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QUARTERLY PROGRESS REPORT (U)

to the JOINT COMMITTEE on ATOMIC ENERGY

RESTRICTED DATA

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April - June 1958

UNITED STATES ATOMIC ENERGY COMMISSION

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*Transmitted as a separate document.

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NUCLEAR ACCIDENT AT OAK RIDGE Y-12 PLANT [redacted]

A nuclear accident occurred on June 16 in the weapons fabrication facility of the Y-12 plant at Oak Ridge. A critical mass was formed when a solution of highly enriched uranium was inadvertently transferred from a container of "always safe" configuration to one not so designed. The radioactivity thus released set off the alarm system and the plant was evacuated. Except for the immediate area of the accident, the building was reoccupied within 4 hours. Decontamination was completed and all areas were returned to operation by June 23.

Eight employees were exposed to radiation. Five were estimated to have received exposures between 200 and 320 rad.* The other three received less exposure and showed no indications of radiation effect. All eight were under continuing observation at the Medical Division Hospital of the Oak Ridge Institute of Nuclear Studies. (End of [redacted]ection.)

*These five men were released from the hospital on July 30. By this time, more than 6 weeks after the accident, they had passed through their critical period and were recovering satisfactorily from the acute phase of exposure to this radiation. While there were definite changes in the blood elements of all five men, there were evidences of recovery of the bone marrow such as to warrant a favorable prognosis.

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Part VIII

Biology and Medicine

PROJECT SUNSHINE ([redacted])

Monitoring and sampling of worldwide radioactive fallout continued throughout the quarter. The Health and Safety Laboratory of the New York Operations Office prepared a report which brings together all the data that have been obtained on the deposition and uptake of fallout since systematic monitoring and sampling began.* The data on gummed film, surface air monitoring, Pacific Ocean water, and human bone sampling are only summarized in the report because they comprise hundreds of thousands of individual listings. However, the detailed information is unclassified and available to anyone.

Stratospheric Monitoring

Table 1 summarizes the results of analysis for strontium 90 of stratospheric samples collected during the period November 1956 through January 1958, based on data available

Table 1—Average Concentrations of Strontium 90 in Stratospheric Samples Collected November 1956 through January 1958*

(Strontium 90 content expressed in micromicrocuries per 1,000 cubic feet of air, reduced to standard conditions.)

	Minneapolis, Minnesota		San Angelo, Texas		Panama Canal Zone France Air Force Base		Sao Paulo, Brazil	
Altitude (feet)	Average strontium 90 content	Number of samples	Average strontium 90 content	Number of samples	Average strontium 90 content	Number of samples	Average strontium 90 content	Number of samples
90,000	7 ± 10†	10	5 ± 5	14	7 ± 5	2	9 ± 9	11
80,000	10 ± 7	8	15 ± 10	11	14 ± 11	5	12 ± 8	14
65,000	24 ± 15	17	29 ± 12	10	29 ± 26	6	17 ± 13	11
50,000	9 ± 5	19	2 ± 2	10	-	0	1 ± 1	5‡

*Based on data available through June 26, 1958. Analyses had not been completed on all samples collected during this period. The program calls for one sample a month from each altitude at each location. In some instances the sample was not recovered.

† Range shows one standard deviation above and below average. Standard deviations shown include both errors of measurement and variations in strontium 90 content from month to month.

‡ These samples were collected in the vicinity of the tropopause and probably do not represent stratospheric concentrations. The 50,000-foot sampling level is usually below the stratosphere at this location.

*Copies of this report, "Environmental Contamination from Weapons Tests—A Compilation of Data Concerning Transport, Deposition, Distribution, and Biological Uptake of Worldwide Radioactive Fallout," HASL-42, were provided to the Joint Committee. The report will be sold by the Office of Technical Services, Department of Commerce.

[redacted]

through June 26. It will not be possible to give these data their final interpretation in terms of strontium 90 concentrations in the stratosphere until the question of the efficiency of air filters can be resolved.

Foreign Food Collection

Food samples were collected in Spain by a nutrition team of the Interdepartmental Committee on Nutrition for National Defense and will be analyzed for their strontium 90 and calcium content. (End of U[redacted]section.)

RADIOBIOLOGICAL SURVEYS IN THE PACIFIC [redacted]

A number of radiobiological surveys were under way in the Pacific to monitor the radioactivity in the water and marine organisms resulting from the current test series, Operation HARDTACK. In addition, ecological studies at Rongelap Atoll will continue. Each of these programs is described briefly below.

Surveys in Connection with HARDTACK

Informal arrangements were made with a radiochemist of the National Institute of Health, Tokyo, for the collection of tuna samples at a port of landing in Japan. A total of 2,600 samples will be collected at the rate of 20 samples per day 5 days a week for 6 months and sent to the Laboratory of Radiation Biology of the University of Washington. All samples will be counted for total beta and gamma activity, and a limited number will be selected for radiochemical analysis. The Japanese will retain duplicate samples, and it is expected that information on sample analyses will be exchanged with them.

In connection with the WAHOO underwater detonation on May 15, which was only the third underwater detonation since the beginning of testing in the Pacific, the University of Washington and the Office of Naval Research joined forces to observe the physical and biological dispersal in the water of radioactivity from that event. The Hydrographic Office Vessel USS *Rehoboth* was used for the observation of water structure and the collection of water, plankton, and fish, both before and after the event.

A limited number of biological samples were collected at Eniwetok, Bikini, and a few nearby atolls prior to Operation HARDTACK and will also be collected following the test series. Personnel were to be available during the operation for other radiobiological surveys that might be needed.

