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...erally, both WFO and the Northern Laboratory (NL) have been ... the ... islands. It would be desirable to distinguish between the past and present activities of the two laboratories. This should help to assure that the two programs continue to complement one another in the future.

In our view, NL has played the major role in (1) characterizing the radiation environments on contaminated islands, and (2) developing models for long-range predictive dosimetry using the environmental data. In contrast, WFO's past and present role has been in the performance of (1) routine environmental monitoring and internal dosimetry for environmentally derived radionuclides, and (2) retrospective dose assessments utilizing past and contemporary personnel and environmental monitoring data. However, prospective dosimetry efforts do not have been done at WFO for individuals; however, due to the paucity of historical data on individual results have generally tended to be population or subpopulation based. Contemporary dosimetry programs assessments to both individuals and populations and subgroups. Both the retrospective and the prospective dosimetry programs activities are based and the overall effort is coordinated by the NL, and provides information to WFO for long range predictive dosimetry.

Future Direct. As for the NLSP

As stated in the 1970 NLSP rationale, NL will cooperate with WFO in monitoring in view of the expectation that the Northern Laboratory's biological research will be rigidly defined and environmental monitoring. The NLSP also contains a section on environmental research provided in the rationale, and the existing need for a program.

toring and dosimetry information from BNL. The impetus behind this last issue was the discovery of unexpectedly high Cs-137 body burdens among Bikini Island residents in 1977 and 1978.

In keeping with historical precedents, we propose that BNL be designated the "lead laboratory" for those scientific and medical programs which involve direct interaction with the Marshallese people. In contrast, LLL would continue to function in areas related to environmental and long-term predictive dose assessments. Within this conceptual umbrella of "people-related" program, the MIRSP proposes to initiate, expand and/or continue activities in the following areas:

A. Retrospective Dose Assessments or Reassessments

The unexpected incidence of thyroid pathology among Utirik Atoll residents formed the basis of a proposal to reassess the thyroid and whole-body doses to the residents of Rongelap and Utirik resulting from the BRAVO test. This study has been funded at an annual level of about \$50K since FY 1978. The first report on this program is currently in draft. It covers the chronic doses to the populations of these two atolls, once they were returned home following the BRAVO evacuation. A report on the acute doses is awaiting receipt and analysis of work subcontracted to BNWL (activation analysis of I-129 and other long-lived fission products) and LLL (meteorological modelling of BRAVO fallout transport and deposition). In light of the modest level of funding for this project, we feel that significant progress has been made to date.

Our literature search in connection with the retrospective dosimetry activities has uncovered important historical radiological monitoring data for several additional atolls, including Likiep, Ujelang and Ailuk. When coupled with the results of the Northern Marshall Island's Radiological Survey (NMIRS) and our contemporary personnel monitoring activities these data will provide a reasonably sound basis for retrospective dose estimates for the populations of other atolls in the Northern Marshalls. It is also apparent that other tests in addition to BRAVO have made significant contributions to population doses in the region.

Insofar as P.L. 96-205 mandates medical care, environmental research and monitoring, etc. "for the people of such other atolls as may be found to be or have been exposed ...", we feel that an expanded program of retrospective dosimetry should be vigorously pursued. Apart from its obvious scientific importance, the doses incurred by the people of the Marshalls are now a politico-legal issue, and form a logical basis for the establishment of priorities in implementing P.L. 96-205. Since we have conceived the original retrospective dosimetry program, and have made demonstrable progress in this area, we feel that the expansion of our existing program is justified.

B. Contemporary Dosimetry

Historically, personnel monitoring (whole body counting and urine bioassay) activities in the Marshall Islands were conducted under the auspices of the Brookhaven Medical Program. This responsibility was gradually assumed by the MIRSP beginning in 1977. The rationale for this change was that the per-

sonnel monitoring activities were required for contemporary dose assessments, and are not related to the acute high-level doses which may have caused the medical problems at Rongelap and Utirik. Also, the need to provide these services for a growing number of Bikini residents had developed, and a similar need for was anticipated in connection with the impending return of the Enewetak people. Neither of these populations was affected by acute high-level radiation.

