose used, 0.67 microcuries per 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 per 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 per kilogram intramuscularly; these were detected at 674 days, 830 days, and 1,393 days, respectively. Intravenous injection of 0.67 microcuries per kilogram resulted in a malignancy 1,454 days later.

Radiation Instruments Program

Scintillation counter symposium. A meeting was held recently of the Joint Subcommittee on Nuclear Instruments of the Institute of Radio Engineers and the American Institute of Electrical 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. Arrangements were made for Dr. John H. Lawrence, Director of the Donner Laboratory of

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Medical Physics (University of California Project--Berkeley), to travel to Yugoslavia to render medical aid to Aloysius Cardinal Stepinac, who is suffering from polycythemia. 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. Release was obtained from the Commission of a sufficient quantity of phosphorus 32 for medical treatment, and Dr. Lawrence left for Yugoslavia on July 23, 1953. (End of UNCLASSIFIED section.)

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