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# MONTHLY STATUS AND PROGRESS REPORTS FOR NOVEMBER 1951

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U. S. ATOMIC ENERGY COMMISSION

Washington, D. C.

Issued December 29, 1951

UNIQUE DOCUMENT # *SA A2000.50840000*

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VI - BIOLOGY AND MEDICINE

Research Projects Approved during November

The following number of proposals were approved by the Research Committee for contract negotiation or renewal during the month:

	<u>No. of projects</u>	<u>Amount</u>
Medicine	13	\$124,628
Biology	6	55,854
Total	19	\$180,482

Atomic Bomb Casualty Commission

Dr. Grant Taylor, Director (ABCC), Hiroshima, Japan, returned recently for a meeting with the Committee on Atomic Casualties of the National Academy of Sciences. Dr. Taylor reported that the clinical investigations of Japanese exposed to atomic bombs are proceeding satisfactorily, and his statements confirm findings previously reported on the incidence of leukemia, cataracts, and genetic aberrations.

Weapons Test Activities (JANGLE)

Monitoring of radioactive fall-out. Within the test site area, the RadSafe group mapped out and controlled the contaminated areas. The amounts of radioactivity to which monitors and recovery parties were exposed exceeded permissible dose in two cases only, these to a minor degree.

Eight mobile monitoring teams, equipped with instruments, vehicles and radio communication, patrolled all inhabited areas within a 200-mile segment, and informed the control point as to the degree of radioactive fall-out. In no case did such radioactivity begin to approach a hazardous level, although vehicles and plans for emergency evacuation were available had serious contamination occurred. The highest level observed was about 2.5 milliroentgens per hour in the vicinity of Ely, Nevada, resulting in a calculated total exposure of about 60 milliroentgens. This is approximately the dose which may be taken daily for an entire lifetime.

In the region between 200 and 500 miles from the shot point, observations of radioactivity in the air were made by members of the Health and Safety Division of the New York Operations Office. Stations were located in the downwind segment, at Elko (Nevada), Wendover, Salt Lake City and Delta (Utah), and Idaho Falls (Idaho). The highest values of activity in the air were found at Elko, where 0.18 microcurie per cubic meter of air was observed about 8 hours after the surface shot. The 24 hour average was about 0.003 microcurie per cubic meter. The safe level agreed upon by the Feasibility Committee (July report) was 1.0 microcurie per cubic meter. Hence observed levels failed to approach permissible levels.

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In addition to the above close-in monitoring of fall-out primarily for safety reasons, a country-wide monitoring program was also in effect through the coordinating activities of the Health and Safety Division, NYOO, and the cooperation of AEC laboratories and contractors and the Weather Bureau. Results of this study will be reported later, but none of the observations indicated hazardous levels of radioactivity anywhere in the country.

Analysis of soils samples. Analysis of soil samples collected from the fall-out from the surface and underground bursts at the Nevada Test Site has provided useful data for the evaluation of the overall health hazards of atomic explosions. Deposition of radioactive particles on the land and absorption by plants is the beginning of a major pathway for uptake by man of fission products and induced radioactive elements.

Additional samples of the dirt and fused glass of sodium, potassium, and calcium silicates around the surface crater have also been collected. This material has been sent to the AEC project at the U. S. Department of Agriculture at Beltsville, Maryland, for chemical and particle size analysis and for studying its rate of uptake by plants growing in various soils. Minute particles of the fused soil constitute an appreciable portion of the radioactive dust cloud and it is desirable to know its solubility and rate of solubilization on various soils, especially eastern acid ones. Previous test of the fall-out on the soil from around the old Alamogordo test crater in New Mexico had indicated that the radioactivity was taken up by the plants very slowly over a period of several years. However, the western desert soil has an alkaline character while eastern soils are predominantly acid. It is known that glass silicates are many times more soluble in slightly acid solutions. Therefore, it is desirable to obtain more information on the rate at which radioactive fall-out will be absorbed by plants from dust from an underground explosion.

Study of long-range effects. The study of long-range effects which may result from the detonation of a large number of atomic bombs was begun several years ago. During the past few months, the question was again subjected to careful scrutiny in the light of new information gleaned from recent bomb tests, and a revised report was prepared. In November, this report and the various questions of climatology, fall-out, and biological effects of bomb debris were carefully considered by an ad hoc committee of appropriate specialists<sup>1/</sup> assembled by the Division of Biology and Medicine. This committee agreed in essence with the conclusions of the report and went on to consider short-range effects as well. Results of

<sup>1/</sup> L. S. Taylor, Chairman (USNBS physicist), N. M. Smith, Jr. (ORNL, author of reports), Edward Teller (LASL theoretical physicist), Joseph Kaplan (UCLA geophysicist), Leo Marinelli (ANL radiologist and health physicist), Col. Benjamin Holzman (USAF meteorologist), Sterling Hendricks (USDA soil expert), William Urry and Donald Rock (AFOAT-1), Shields Warren (Director, B&M). This group was assisted by Dr. Sverre Petterssen of Air Weather Service and staff members of Divisions of Biology and Medicine, Military Application, and Reactor Development.