Immediately following the conclusion of the current test series a survey similar to the post-REDWING survey of 1956 will be conducted to measure the contamination of water in the restricted area preparatory to removing the boundaries of the area. The survey will go beyond the restricted area and in general, will include the area between Bikini, Eniwetok, and Guam. Water, plankton, and fish will be collected. Gross beta and gamma counts will be made of all samples and radiochemical analyses of a limited number of selected samples.

Beginning in July, four radiobiological surveys were to be made during the year at Guam, in the Palau Islands, and in the Gulf of Siam by the Vanderbilt Foundation of Stanford University. The ocean transport of contamination from the test site to these areas requires several months. Those organisms will be collected that are most likely to concentrate radioisotopes from weapons tests (commonly called indicator species) and that correspond most closely to species sampled in other radiobiological surveys. Indicator species include fish, giant clams, lobster, plankton, and land crabs. The samples will be sent to the University of Washington for counting and radiochemical analysis.

Rongelap Ecological Studies

The first phase of a long-term ecological survey of Rongelap Atoll was carried out during February and March. The object of the initial study was to determine the types of soil on the atoll, their approximate distribution, their chemical and physical properties, their relation to plant distribution, and the distribution of radioactive materials in soils, plants, and ground water. Field work consisted of reconnaissance surveys of Rongelap, Eniaetok, and Kabelle Islands, followed by detailed examination of soil profiles and collection of soil samples.

An integral part of the Rongelap ecology study is the continuing program of monitoring the foodstuffs of the natives. This serves as a check on the radioisotopes ingested by the natives and also provides information required for food chain studies.

Thirteen field rats collected on Rongelap Island during this trip were assayed for strontium 90 content of bone. The values obtained ranged from 268 to 926 strontium units, with an average value of 443. One pig bone was obtained, which gave an assay of 480 strontium units.

A second field trip is planned for September 1958. (End of [redacted]ection.)

TREATMENT OF RADIATION DAMAGE ([redacted])

Studies continued at the Oak Ridge National Laboratory on the treatment of radiation injury by bone marrow transplants. In an experiment conducted on bone marrow cells in suspension the cells were protected from a dose of 800 roentgens of X irradiation by removing most of the oxygen in the cell suspension just before irradiation. Protection was judged by the ability of the irradiated marrow cells to promote recovery in mice exposed to a lethal dose of radiation.

Various chemical compounds were administered to mice in an effort to suppress the reaction which prevents the successful transplant of foreign bone marrow. None of these compounds proved to be effective, nor did diets deficient in specific vitamins have any effect on this reaction.

RADIOLOGICAL ASSISTANCE PLAN

Procedures coordinating the capabilities of the AEC and the Department of Defense for handling all types of radiation incidents were established during the quarter. As reported in the Program Status Report for December 31, 1957, the AEC had certain capabilities for handling both onsite and offsite incidents, and joint AEC-Department of Defense procedures were already in existence for handling incidents involving nuclear weapons. The new radiological assistance plan applies to both weapon and nonweapon incidents arising in onsite contractor operations, offsite contractor or licensee establishments, or in other places as reported by either military or civil authorities. The plan provides for rapid response to a request for assistance at the scene of an incident by a team from the responsible AEC regional office, with assistance from the AEC-DOD Coordination Center at Sandia Base, New Mexico, if requested.

The AEC issued a press release on June 10 describing the services available in the event of a radiation incident. Each AEC regional office sent letters describing the radiological assistance plan to contractors, licensees, and state and local government officials in the geographical area under its jurisdiction.

CIVIL EFFECTS ACTIVITIES

Civil Effects Exercise 58-1

A civil effects exercise was conducted at the Nevada Test Site (NTS) during May under the technical leadership of the Oak Ridge National Laboratory to determine shielding characteristics of typical structures remaining at NTS and the value of simple modifications and other methods of improving the shielding. The objective of this exercise was to develop data useful in the preparation of standards for fallout protection and to find inexpensive means of improving or improvizing shelters. Another important phase of the exercise was the collection of data on which to base specifications for a vehicle equipped with radiation sources and instruments for evaluating the shelter characteristics of homes.

Civil Effects Exercise 58-2

A brief but intense temperature rise at the time of nuclear detonation was noted in certain large shelters at NTS, particularly during Operation TEAPOT experiments in 1955. A civil effects exercise was scheduled for a 2-week period during August at NTS to determine the attenuation of light by the configuration of these shelters in an effort to determine the physical basis for the temperature rise. Data on temperature rises in shelters is essential to the development of acceptable criteria for protective construction.

Civil Effects Exercise 58-3

During June personnel of the Atomic Energy Project of the University of California at Los Angeles initiated a resurvey of the radiation levels in and around the Nevada Test Site. A detailed survey of the Jackass Flats area, which was to be completed prior to the commencement of reactor testing activities in that area, was to include sampling of soil, plants, and animals as well as monitoring of radiation levels. This information may be useful to projected ecological studies.

Planning for Future Civil Effects Tests

In order to lay a firm foundation for participation in future test operations, task units were established to review existing information on various subjects and to determine the types of field experiments that would furnish the most urgently needed data and the preliminary laboratory work that would complement these experiments. These groups, each composed of six or more specialists, are conducting studies of radiobiology, fallout, ecology, genetics, blast biology, thermal biology and effects, physical damage to structures, countermeasures and decontamination, and radiation dosimetry and other instrumentation.

A group of 15 ecologists met May 27–29 at the Nevada Test Site to consider research needs and opportunities in this area. This survey of NTS was only a part of the group's total program; its recommendations for ecological research were expected to cover all aspects of interest to the AEC.

BACKGROUND RADIATION SURVEY OF ATOMIC ENERGY INSTALLATIONS

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