

Preliminary outline of a program for the second radiobiological resurvey of Bikini Atoll during the summer of 1948 to be sponsored by the Atomic Energy Commission and the U. S. Navy.

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Prepared by the Applied Fisheries Laboratories  
University of Washington  
Contract No. W-29-094-eng-33

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Introduction

A resurvey of the Bikini Atoll during the summer of 1948 should be undertaken to further our knowledge of the over-all biological problems of the effect of the release of energy from atomic bombs above or under water.

Biological studies are of necessity long time, complex projects. The Bikini biological studies are so very complicated that only through continuous long time effort can we hope to understand the basic principles involved.

The fundamental data that needs to be gathered at regular time intervals for re-evaluation of the problems involved are grouped as follows: (1) the presence or absence of radiation in the various types of marine organisms; (2) the distribution of radioactive substances in the marine plants and animals from different geographical locations within the atoll; and (3) the amounts of radioactive substances in certain tissues and organs.

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DATE: <i>11-14-94</i>	
1. CLASSIFICATION CHANGED TO: 2. CLASSIFICATION CHANGED TO: 3. CONTAINS NO SCS CLASSIFIED INFO 4. COORDINATE WITH: 5. CLASSIFICATION CHANGED TO: 6. CLASSIFIED INFO DELETED 7. OTHER: <i>SCS necessity</i>	

Organization

The work of conducting a resurvey of the Bikini Atoll must have to be a joint operation between the Navy and representatives of the Atomic Energy Commission.

The Navy might be expected to provide the transportation to and from the atoll and the facilities for living and working in the area.

The Atomic Energy Commission would (1) provide through its contracts the technical staff to do the field work, (2) gather and analyze the data and (3) write the reports. Special equipment needed to conduct such studies would also be furnished by the Atomic Energy Commission.

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General outline of the suggested program of operations

Work Program

To provide samples of as many types of marine plants and animals that are available, five types of collections should be made:

A. Collections of marine forms from the intertidal and shallow reef zones from the following 10 locations. Collections would be made by use of rotenone. (1) Northwest tip of Bikini Island, (2) midway between Bikini and Amen Islands on the reef, (3) Near Uku Island along the inner and outer reef, (4) near the lagoon side of Namu Island, (5) along the inner and outer reef near Boro Island, (6) lagoon side of Cherry Island, (7) lagoon side of Airy Island, (8) Enyu Island near the channel, (9) lagoon side of Rokar Island, (10) on the lagoon side of Bikini Island.

B. Collections of marine forms from the coral heads in 25 to 35 feet depths in at least four (4) locations. To make these collections rotenone would be used. Shallow water diving gear would be required to place the poison and to collect specimens. Suggested locations would be (1) along the Bikini-Amen reef, (2) near Namu Island, (3) near Airy Island and (4) between Enyu and Bikini Islands.

C. Collections of planktonic material from tows made in the lagoon in various areas and depths.

D. Collections of the pelagic fishes would be made by hook and line fishing in the lagoon and the channels between the islands.

E. Set line fishery in target area.

Use of materials

A. From each collection a set of samples of the vertebrate and invertebrate material should be ashed on trays for future counting and analysis.

B. A portion of each collection should be frozen for transfer back to laboratories on the mainland for activity studies.

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C. The remainder of the material collected should be preserved in alcohol or formalin and returned to laboratories on the mainland for identification.

Types of collection material for sampling

A. Samples for ashing should consist of one specimen from each of 12 species of fish and 7 plant and invertebrate groups. The fish groups should include blennies, cardinal fish, damsel fish, eels, goat fish, groupers, lizard fish, parrot fish, siganids, squirrel fish, surgeon fish, and wrasse. The plant and invertebrate forms should include algae, clams, crabs, coral, sea cucumbers, snails and sponges: A determined effort should be made to collect at each station some specimens of all of the 19 groups. Specimens other than these should be saved for the general collection.

B. Trolling and long-line samples should also provide barracuda jacks, mackerel, runners, sharks and tuna for sampling.

C. Tissues ashed would be of six types: (1) entire organism, (2) liver or digestive gland, (3) viscera or faeces, (4) spleen and or kidney, (5) muscle and (6) bone or shell.

