

LAWRENCE LIVE MORE LABORATORY

Biomedical & Environmental BASIC ROUTING SLIP

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December 12, 1979

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FEBRUARY AGT. REP.				
OTHER				
REMARKS:				

Mr. W. J. Stanley  
 Director  
 Department of Energy  
 Pacific Area Support Office  
 P. O. Box 29939  
 Honolulu, HI 96820

Dear Bill:

I've been very negligent in writing detailed trip reports about our operations aboard the Likitanur this past year. One is easily lulled into a state of complacency when there is nothing to complain about and it is easy to outright forget, when other matters require attention, that it is just or more important to praise an excellent performance as it is to condemn a poor performance. Therefore, by this letter, I wish to provide you my independent evaluation of the operations aboard the Likitanur; the hospitality and cooperation extended to our group by the crew; and the adequacy of the vessel in support of our efforts this past year.

During 1979 we scheduled 3 cruises aboard the Likitanur to conduct a variety of oceanographic and groundwater studies at Bikini and Enewetak Atolls. During the periods 3-27 April, 14-22 June, and 19-26 October, 140 man-days of our effort were expended in the field on the following aquatic studies:

- 1) Sediment sampling program -- over 250 samples of lagoon surface sediment were collected from Bikini and Enewetak during the year. The purpose for the collections were (a) to document the present sediment concentrations and distributions of radionuclides and to compare these to concentrations and distributions measured in 1972 to assess what, if any, radiological changes have occurred in the lagoon during these intervening years, (b) to determine what modifications in lagoon sediment composition have occurred as a result of man's activities at the atolls; the previous compositional study for comparison was conducted by Emery in the early 1950's before the major nuclear tests were held at the atolls, (c) to document, by way of photographs, a description of the sediment types, composition and benthic organisms over the entire lagoon. Our previous work has shown that transuranics and other radionuclides are mobilized from the sedimentary deposits to the overlying water column where they are subsequently mixed in the lagoon water mass and are exchanged to the equatorial Pacific Ocean.

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We attempted some in-situ experiments in the lagoon to directly measure the flow of dissolved radionuclides entering the water column from the sediments. All of our efforts are related to understanding the persistence of long-lived radionuclides in the environment of Enewetak and Bikini Atolls to define and predict what future impacts the radionuclides may have on man using the environment.

- 2) Pelagic fish collection. One of the deficiencies recognized in our dose assessments was the lack of sufficient radiological data for representative pelagic species in the lagoons. We have, in hand, sufficient data for many of the reef species. This year, in conjunction with our other programs, a number of samples were collected from different regions of the lagoon to remedy this deficiency.
- 3) Lagoon water sampling. To understand how radionuclides move and migrate in any environment requires a knowledge of the basic chemistry of the specific radionuclide in the system. Last year a significant breakthrough occurred which allows one to differentiate between different chemical species of plutonium which coexist in seawater. Water samples from the lagoon and groundwater samples were collected to conduct this unique analysis to try to understand what environmental factors influence the oxidation state of plutonium in water at the atoll.
- 4) Groundwater sampling. As part of our continuing studies at the atolls, groundwater samples were collected for analysis at several islands of both atolls to provide temporal radiological and chemical data on water quality and to assess the migration of radionuclides first to the water table through the soil column and then to the lagoon.
- 5) A number of other ancillary experiments were conducted and samples were collected to study the partitioning of specific radionuclides between the soluble and the particulate phase in the lagoon water; tidal responses at specific wells; leakage of any radionuclide from the crypt at Cactus crater; concentrations of radionuclides in some terrestrial insects; radiological quality at 3 new fresh groundwater locations established on Engebi; and radionuclide levels associated with cable on the lagoon floor.

One does not have to be a qualified oceanographer to recognize that none of the marine or groundwater sampling could have been accomplished in a reasonable amount of time without:

- 1) An adequate small vessel with a shallow draft capable of operations anywhere in the lagoon and yet large enough to support operations for periods of time in remote regions of the lagoons with sufficient food and quarters for a scientific party and crew.
- 2) A stable platform that can maintain station position during sampling operations.

- 3) Ships' personnel having the ability to fix accurately positions at locations sampled in the lagoon.
- 4) Adequate equipment to lower and retrieve a bottom sediment collecting device and a qualified operator to handle the equipment.
- 5) A vessel to move personnel and considerable gear between islands at the atolls, to land this gear and people safely on shore, and to recover and relocate the same.
- 6) Ships' personnel that are responsive to the program's requirements.
- 7) Freezer facilities to store, for periods of time, perishable samples of sediment and biota.
- 8) A mobile laboratory in the field used to process specific samples.
- 9) Storage facilities for the various types of oceanographic equipment used on phases of this program.

In addition, a vessel has been required for use at the atolls which can quickly adjust or modify its facilities to accommodate the requirements of several programs. This is a unique capability not often found on an oceanographic ship.

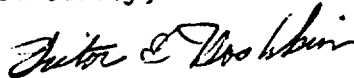
The Liktanur has fulfilled all our program requirements and, in fact, is far superior for our purposes than the LCU used in years prior to 1978. I cannot provide words adequate to praise all members of the crew collectively and each individually. They have, as a group, been exceptionally helpful and cooperative during our operations; provided us assistance whenever possible and have always conducted themselves as truly professional seamen. In addition to operating the ship in a professional manner and insuring we were at designated stations, they went out of their way to do things for us which I considered to be tasks beyond their normal duties. For example, they assisted with much of the on board sampling; photographed underwater operations; operated the winch during the entire sediment collection program; photographed the sediment samples; assisted with sampling on island; repaired gear and helped to repair gear when they could; assisted in planning for the day's or week's operation to minimize transit time between stations; helped collect underwater cable at Enewetak; secured all of our gear during long transits; helped to pack, unpack, and store gear on board; shipped samples back to us from Kwajalein; and performed a number of other tasks which made our operations on board much easier than anticipated.

Food on board has been more than adequate and plentiful. Larry has performed miracles in the confines of the small kitchen and it was often necessary to prepare meals while the ship was underway in rough water between stations at the atolls. It is difficult enough to prepare 3 meals a day for 10-15 people and when the motion of the ship is included, the task is compounded.

For our purposes, the sleeping quarters for the scientists on board have been adequate once the space limitations were recognized. We would never again plan to sail with a complement of 12 scientists on board since the quarters become overly crowded and, because of this, personnel quickly become irritable and are prone to complain excessively. It is quite easy to adjust the people on board to the space and other limitations of the ship. Once this is done, living for the scientists on board is comfortable, personnel are agreeable and work is accomplished using fewer people with a higher degree of efficiency.

In summary, for our program, the ship has provided us more than adequate support and for this we are greatly appreciative.

Sincerely,



Victor E. Noshkin  
Section Leader  
Aquatic Sciences Section  
Environmental Sciences Division

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Copies to:

Mr. H. Brown (PASO)  
Mr. C. Otterman  
Mr. R. Ray (NVO)  
Mr. R. Watters (DOE Hdqrts.)