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the study to date are being summarized, and further studies are planned should they be required.

Shelter Design Criteria

A prototype shelter was designed by the Civil Defense Liaison Branch and was tested during Operation BUSTER in the fall of 1951. In the design of the shelter primary consideration was given to simplicity and economy and to optimum salvage value.

In order to obtain maximum test data to support theoretical design the shelter was built in two sections, each of different material and construction, to compare the relative effectiveness of each. Specifically, the structure consisted of:

(1) 24 feet (3 8-ft.lengths) of 90-inch (I.D.) culvert pipe of standard centrifugally spun reinforced concrete, with a poured-in-place reinforced concrete ramp entrance; and


(2) 24 feet (4 6-ft.lengths) of 90-inch (I.D.) culvert pipe of standard 10-gauge ingot iron corrugated multiplate, with a 10-gauge corrugated multiplate and structural steel ramp entrance.

These materials were joined at the center to form a 48-foot long shelter covered with 3 feet and 3 feet, 8 inches of earth over the concrete and metal pipe, respectively, with a capacity of 48 persons. The structure was located 800 feet from ground zero of Shots BAKER, CHARLIE, and DOG, and a greater distance from Shot EASY, of Operation BUSTER. Shots CHARLIE and DOG exposed it to estimated blast, radiation, and thermal effects of greater severity from each shot than that at ground zero from a 20 kiloton atomic bomb detonated at a 2,000-foot height. The shelter successfully withstood the individual and cumulative blast overloadings with light to moderate observable damage. Final evaluation of radiation, pressure, and displacement measurements will furnish valuable data for future consideration with respect to gamma radiation, reflected static pressures from shock fronts, and dynamic overpressures, or wind drag, inside the shelter and their effects on occupants.

The data obtained from this test will be made available to the FCDA for review and study, and its applicability to civil defense practices for protective measures.

Instrument Loan Program

Instruments were provided for FCDA for use in the three touring exhibits, the "Alert America Convoys." These convoys have been prepared and are operated by the Valley Forge Foundation for FCDA.



### Effect of X-Radiation on Chromosome Breakage

Recent studies at Brookhaven include the effects of X-radiation on various plants. In experimenting with a lily, as a typical plant, an interesting reaction was noticed. Chromosome fragmentation occurs most frequently if the radiation is given when the dividing cells are at the diplotene stage, immediately preceding the actual division of the cell nucleus. It has been found that nucleic acid (DNA) is actively synthesized up to that time, and then remains constant. Thus it is believed that chromosome breakage, or mutation, is associated with DNA synthesis, even though this is not the only factor in radiosensitivity.

### Protective Chemicals to Living Cells

The protective action of certain chemicals against irradiation damage to living cells continues to be a subject of major interest at ORNL. High oxygen concentration is directly related to death by X-irradiation, and most chemicals which give increased protection against radiation damage are oxidizable compounds. Recent work has shown how this protective action results. It is shown that these protective chemicals remove oxygen from within and around bacterial cells, and this decreases the concentration of toxic substances formed by the action of X-rays.

### Radiation Instruments Catalog

Preparation of the 1952 edition of the Radiation Instruments Catalog has been initiated. The new issue will be about one-third the present size and will represent a considerable savings in publication costs and an improvement in format.

### Ra-Det

The November issue of Ra-Det will include as its feature articles, a report on a tritium air monitor developed at Los Alamos Scientific Laboratory, and a progress report on the development of the special photomultiplier tubes at RCA Laboratories under AEC contract.

Both of these items have been of interest to AEC personnel as well as to other governmental agencies, and the articles provide considerable factual data.

### Visitors to Radiation Instruments Branch

In November, the RIB received 15 visitors from the following organizations: Ericson Research Laboratory, Radio Corporation of America Research Laboratory, Westinghouse Atomic Energy Laboratory, El-Tronics, Inc., Beckman Instruments, Inc., Nuclear Instruments and Chemical Corporation, Landsverk Electrometer Company, Office of Naval Research, Navy Department Bureau of Aeronautics, Princeton University, and the National Bureau of Standards.

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