The years 1977 and 1978 were decisive in the revelation of unexpectedly high cesium body burdens among the Bikinians. Followup monitoring is continuing in order to record the decline in their body burdens since they left Bikini in 1978. These activities are seen as continuing indefinitely on behalf of the residents of Rongelap and Utirik, as well as for the newly added populations of Enewetak and Ujelang. The Bikini people may continue to be routinely monitored pending the outcome of negotiations on a temporary residence program on Eneu Island.

Baseline personnel monitoring was conducted early this year on the people of Enewetak Atoll, most of whom had been living for the past 33 years on Ujelang. The population mean body burden for Cs-137 is currently about ten times "background".* This discovery, though not significant in terms of contemporary doses and dose commitments, is proof of at least one fallout contamination episode at Ujelang during the testing period. As a result, serious consideration should be given to the inclusion of personnel monitoring at other populated atolls for which medical services will be offered under P.L. 96-205.

C. Control Data

The recent incidence of thyroid pathology at Utirik, and the allegations of similar problems at Likiep and other atolls have demonstrated the need for the compilation of control statistics and normal incidence levels for radiation-related disease and for medical and radiological parameters in the Marshall Islands. Preliminary discussions between BNL Medical and MIRSP personnel began in 1977 to consider the establishment of a "control atoll" from which the required statistical data could be derived and continuously updated. Such a strategy would probably be practical under P.L. 96-205. Short of this, it is deemed essential to the MIRSP that we develop a radiological control data base as soon as possible. The data required for accurate assessment of the personnel dose contributions from the Pacific testing activities are: (1) means and ranges of fallout nuclide body burdens and excretion rates for Marshallese who have not been affected by tropospheric fallout, and (2) anthropometric and metabolic statistics from which Marshallese "reference man, woman and child" data could be constructed. Some progress has been made in this latter area in cooperation with the Medical Program.

*Background body burdens for fallout radionuclides among the Marshallese are yet to be rigorously defined; however, a sampling of Majuro residents who never lived in the Northern Marshalls demonstrated cesium body burdens of 2 to 3 nCi in 1979.

D. Diet and Living Pattern Study

The understanding of radionuclides body burden kinetics, and of resultant doses and dose commitments requires a quantitative assessment of radionuclide intake. Preliminary efforts to develop these data were undertaken by the MIRSP in 1977, along with the gathering of information on Marshallese living patterns. This latter information is important insofar as the assignment of external radiation doses is concerned because the Marshallese are not monitored for external radiation, and the external dose component must be derived from models which define the movements of people among heterogeneous radiation environments. Our prior experience in these areas resulted in the assignment of responsibility to BNL for diet and living pattern assessments in support of the 1978 NMIRS.

Past experience has demonstrated that extended periods of residence by BNL scientists in a Marshallese community is the best way to gather this information. We are also convinced that it is the best way to accomplish the educational goals regarding radiation which are mandated by P.L. 96-205. For this reason, we feel that resident educational programs and diet and living pattern studies should best be conducted simultaneously. Observations of dramatic changes in diet and living patterns over the past several years also suggest that these studies be continued indefinitely. A proposal further discussing our involvement in these areas is the subject of a memorandum from J. Naidu and N. A. Greenhouse to V. Bond (copy attached).

Summary

This report discusses four areas in which the MIRSP should be expanded. We feel that these areas are necessary to the formulation and continuation of sound radiological programs in the Marshalls, as provided by P.L. 96-205. These activities should be viewed as being separate and distinct from the environmental and predictive dosimetry activities which to date have been conducted by LLL. They are, however, a necessary complement to the LLL programs, since they will provide actual dosimetric information against which the Livermore predictive dosimetry models can be referenced.

It is important to note that the present and proposed future activities of the MIRSP all involve close interaction with the Marshallese people, a fact which is intrinsic to the BNL Medical program. Therefore, for reasons of logistical cost effectiveness, and, perhaps more importantly, the minimization of the disruptive impact of field trip activities on Marshallese communities, we feel that the Medical Program and the MIRSP should be closely coupled.

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