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Office Memorandum • UNITED STATES GOVERNMENT

TO : K. D. Nichols, General Manager

DATE: February 10, 1954

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

SUBJECT: MONTHLY STATUS AND PROGRESS REPORT, JANUARY 1954 -
DIVISION OF BIOLOGY AND MEDICINE

407692

SYMBOL: BMA:RON

Transmitted herewith is the Monthly Status and Progress Report for this Division covering the month of January 1954.

Enclosure:
Report

CC: J. H. Burchard

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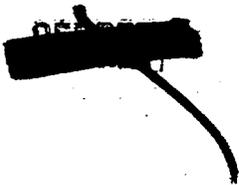
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MONTHLY STATUS AND PROGRESS REPORT

Division of Biology and Medicine

This document consists of 6 pages
No. 1 of 1 Copies, Series HD-A

MONTH OF JANUARY 1954

Weapons Test Activities

Monitoring Program for Operation CASTLE. Plans have been completed for the operation of a world-wide monitoring program to measure and collect radioactive fall-out during the forthcoming test series in the Pacific. A network of 150 stations has been established throughout the world, with concentrated networks in areas of the United States and in the Pacific near ground zero. Automatic, continuous recording monitors will be placed on the islands of Ponape, Kusaie, Rongerik, Majuro, Truk, Yap, Wake, Iwo Jima, Midway, Kwajalein, and Guam. Monitoring of these islands during past test series showed only small amounts of radioactive fall-out had occurred. However, information collected by the automatic recorders will be of value to the aerial monitoring groups measuring radioactivity through the use of air-borne scintillation instruments. Based on the findings of the ground monitors, negative flights may be eliminated and flight patterns rescheduled to operate more effectively. Collections of fall-out material will also be made aboard several hundred United States naval vessels traveling the North Pacific ocean routes. This will permit detection of fall-out which is carried by winds to the open sea. The small total areas of the Pacific Islands in relation to open water make it difficult to predict the fall-out patterns accurately, and observations in these open ocean areas will yield more complete information.

Procedures for monitoring radioactivity were initially established by the Commission in 1951 in the northeastern states during the RANGER test series. In 1952 the program had been expanded from a nationwide network (TUMBLER-SNAPPER series) to a world-wide network which was in operation during the IVY and UPSHOT-KNOTHOLE series. A skeleton network is maintained continuously between test series. The monitoring program provides the Commission with documentary evidence concerning the amount and distribution of fall-out from nuclear weapons tests for use in evaluating radioactive contamination for immediate, as well as long-range, effects.

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Investigations of Radiation Effects on Sheep--Operation UPSHOT-KNOTHOLE. (UNCLASSIFIED) Extensive investigations have been completed in connection with reports that sheep had been allegedly injured by fall-out particles during the spring 1953 test detonations. The unusually heavy losses of sheep grazing north of the test site during the test period were estimated near several thousand head. Investigations, including laboratory experiments, post-mortem examinations, and studies of range conditions, show that radiation could not have been a contributing factor in the sheep losses. A final report was prepared on the findings, and a special meeting was held at Cedar City, Utah with the sheep owners. Copies of the report were distributed and reviewed in detail to permit discussion of the findings. The meeting included specialists from AEC, U.S. Public Health Service, U.S. Department of Agriculture, and the Utah State Agricultural College. Representatives of the press and a local radio station were also present.

Feasibility Committee--Operation JANGLE. ~~SECRET~~
The Feasibility Committee met in January to review the criteria and assumptions for radiological safety that were initially established for JANGLE in 1951 (surface and underground detonations). Discussions were held on the actual radiological conditions which existed after the detonations. Based on these findings, estimates and calculations were given of possible radiological contamination that would result from nuclear devices of larger yield for surface and underground detonations at the Nevada Proving Grounds.

Recommendations made by the Committee concerning establishment of an operational guide for whole-body gamma radiation for the general off-site population and the continuation of the air sampling and monitoring program for future test series will be presented to the General Manager by the Director of the Division.

Research Activities

Project SUNSHINE. ~~SECRET~~ A conference was sponsored jointly by the Division and Rand Corporation in January to review progress of Project SUNSHINE to date and to direct future efforts in the study of possible world-wide contamination with radiostrontium from nuclear detonations. The project has been under way for several months and includes a world-wide program for sampling of soils, forage crops, animal bones,

and products (milk, cheese, etc.), as well as human materials (particularly skeletons of stillborn infants and human milk). It is notable that radiostrontium has been observed in many parts of the world; however, the concentrations are too low to establish a biological hazard as a result of detonation of any practical number of atomic weapons. Present considerations of biological hazards are based on a value of maximum permissible body burden established by the National Committee on Radiation Protection. In times of national jeopardy, however, this value would be unrealistic.

A group of radiobiologists, with radioisotope experience, was assembled to consider the practical aspects of biological hazards due to radiostrontium. This group estimated the degree of hazard associated with various amounts of radiostrontium in the human skeleton, from barely observable effects up to lethality. These calculations can form the basis for further estimates of secondary bomb hazards. In addition to making the estimates, it is planned to initiate laboratory experiments to check the estimates. All available data on human cases, particularly those in which patients have been treated with radiostrontium, will be assembled and reviewed for pertinent information. Additional tracer experiments on humans may also be practical.

Liver Protein Alteration in Radiation Injury. (UNCLASSIFIED)

By the use of electrophoresis, investigators at the Medical College of Virginia have recently revealed a substantial change in the constitution of the proteins of the liver of rabbits exposed to 600r of x-irradiation. One of the major components, constituting about 15 per cent of the normal soluble liver proteins, disappears within 24 hours after irradiation and is still absent after 50 days (the limit of observations at the time of the report).