Numbers of samples

A. The number of ashed samples will be dependent upon the time and personnel available, but we feel that at least 1000 ashed samples should be collected in the field.

B. The material preserved by freezing would provide an additional 2000 or more ashed samples for extensive counting and detailed study after the return to the mainland.

C. The material preserved by storage in alcohol and formalin would include representatives of all the forms used in the field studies.

Personnel

A. A total of 10-12 technical staff members would be needed to carry on the field work. This group should be made up of experienced men to take charge of the various phases of the work and direct the work and training of the junior members of the expedition.

B. Suggested list of personnel with the special training of each.

- Lauren R. Donaldson.<sup>1,2</sup> - - - -biologist and group leader
- Asher A. White.<sup>1</sup> - - - - medical consultant
- Arthur D. Welander.<sup>1,2</sup> - - - - radiobiologist and ichthyologist
- Clarence F. Pautzhe.<sup>1,2</sup> - - - fisheries biologist
- Allyn H. Seymour.<sup>2</sup> - - - biostatistician and plankton work
- Richard H. Osborn<sup>2</sup> - - - biologist and photographer

4-6 young men in a training capacity. These men should each be a specialist and contribute to the success of the expedition as well as gain training and experience in the field of radiobiology.

C. For optimum functioning of the expedition at least one naval officer should be assigned to the radiobiology resurvey.

We would like to suggest either of the following:

- Lt. (jg) Burris D. Lamar
- Ensign Felix J. Jablonski

1 Operations Crossroads, radiobiology 1946

2 Bikini Scientific Resurvey, radiobiology 1947

D. For field work the personnel would be divided into two teams. On alternate days each group would collect material in the field and follow through with the dissection, weighing, ashing, preserving and packaging on the following day.

Season for conducting field work

A. The summer season during the months of June and July are best for conducting field work.

B. Many of the men needed to carry on the field work have other commitments so that they would not be available until the close of the regular spring Univ. term.

C. The need for a diversion of both material and personnel from other operations planned for the spring season would make a June date the most feasible.

Time needed in the field and for preparations

A. The work program has been so scheduled that it can be accomplished in fourteen (14) working days at Bikini.

B. Allowing for time to transport the personnel from the mainland to Kwajalein by air, then to Bikini by ship, collect the material and return would require at least 30 days time.

C. A preparation period of one month will be needed to assemble personnel and supplies prior to departing from the mainland.

D. Analysis of the data obtained will require the services of laboratories on the mainland and an extended period of time.

Material and equipment needed for the field work. To be provided by the Navy

A. One major ship, such as, an LSM or equivalent, to transport personnel and equipment from Kwajalein to Bikini and return. The ship would also furnish living facilities and laboratory facilities in the field.

B. Two or more boats for use in the lagoon -- motor launches, L.C.P.L's or equivalent.

C. One boat, L.C.V.P. or equivalent, equipped for shallow water diving. With one or more master divers in attendance.

D. One or more six to eight-man air rescue type rubber life rafts for landing collecting parties on the reefs and islands.

E. One freezing unit, such as a walk-in type of refrigerator for use in preserving collections in a frozen condition until they reach the mainland and can be distributed for analysis.

Material needed for field work to be provided by the contractor for the Atomic Energy Commission

- A. Equipment for collecting material, such as nets, bags, spears, hooks, lines, buckets, etc.
- B. Equipment for weighing, dissecting and ashing of samples, such as, scales, dissecting tools, ashing ovens, stainless steel plates, shipping cartons, etc.
- C. Rotenone and other material used to collect fishes.
- D. Containers and preservatives for storage and shipment of collections.

Finances

- A. A modification will be needed to the basic contract W-28-094-eng-33 to authorize the travel, expense, insurance, etc.
- B. A further modification of the contract W-28-094-eng-33 must be made to extend the time during which the contract is active.
- C. A supplement to the basic contract increasing the amount of money allocated should be executed.

As near as we can determine the field trip as described in this preliminary outline will be of about the same scope as the one conducted in 1947 when the cost was \$25,000.

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