UNITED STATES
ATOMIC ENERGY COMMISSION
WASHINGTON 25, D. C.

Mr. James T. Ramey
Executive Director
Joint Committee on Atomic Energy
Congress of the United States

Dear Mr. Ramey:

Enclosed are copies of a summary and report entitled "Medical Survey of Rongelap People Five and Six Years after Exposure to Fallout". I believe the Joint Committee will find this material of interest. The report was prepared by the Brookhaven National Laboratory from data obtained by Dr. Robert A. Conard and associates. The summary was prepared by Dr. William E. Lotz of this Division.

In brief, the Marshallese are not showing clinical signs and symptoms or abnormalities clearly attributable to their 1954 exposure. They continue to show, however, low body burdens of Sr^{90}, Cs^{137} and Zn^{65}, all of which we believe to originate from the contamination in their current food supplies; the Zn^{65} is believed to come from the seafood caught locally.

If additional copies of the report and summary are desired, we shall be pleased to forward them.

Sincerely yours,

C. L. Dunham, M.D., Director
Division of Biology and Medicine

Enclosures:
Report and Summary (2)

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SUMMARY OF MEDICAL SURVEY OF RONGELAP PEOPLE

FIVE AND SIX YEARS AFTER EXPOSURE TO FALLOUT

Annual medical surveys of the Marshallese Islanders were carried out in March 1959 and March 1960, 5 and 6 years after their accidental exposure to the fallout from the weapon exploded at Bikini March 1, 1954. During the 1959 survey 76 exposed persons, including their children, and 166 unexposed Rongelap people, who served as a comparison population, were examined. In addition, groups of children at Utirik, Majuro, and Kwajalein Atolls were examined as controls for the growth and development studies on the exposed Rongelap children. The 1960 survey was brief, only the exposed people being examined.

As a result of their exposure in 1954, many of the Rongelap people had experienced early symptoms related to the gastrointestinal tract and beta burns of the skin along with spotty epilation. Later they showed depression of their peripheral blood elements commensurate with the calculated doses of gamma radiation (175r to 64 people and 69r to 18 people). In addition, radiochemical analyses of urine samples indicated that they had acquired fractional body burdens of certain radionuclides. Despite these evidences of exposure, acute radiation sickness did not develop in the people and there were no deaths then (or subsequently) that could be assigned to their radiation exposure. No specific therapy was given. Recovery of the peripheral blood elements, particularly the lymphocytes and platelets, proceeded gradually over the ensuing years. The beta burns, which appeared about two weeks after exposure, were, for the most part, superficial in nature and healed in several weeks; only a few lesions persisted and these were not disabling in any way. The hair regrew normally, beginning about three months after exposure. The internally absorbed radionuclides caused no known acute effects and were rapidly excreted so that barely detectable activity was found a year or two later, excepting the Sr^{90} and Cs^{137} isotopes present in the general population and Zn^{65}.

The 5- and 6-year post-exposure surveys were aimed primarily at evaluating the general medical status of the people in comparison with the unexposed control population, particularly as to slowly developing radiation effects.

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Medical histories of the people during 1958 to 1960 were essentially uneventful; no special disease occurred and there were no significant differences in mortality rates. Four deaths have occurred in the exposed people since exposure giving a mortality rate of 8.1 per 1000 population, compared with 8.3 per 1000 for the control population and 6.8 for the Marshall Islands as a whole. The birth rate in the exposed group over the past six years indicates no noticeable change in fertility. The 24 births represent a rate of 48 per 1000 population, compared with 62 per 1000 for the control population and 37.3 for the Marshall Islands (1957).

Physical examinations showed both the exposed and unexposed people to be generally in a state of good health. No conditions were seen that could be directly related to radiation effects. The incidence of various minor disorders in both adults and children was about the same in the exposed and unexposed groups.

In connection with growth and development studies in the six-year chronological age group, three boys and one girl out of five boys and two girls in the exposed group exhibited significantly retarded skeletal maturation as judged by x-ray examination, but the over-all group sizes are too small to warrant interpretation.

