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6. FROM
Roger Ray, Deputy for Pacific Operations
DOE/NV

7. John E. Viard
(Signature of authorizing official)

8. DATE 1-3-85

9. TO
John E. Rudolph (DP-224) GTN
ph. 353-3618

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Department of Energy

Nevada Operations Office

P. O. Box 14100

Las Vegas, NV 89114-4100

January 3, 1985

Memorandum for the File

MARSHALL ISLANDS DOSE ESTIMATES--MC CRAW MEMORANDUM OF DECEMBER 14, 1984

The subject memo from McCraw to Vallario notes what McCraw terms "an unexplained difference among LLNL dose estimates for Rongelap, Bikini and Eneu Islands." He then argues that this difference must be resolved "before any further consideration is given to providing DOE advice to DOL. . ." (underlining mine).

This concern of McCraw's is not new to those who are knowledgeable and current on DOE's scientific programs in the Marshall Islands. We have observed for some time that there appears to be a real difference between Bikini Atoll and Rongelap Atoll in terms of the uptake, transfer and removal of radiocesium (and other nuclides) in the biosystem. Some of the known differences which have been under study are the following:

- a. The difference in distance from the source. Most of the fallout debris at both atolls is attributable to the BRAVO test at Bikini Atoll. Thus the close-in fallout on Eneu and Bikini Islands was deposited from the low level air mass whereas both the BRAVO meteorology and intuition tell us that the deposition upon Rongelap resulted from transport by high level winds. It should be no surprise then if we should find differences in particle size and even in the chemistry of the pertinent nuclides (due to fractionation).
- b. Engineering and earth-moving. Both islands at Bikini have been subjected to significant earth moving and other disturbance incident to the cleanup and resettlement preparations. This has served to distribute the fallout debris deep in the soil column leading to enhanced availability in the root zone. Rongelap, on the other hand, remains relatively undisturbed. Thus again it should be no surprise if the concentration ratio between plant and soil varies from place to place as has been observed. This ratio, of course, translates directly into the ratio of internal to external dose.
- c. The age of the trees. The producing trees at Rongelap are of all ages, the island never having been stripped of its vegetation, as was the case at Eneu and Bikini. It is not known how significant this difference may be for there are very few older trees available for sampling at the latter two islands. Never the less, it is a difference which may contribute to the variation in concentration ratios.

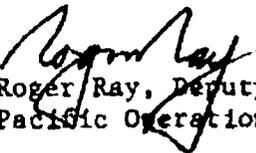
January 3, 1985

d. The variable distribution of soil concentrations at Bikini Island. Not only is the total inventory of radionuclides at Bikini Island much higher than at either of the other two locations, but the local concentrations vary widely from place to place within the island. Thus it is somewhat more difficult to determine concentration factors for Bikini Island. In addition, the dose ratios cited by McCraw are themselves complex numbers. With a constant distribution in depth, one would expect a near linear relationship between soil concentration and external dose; but it would be surprising if such variables as biological availability, plant uptake, gut transfer, retention in the body, etc., all lined up in such fashion as to result in a linear relationship between environmental concentrations and internal dose.

All of the matters discussed here are subjects of continuing investigation in the 90th Marshall Islands environmental program. If all of them were thoroughly understood, we could be satisfied with a much smaller data base and a much simpler modelling task and could with some confidence extrapolate from one location to another. Not enjoying this luxury, however, we continue to sample, to analyze, to study and observe.

The important and pertinent point is that in the case of Eneu we are not using Bikini data or Bikini Island data. We are using real and current Eneu data. Soil concentrations are determined not just as averages for the island as a whole, but for the root zones of particular trees. Furthermore, in the resettlement, the concentrations in foods grown on Eneu are actual measured values in the foods themselves rather than values calculated from food-soil ratios. External doses are calculated from actual measurements at Eneu Island. Nevertheless, we do not yet have a full explanation for the variation in ratios illustrated by the McCraw memo. But that ratio per se has no significance to radiological safety and health; nor does it provide any basis for challenging the predicted doses for residence on Eneu.

To delay further consideration of the Eneu resettlement question until all of the complexities of environmental radiation are understood with certainty would be both cowardly and intellectually absurd.


Roger Ray, Deputy for
Pacific Operations