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MONTHLY STATUS AND PROGRESS REPORTS FOR DECEMBER 1951

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IV - BIOLOGY AND MEDICINE

Weapons Test Activities (BUSTER-JANGLE)

Project Gabriel. Project Gabriel was an evaluation of long-range hazards associated with the detonations of a large number of atomic air bursts. This report and the deliberations of an ad hoc committee which met in November were given further consideration in a staff study, and utilizing additional data from BUSTER-JANGLE data the studies were extended to calculate short-range effects. These were considered under three possible conditions: (1) a high air burst without rain or snowfall; (2) a high air burst with early rain or snow; and (3) a low air burst, surface burst, or underground burst.

Monitoring at Test Site (BUSTER-JANGLE). Personnel within the test site area were issued film badges by the RadSafe Unit. The final personnel radiation report requires some upward revision of exposures previously reported. This report shows that of the 1,749 persons with badges none exceeded an integrated dose of 6 roentgens, and only 12 exceeded 4 roentgens. These 12 represent less than 0.7 percent of the total personnel subject to exposure. The average integrated exposure was about 1.2 roentgens.

The timing of each shot with respect to weather conditions was the major factor in preventing significant fall-out in populated areas. However, surveys of fall-out in the test area were made by helicopter and estimated results show "hot" areas with integrated doses of 75 roentgens at 15 miles from the surface shot, and 175 roentgens at 9 miles from the underground shot. Since these specific areas were observed within the Nevada Test Site, they do not represent a health problem to populated areas. However, such fall-out patterns are phenomena not fully understood or predictable. Further monitoring should provide data upon which to base predictions of fall-out patterns for future tests.

Monitoring of air activity. To assess air activity, two groups were utilized for BUSTER and 12 for JANGLE within the limits of 10 to

200 miles of the test site. The Jangle Feasibility Committee requirements for populated areas called for a limit of 100 microcuries per cubic meter of air, averaged over a period of 24 hours. In the case of particles having diameters in the range of zero to five microns, the 24-hour averaged activity per cubic meter should not exceed 1/100 of the above; nor was it desirable that any individual particle in this size range have an activity greater than 10^{-2} microcuries calculated 4 hours after the shot. Although the air activity near the surface following JANGLE shots was about 10 times greater than following BUSTER detonations, no activity was found that exceeded the requirements of the Jangle Feasibility Committee. The margin between the required and observed air activity was small, which indicated the necessity for continuing such air sampling programs at future tests. The responsibility for monitoring air activity beyond 200 miles, and within the continental limits of the United States, was assigned to the Health and Safety Division of NYOO. These data are being correlated for further study and use.

AEC personnel shelter test. The first preliminary report on this project of Operation BUSTER was submitted by the Project Officer (Chief, Civil Defense Liaison Branch) to the Test Organization on December 3, 1951. The preliminary report of the FCDA shelter test was submitted through the Civil Defense Liaison Branch to the Test Organization on December 6, 1951.

Test Planning and Screening Committee. On December 10, 1951, an invitation was extended to FCDA to participate in a Biomedical Test Planning and Screening Committee established to receive, screen, develop, and coordinate requirements and proposals for biomedical testing at future weapons tests, and to elaborate a final and scientifically valid program for formal approval and implementation. Subsequently, FCDA was also asked to designate a representative to a companion committee to perform the same functions with respect to tests of effects on structures, under the chairmanship of the Chief, Civil Defense Liaison Branch. Also represented on the Structures Committee are the LASL, the Public Buildings Service of the General Services Administration, and the Department of Defense.

Direct and Genetic Effects of Radiation in Mammals

Current data on biological effects of radiation in mammals have been assembled in summary form by Dr. H. H. Plough of the Biology Branch. This memorandum outline represents a compilation of much of the literature on the subject and lists many references. The paper will be distributed to the various Divisions to serve as a working summary in discussions of permissible radiation dosage or expected genetic effects. Copies are available from the Biology Branch for those who may have an interest in the subject.

Low Level Portable Cobalt Irradiator

A pilot model portable cobalt irradiator was developed by the

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Brookhaven National Laboratory under the direction of the Division of Biology and Medicine. This experiment was completed with successful results. Arrangements have been made to deliver this instrument to the Worcester Foundation for Experimental Biology. The Foundation will use the instrument in the program for investigating the effects of radiation on the protection of the adrenal corticle hormones.

This cobalt irradiator is designed to handle a moderate level source up to 250 curies of cobalt 60, and will fill a definite need in the experimental radiobiology program of the Commission for cheap flexible sources of highly penetrating gamma radiation for use in animal and other experiments.

The pilot unit described above was designed and fabricated at a cost of approximately \$7,500. It is estimated that the cost of additional models of this type constructed commercially should cost between \$4,000 and \$5,000.