It is known that this particular component undergoes a change in electrophoretic mobility under circumstances in which the oxidation of the protein's sulfhydryl groups is to be expected. Such a shift would make this component indistinguishable (electrophoretically) from other large components and could account for its apparent "disappearance." The idea that this oxidation is actually what happens after irradiation is supported by the fact that the missing components can be made to reappear by incubation of the protein extract with certain sulfhydryl-donating chemicals, and that the loss can be prevented by giving cysteine immediately before the X-ray exposure.

Isolation and analysis of this reactive component is now being attempted, and if this is successful, its biological activity as a preventive or therapeutic agent against radiation damage will be tested.

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Tissue Breakdown Following Radiation. (UNCLASSIFIED) At the University of Rochester School of Medicine some interesting studies are in progress which include the assessment of tissue breakdown (based on hippuric acid synthesis) occurring in animals subsequent to exposure to ionizing radiation. This group is attempting to measure tissue degradation by determining the release of glycine and substances in biological equilibrium with this amino acid from tissue proteins labeled with glycine-2-C¹⁴ prior to exposure to ionizing radiation.

It has been demonstrated that total body x-irradiation (700 roentgens) causes a significant increase in the isotope concentration of hippuric acid during the first six hours following radiation exposure in rats given several doses of glycine-2-C¹⁴ prior to the exposure. This suggests that the tissue breakdown is initiated by ionizing radiation. Additional experiments using benzoic acid - carboxyl C¹⁴ indicate that radiation does not interfere with benzoic acid conjugation.

Magnetic Spectrometer for High Intensity Measure. (UNCLASSIFIED) A magnetic spectrometer capable of measuring gamma rays of high intensity has been designed and constructed under an AEC-National Bureau of Standards research project. Its completion represents a part of the total effort of the Commission to improve quantitative methods for measuring radiation in the high intensity regions.

The gamma rays having energies up to 12 MEV impinge on a thin beryllium foil target which in turn ejects Compton electrons in a direction incident to the gamma ray beam. The momenta of these electrons are then measured using a photomultiplier with an anthracene scintillator. Photon energies in the range of .2 to 12 MEV can be measured with an accuracy of 2 per cent. Intensities of photons can be determined with an accuracy of 10 per cent. Measurements of weak photon sources are more difficult, however, and a considerable sacrifice in resolution must be made to boost the detector counting rate for a given source strength. In spite of its relatively low sensitivity for photon measurements, the spectrometer has certain advantages over other types. It covers an energy range that bridges the ranges covered, for example, by a spectrometer using photoelectrons and one using pair electrons. For sufficiently intense sources, it is capable of operating with good resolution. Finally, if the electron trajectories are accurately known, the photon intensities over this wide energy range can be determined from the spectrometer measurements by a direct method.

Civil Defense Activities

Test Program for Future Operations. ~~TOP SECRET~~ A meeting was convened by the Armed Forces Special Weapons Project in January to discuss

current status of plans for future continental weapons tests. Representatives of AEC, the Department of Defense, and the Federal Civil Defense Administration were in attendance. Items included: (a) Proposed participation of FCDA in Operation TEAPOT; (b) Military projects in Operation TEAPOT on weapons effects, phenomena measurements, and a limited thermal radiation program; (c) Consideration of procedures for comparing FCDA and military effects projects.

FCDA plans include additional effects data on residences, components of buildings, structures, civil defense training similar to Desert Rock maneuvers, and an "open shot" with public news media representatives. It is proposed to enlist private industry support for the FCDA program at the ratio of 10 private dollars to one government dollar.

A number of meetings will be arranged in the future to attain proper coordination for each agency's requirements. FCDA indicated that their planning would be accelerated in order to complete preliminary coordination prior to submitting their program to the Commission's Test Planning and Screening Committee.

Briefings for Life Insurance Association of America. (UNCLASSIFIED) The AEC at the request of the Federal Civil Defense Administration arranged a classified briefing for the Civil Defense Committee of the Life Insurance Association to acquaint the group with the responsibilities of civil defense as related to the national security program. Representatives of the Divisions of Raw Materials, Production, Military Application, and Reactor Development presented material. In this connection, the Association was also briefed by the Central Intelligence Agency, Department of Defense, and Office of Defense Mobilization, and plans to introduce the subject of civil defense responsibility at their Association meeting in the spring.

Radiation Instruments Program

Neutron Instrumentation. (UNCLASSIFIED) The Division sponsored an informal conference on neutron instrumentation on January 28 for an exchange of ideas on the problems associated with neutron dosimetry and possible new instrumentation approaches to this field. The discussion group consisted of representatives from AEC research groups engaged in the radiation protective aspects of neutron instrumentation. Items covered were: (1) review of the neutron measurement problems; (2) reports on the performance of presently available instruments; and (3) current developments and possible future trends.

The conference provided an opportunity to bring the various research groups together to effect closer coordination, and to direct efforts toward new approaches in research and development of neutron instrumentation.

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Scintillation Counter Symposium. (UNCLASSIFIED) The fourth Scintillation Counter Symposium was held in Washington on January 26 and 27 under joint auspices of the AEC, National Bureau of Standards, the American Institute of Electrical Engineers, and the Institute of Radio Engineers. Approximately 350 persons attended the symposium and represented many fields of scientific endeavor and industrial interests. Recent progress was reviewed, and the reports indicate clearly that increased dependence is being placed on scintillation counting techniques. This emphasizes the importance of instrumentation in the fields of science and technology, and the need for continued exchange of information between the instrumentation groups.

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