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~~ENERGY RESEARCH & DEVELOPMENT ADMINISTRATION~~
Department of Energy

Division of
Operational and
Environmental Safety

May 15, 1978

Note to Dr. Bair, PNL:

Attached for your information is a copy
of a letter from LLL to Roger Ray regarding
the Atoll survey meeting.

Hal
Hal Hollister

Attachment



*Lawrence
Lawrence*

REPOSITORY PNNL
COLLECTION Marshall Islands
BOX No. 5685
FOLDER Sci Imp
Enewetak May 1978

DOCUMENT DOES NOT CONTAIN ECI

Reviewed by R. Schweltz Date 4/29/97



LAWRENCE LIVERMORE LABORATORY

ENVIRONMENTAL SCIENCES DIVISION

*New Atoll Survey
15-Atoll survey*

*Bank
15-Atoll Survey*

April 24, 1978

*1) Copy to Mill
Rice, Bruce
Wachholz (work
C.T. Mat.)
2) Send to Herb Field / PR
re Pacific Planning.
H S/M*

Mr. Roger Ray
Department of Energy
Nevada Operations Office
Las Vegas, Nevada 89114

Dear Roger,

After sifting over what we saw and heard or thought we heard or perhaps didn't hear at the Atoll survey meeting, we have come up with several field program plans for consideration. We've attempted to estimate the cost of each option and the impact on and requirements for the Wheeling operations to support the field efforts. We feel a reasonable job can be done at most of the Atolls, with your present schedule, providing that personnel are able to get ashore using available transportation.

Before we accept the job of supervising the survey efforts, some agreement must be reached to fold the analytical costs for the program into the cost for the entire survey. It makes absolutely no sense to spend a great deal of time and considerable effort in the field and in planning to correctly and carefully collect a lot of samples which will never be analyzed. We have no desire to find ourselves in the same situation we experienced after the 1975 Bikini survey. If the funds had been available to complete the analysis of the Bikini samples on a more timely basis, we may not have been in the mess we find ourselves in today. All samples should only be analyzed for ¹³⁷Cs, ⁹⁰Sr, and the transuranics by wet chemical methods. These are the principal dose contributing radionuclides at Bikini and Enewetak, and there should be no new surprises at the other Atolls. Let's not try to analyze what is easy or do a lot of spectrometry; this is a waste of money and effort. The levels of these radionuclides at Atolls other than Bikini and Enewetak will be very low. To generate accurate numbers will require careful and reliable analyses. We cannot afford to come out with a lot of less than numbers which could result in an ingestion dose equivalent in value to EPA guidelines. This was the case, as you know, for the dose computed for plutonium in the marine pathway generated from the samples collected at Enewetak for the survey. The dollars for processing will have to cover the handling and analysis of larger samples (>1 or 2 kg) of vegetation and fish. Laboratories only with low level analytical capabilities should be considered for the analytical work.

the 150K analytical price tag.

There are three options to consider for the terrestrial programs. The first involves going onto the islands with no backhoe and sampling the available terrestrial food products, surface soil and existing water cisterns and skimming wells. Transportation of personnel to the islands will be by helicopter when the whaler cannot be used. On larger islands, a jeep will be necessary to relocate gear, water barrels and personnel. Transporting the jeep will have to be done by helicopter. Preparation and equipment costs, which include additional freezers for the terrestrial samples, general land and water sampling gear, 15 gal. barrels for water, drying ovens, foot lockers, freeze dryer, etc., will cost approximately 28K. Additional space on the ship will be required for 3 freezers, a laboratory to log in samples, storage area for water barrels and terrestrial samples (preferably a conex container on the forward deck), and storage area for gear. If, on the average, 35 surface soil samples and 50 vegetation samples are collected at each Atoll, then analysis for ^{137}Cs , ^{90}Sr , and the transuranics would be required for approximately 1,100 samples. The analytical cost would be in the neighborhood of 440K dollars. Assuming there are 3 well sites or cisterns on the inhabited Atolls visited, the analytical cost for determining the radionuclide concentrations in water will run 8.5K. Each additional water sample will add 0.4K to the total. The disadvantages of this option are that we will be unable to profile soil for depth concentrations through the root zone to provide concentration ratio data, or establish new ground water wells on any island of the Atolls.

Shipping costs for the entire program are estimated at 55K.

April 24, 1978

We also indicate, in the enclosed letter, that it will be possible to conduct a more limited program, concentrating on 3 or 4 Atolls which would reduce costs somewhat. We will require additional guidance from Headquarters as to the desirability of this option and what Atolls should demand our focused attention.