Research in Fractionation of Formed Blood Elements

The Harvard University Laboratory has made significant progress on the AEC-research project on separation of the formed blood elements. This study is being conducted by Doctors E. J. Cohn and J. I. Tullis. It has been found that blood platelets may be quantitatively isolated from blood being processed in the national blood program, and recovered in relatively undamaged form for subsequent medical study. The importance of this work lies in the fact that blood platelets are a necessary factor in controlling the hemorrhagic state which accompanies exposure to high dosages of ionizing radiation. In radiation injury of this nature the platelet producing mechanism of the bone marrow is damaged and patients frequently die of multiple internal hemorrhages. If these platelets prove to be viable they will contribute greatly to the therapy of radiation injury. Similar progress has been made in the isolation of the white blood cell fractions from processed whole blood. The white cells are under investigation to determine if they may be transfused into patients suffering a deficiency of white blood cells, and thus aid in combatting the overwhelming infection which frequently accompanies acute exposure to whole body radiation.

Fellowship Program - Health Physics

The latest class of the Fellowship Program conducted at ORNL included 20 members. Information has been received from the laboratory that 19 of the group had received offers for employment prior to graduation. It is understood that the 20 members under this program at Rochester-Brookhaven have also been solicited for employment.

Visit to Savannah River Site

A recent visit was made by staff members to the Savannah River Site to study the biological and medical problems relevant to plant

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operations. The progress was reviewed of the biological survey being conducted under the auspices of the University of South Carolina, the Philadelphia Academy of Natural Sciences, and the U. S. Public Health Service. This survey involves an accurate record of aquatic life in the area. These observations will be compared with the results of similar surveys made later in order to determine the effects of aquatic life of small amounts of radioactive material released into the streams.

Meeting of American Association for the Advancement of Science

The Director and representatives of the Division attended meetings held by the AAAS in Philadelphia from December 26 to 31. The session of the Symposium on Cancer Therapy with Radioisotopes included the address of Dr. Shields Warren on "The Impact of Radioisotopes in Cancer Research."

Other sessions included papers on effects of radiation on animal tissues; effects on the skin tissues; summarization of the study of the production of cataract and retinal damage by irradiation of the heads of new-born mice; and methods of following deposition in mollusc shells by radiocalcium.

Review of FCDA Publications

Technical manuals recently reviewed were: "Improvement of Shelter Areas in Existing Buildings," and "Interim Guide for the Design of Buildings Exposed to Atomic Blast Loads."

In addition, a panel meeting of major industry representatives arranged by FCDA was attended for review of the FCDA-sponsored "Interim Guide on Design Criteria."

Scintillation Counter Symposium

Final arrangements are being made to hold the Symposium conference at the National Bureau of Standards on January 29 and 30, 1952. The Radiation Instruments Branch reports that considerable interest has been evidenced by the large number of acceptances and the many requests for additional invitations. The spontaneous response far exceeds the original estimates of attendance and stresses the importance of this meeting. A large number of speakers have been scheduled to report on the various stages and recent developments in this field. The results of these discussions should provide informative and current materials of value since no meeting of this kind has been held in the past 2 years.

Equipment for Monitoring Teams

Bids were opened for the procurement of radio communications equipment for the AEC emergency monitoring teams. It is indicated that award will be made to the lowest bidder who has assured delivery of portable units within 90 days, and mobile units within 60 days.

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Survey of Instruments Industry

A questionnaire form has been prepared and circulated to the major nuclear instruments companies. This form has been reviewed by NPA and approved by the Bureau of the Budget.

The information requested pertains to the rate of expansion over the past years and the present production capacity.

Survey Meters

Information received from ORNL indicates that contracts for the fast neutron and alpha survey meters have been awarded. These meters which had been requested for use in various Commission installations will cost approximately \$19,700 for 35 neutron, and \$17,600 for 30 alpha meters. Delivery is expected in May of both items.

An urgent need has been indicated by the Raw Materials Division for approximately 50 scintillation type survey meters of the type developed at ORNL. In addition, the Geological Survey has use for about 50 instruments. A meeting will be held with a representative of the Geological Survey to consolidate their needs along with those of the Commission.

Loan of Radiation Instruments and Sources

During the month, approvals were granted and arrangements made for the loan of radiation detection instruments and radioisotopes for civil defense training use to the State Civil Defense Organizations of New Jersey and Kentucky and the county organization of Pinellas County (St. Petersburg), Florida.

FCDA "Alert America" Exhibit

This exhibit, opening in Washington, D. C., on January 7, 1952, constitutes a graphic presentation of atomic and other weapons of modern war and the urgent civil defense measures needed to cope with them. The Civil Defense Liaison Branch has devoted considerable time in connection with FCDA requests for assistance in providing elements for the atomic energy portion of the exhibit, and arrangements have been made through the Branch for loan of radiation detection instruments and other items. On December 13, 1951, the Chief, Civil Defense Liaison Branch, and a representative of the Office of Classification reviewed the exhibit in Richmond; it was determined that there was no AEC classified material involved.

Discussions on Effects Test

Conversations with various representatives of FCDA and the Divisions of Military Application and Information Services have continued on the general proposal that a weapons effects test as distinguished from a weapons development test be held, at which requirements of FCDA, Public Building Service, and AEC with regard to structures, biomedical and miscellaneous testing would be accommodated.

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