A cardiovascular survey of the adults showed no outstanding differences between the exposed and unexposed groups.

An arthritis survey showed no real differences between the exposed and the unexposed people; the incidence is about the same as that seen in American populations.

An opthalmological survey demonstrated no differences between the exposed and unexposed groups except possibly a slightly greater incidence of corneal hypertrophy and scars in the exposed group.

A dental survey showed no significant differences in either caries rate or incidence of peridontal disease between exposed and unexposed groups. Radiation exposure appears not to have affected dentition in the exposed children.

The late effects of radiation are difficult to assess as they are those associated with normal ageing (skin looseness, elasticity, and senile changes; greying of the hair and balding; loss of accomodation, reduced visual acuity, and arcus senilis; reduced hearing; cardiovascular changes including blood pressure and degrees of peripheral and retinal arteriosclerosis; retrogression of neuromuscular function and hand strength were measured or estimated on a 0 to 4 + scale). Comparison of these measurements in exposed and unexposed individuals of the same age groups revealed no clear differences.

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One case of cancer developed in the exposed group five years after exposure, but this is too soon, it is believed, to be related to radiation exposure. Leukemia surveys including physical findings, studies of white cell counts and types, alkaline phosphatase staining, and basophil counts showed no evidence of leukemia or leukemic tendency.

Genetic effects have not been specifically studied because of the small number of people involved. However, no apparent radiation-induced genetic changes have been detected on routine physical examination in the first-generation children of exposed parents.

The hematological surveys continue to show considerable fluctuation in the year-to-year mean levels of leukocytes in both the exposed and unexposed groups. The mean leukocyte level of the exposed group showed a decrease at the 1960 survey compared to 1959 (no unexposed people were examined). The reasons for these fluctuations are not apparent. At five years post-exposure (1959), the exposed people still had mean platelet levels 10 to 15% below those of the unexposed group, but in 1960 the lymphocyte levels for the first time equaled those of the unexposed group. The mean erythrocyte levels were slightly lower in the exposed people but a general anemic tendency exists in all Marshallese, both exposed and unexposed. The fact that some of the blood elements in the exposed group have not yet returned to the levels of the unexposed group raises the possibility that a residual radiation effect on the bone marrow persists, but other, not immediately apparent, factors may be involved.

Radionuclide body burdens of Cs^{137}, Zn^{65} and Sr^{90} were evaluated by measurement in a whole-body counter or by estimation from radiochemical analyses of the urine. The mean body burdens for 1959 were: Cs^{137} = 0.57 μc; Zn^{65} = 0.44 μc; and Sr^{90} = 6.0 μc. The body burdens of Zn^{65} and Sr^{90} continue to rise but at decreasing rates, whereas the level for Cs^{137} appears to have reached equilibrium and now to be diminishing. Little or none of the body burdens of the exposed group appear to be due to the initial exposure, since at present there is little difference between the levels of the exposed and unexposed populations living on Rongelap Island. This may be explained by the fact that additional weapon tests held in the area have deposited additional fission products into the environment, and the fact that certain staples of diet are imported and, hence, the people are not living in a "closed environment." Consequently, it may never be possible to equate body burdens with environmental contaminations. In any case, the body burdens are now and will be of small significance in terms of radiation hazards.

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Judging from the Japanese populations being studied by the Atomic Bomb Casualty Commission at Hiroshima and Nagasaki, the next five years will be the critical period for the development of leukemia in the Marshallese. Since animal experiments indicate that still other late effects may occur in man such as premature ageing, shortening of life span, increase in degenerative diseases, genetic changes, etc., continued careful examination of these populations is in order; all effects should be documented and therapeutic procedures instituted wherever possible, should such effects develop. In addition, the relation of the environmental contamination on Rongelap to the body burdens of radionuclides of the people living there, imperfect though it is, warrants close study.

The United Nations Scientific Committee on the Effects of Atomic Radiations now reviews these yearly surveys.