A summary of the estimated costs for the program looks like the following:

	<u>Thousands of Dollars</u>
Supplies and Equipment to get started	47-50
Marine Analytical Processing and Analysis	150-700
Terrestrial and Water Processing and Analysis - Option 1	450
Terrestrial and Water Processing and Analysis - Option 2	810
Terrestrial and Water Processing and Analysis - Option 3	830
Dislocation pay and Air Travel at a rate of 100K/10 people for 3 months	110-150
Shipping Costs	35
Assessment	<u>100</u>
Minimum cost of Program	900
Maximum cost of Program	1865

The options and costs considered, we feel, are all reasonable estimates, based on what we think we can accomplish operating from the Wheeling with helicopter support within the time frame at each Atoll dictated by the requirements of the aerial survey. In order to get gear ordered, checked out and placed aboard the Wheeling before 15 August, the ordering must start now. All of our funds are committed for ongoing programs the rest of this fiscal year, and it looks as though 50K of new money will get things moving. As soon as this money is available and we have a guarantee that the entire program will be funded, please let us know so that we can start ordering. It will be the responsibility of individuals at Headquarters to recommend to us which option we should take to complete the type of program at the Atolls desired to provide sufficient data to estimate ingested radiation doses to individuals inhabiting the Marshall Islands.

Yours truly,



Victor E. Noshkin



William L. Robison

Mr. Roger Ray

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April 24, 1978

VEN:WLR:cd

Enclosure

cc: H. McCammon
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proposed for use; proposed access methods to the islands; availability of small boats; type of gear we can take and plan to move about on the islands for either marine or terrestrial sampling which, in turn, greatly depends on the types of support the ship is willing to provide the scientific parties; the current estimates of time to be spent at each Atoll which will determine the amount of work we can accomplish and the availability of funds which will be required to proceed with any proposed analytical phase of the program.

Marine Program

If a vessel can enter the lagoons a marine collection program should be considered to estimate dose from the marine foodchain. Either a sufficient quantity of the representative edible species be collected for analysis or fewer fish and representative water samples collected to both compute and compare concentration factors. These values can then be used to predict average concentrations in the marine species at the remaining Atolls. All samples should only be analyzed for ^{137}Cs , ^{90}Sr and plutonium radionuclides by wet chemical methods. These are the principal dose contributing radionuclides in the marine pathway at Enewetak and Bikini and it would be a wasted effort to consider looking for other radionuclides by either gamma spectrometry or by wet chemical methods at the other 13 Atolls. As a minimum, at least 2 representative reef species, commonly consumed, be collected from 5 Atoll locations at each Atoll. Five to 10 larger pelagic species should be taken from each lagoon. The fish will be dissected into muscle, bone, skin, gut contents, gills and internal organs. The tissues from the reef fish at each location will be pooled for analysis while the tissues of the pelagic species, providing that large enough samples are available, will be analyzed separately. This procedure will yield from 1170 to 1560 separate samples, each to be analyzed for ^{137}Cs , ^{90}Sr and plutonium. The analytical cost of this program should run about 0.7×10^6 dollars.

to establish new wells, I feel that the available time and support required for this effort would be insufficient to mount a more meaningful program.

Terrestrial Program

If a dose assessment is expected at the conclusion of the 13 Atoll Survey then soil and vegetation sampling will be required. The aerial data will only give results for gamma emitters; we know from our experience at Bikini and Enewetak that ^{90}Sr , a beta emitter, is one of the major contributors to the potential dose to a population. Wet chemistry analysis of soil and vegetation will also be required to evaluate the potential long term effects from Pu.

Soil sampling will in fact be required to determine the depth distribution of gamma emitters in order to quantify and verify the aerial data. In addition, 90% of the total predicted doses to populations at Bikini and Enewetak Atolls are due to ^{137}Cs and ^{90}Sr ingested via the terrestrial foodchains. In order to properly assess this exposure pathway soil profiles, surface soils and vegetation samples will have to be collected for analysis of ^{137}Cs , ^{90}Sr and Pu to determine the potential radionuclide uptake in subsistence crops.

The degree to which soil and vegetation samples are collected at the various Atolls depends upon the time and support which will be available at each Atoll. With specific information on these two items a program could be designed which would be compatible with the time and support available.

If on the average 100 soil and soil profile samples and 60 vegetation samples were collected at each Atoll then gamma analysis

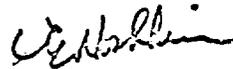
for ^{137}Cs and wet chemistry analysis for ^{90}Sr and Pu would be required for nearly 2000 samples. The analytical cost would be in the neighborhood of 0.8×10^6 dollars. There would of course be other incremental manpower costs such as overtime/dislocation pay and additional laboratory preparation work on these samples. The number of samples estimated above would be a minimal number for doing a reliable predictive dose assessment at each Atoll.

It is possible that it would not be essential to do the full scale assessment at each Atoll at this time. In that case attention could be focused on three or four Atolls which are now inhabited, or are likely to be in the near future, and thereby reduce the number of samples required and the subsequent analytical costs.

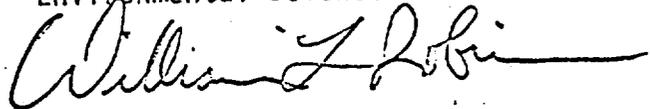
However, even to outline a reduced program focused at only 3 or 4 specific Atolls will require more information or time at each Atoll and available support during the survey.

We will be happy to help plan a more detailed program when more specific information is available.

Sincerely,



Victor E. Noshkin
Environmental Sciences Division



William L. Robison
Environmental Sciences Division

VEN:WLR:1b

cc: Helen McCammon, DBER
Robert Watters, DBER