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Protocol

Radiological Survey at Bikini Atoll

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April 1976

I. Purpose

As preparations continue to be made for the repatriation of the Bikini people, the need for additional detail on the extant radiological conditions at Bikini Atoll becomes more apparent. Surveys by Brookhaven National Laboratory (BNL), and the University of Washington, Laboratory of Radiation Ecology (LRE), from 1972 to the present have served to pull together previous data and provide more contemporary assessments of the radiological impacts of environmental radioactivity on the returning population. These data also laid the groundwork for a major multiagency survey of Bikini and Eneu Islands in the summer of 1975 which was designed to provide a sufficiently complete radiological picture for the Bikini Council and for the Department of the Interior and Trust Territory planners to make the final arrangements for repatriation.

The preliminary Bikini Atoll Master Plan, developed for, and in concert with, the Bikini people by Holmes and Narver, Inc., has established a priority list for the agricultural development of other islands in the atoll. The Nam-Bokata complex in the northwest corner of the atoll will be developed first and the survey team expects to concentrate its efforts in this region since sketchy data exist on the present radiological conditions there. In addition, followup environmental monitoring will be performed

at Bikini and Eneu Islands in an effort to establish trends in the transport and loss of radionuclides at these locations.

II. Concept of Operations

The April 1976 Radiological Survey will include sampling of terrestrial biota and soil, and external radiation measurements at Bikini, Eneu, Nam, Boknegen, and Bokata Islands. In addition, catchment water and/or well water will be sampled from existing sources on Bikini and Eneu Islands.

Personnel and cargo will assemble at Kwajalein and continue to Bikini Atoll via a Kwajalein Missile Range C-54 charter flight to Eneu. At this point the radiological survey team will rendezvous with the R.V. Liktanur and with returning members of the BNL Medical Survey Team. The R. V. Liktanur will provide the base of operations for the radiological survey and will transport survey personnel and cargo to Kwajalein when the survey is completed.

Samples will be shipped via military aircraft and commercial air freight from Kwajalein to BNL and LRE for analysis.

III. Organization and Responsibilities

The management of all survey operations will be the responsibility of the BNL Field Survey Leader. The survey team is expected to include representatives of: a) Brookhaven National Laboratory (BNL); b) University of Washington (LRE); c) Bureau of Radiological Health (USDHEW; BRH); d) State University of New York, Stony Brook (SUSB).

The BNL Field Survey Leader will be responsible for the following:

- 1) direction of field survey operations; 2) coordination of the radio-ecological survey program with BNL Medical Department personnel who will be remaining at Bikini for sick call; 3) management of analytical laboratory efforts on samples collected; 4) preparation of the final survey report.
- The survey team members will assist in field measurements, sample collection and analysis, and interpretation of survey results as requested.

IV. Schedule

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| April 1 | Latest arrival date for Survey Team members in Honolulu. |
| April 2 | Departure to Kwajalein via MAC flight from Hickam AFB. |
| April 4 | Personnel and cargo depart Kwajalein for Bikini via
C-54 charter. Rendezvous with R. V. Liktanur and
with returning BNL Medical Survey Team members.
Followup sample collections on Eneu Island. |
| April 5-6 | Followup sample collections and field measurements at
Bikini Island. |
| April 7-9 | Survey at Nam-Bokata Island complex. |
| April 9 | R. V. Liktanur depart Bikini for Kwajalein. |
| April 14 | Personnel depart Kwajalein for Honolulu via MAC. |

April 1976 Bikini Survey Plan

Field Survey Leader: N. A. Greenhouse

Team members: J. R. Naidu (BNL); F. J. Haughey (BNL); A. V. Kuehner (BNL);
M. S. Terpilak (BRH); K. A. Kastens (SUSB)

Eneu Island

Ground water samples will be collected from the well in the camp area. Additional water samples will be taken for V. Noshkin, Lawrence Livermore Laboratory, at his request. Limited collections will be made of coconut and other available plant material which is relevant to the Marshallese diet. If time permits, beta dose rates will be determined at selected stations by direct beta counting and absorption measurements in the field.

Bikini Island

Ground water samples will be taken from the USGS well and from the new (1975) wells where possible. Additional samples will be collected for LLL per their request. A pooled sample of catchment water will be collected from the houses in the village area.

Sediments will be collected from catchment bottoms where possible for analysis for resuspended radionuclides, particularly alpha emitters, which may have been deposited on the roof tops and subsequently carried into the cisterns by rainwater. Samples of deposited dust will be collected from the houses for analysis for resuspended alpha emitters. The cistern sediment and house dust samples are expected to provide a qualitative indication of the mobility of soil alpha emitters. Fractionation of plutonium and americium bearing particulates during soil resuspension and redeposition may be inferred from differences between their specific activities and those of near surface soil samples taken in the 1975 survey.

The relatively low dose rates in most locations did not permit definitive assessments of beta dose rates by thermoluminescence dosimetry (TLD) during the 1975 survey. Beta dose estimates will be attempted in the village area and in the interior at Bikini Island by in situ beta counting and beta absorption measurements. The 1975 ground gamma survey data will be used to select approximately three locations for beta measurements in the village area and three in the interior based on observed gamma exposure rates.

The subsistence garden in the village area will be observed for previously sampled items and for new items which may have matured since the 1975 survey. Selected plant items and associated surface soil will be collected for laboratory analysis. Samples of mature breadfruit will be collected depending on availability.

Lastly, LiF TLDs left in the village area during the 1975 survey will be collected, and attempts will be made to buy or barter for specimens of local livestock for laboratory analysis of organ burdens for various radionuclides.

Nam-Bokata Complex

Two approximately north-south running transects will be cut through the vegetation at Nam Island. The approximate routes will be determined from enlarged high altitude aerial photographs taken during the 1975 survey, and supplied to us by E G & G, Inc. Measurements will be made of external gamma and beta exposure rates at selected identifiable sites along each transect, and at other accessible sites on the island near recognizable landmarks. Approximately three vertical soil profiles will be obtained along

each transect, along with 50 to 100 near surface samples. Where possible, the vertical profiles will be taken near collection sites for desired vegetation samples, probably Messerschmidia and Scaevola, which can be correlated with traditional food species. LiF TLDs will be installed at selected sites based on gamma survey information. These will be collected during a quarterly visit by the BNL Medical Survey Team in June or September 1976.

A single longitudinal transect will be made at Bokonejien and Bokata Islands. Similar field measurements and sample collections will be made as for Nam. The locations and numbers of measurements or samples will be determined from direct observations of field conditions.

Collections of coconut crabs from this region will be attempted depending on their availability.