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HEALTH AND SAFETY

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SURVEY OF RADIOACTIVITY IN THE SEA NEAR BIKINI AND ENIWETOK ATOLLS JUNE 11–21, 1956

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July 23, 1956

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ABSTRACT

During the period of June 11 to 21, 1956, a survey party, operating from the USS Walton (DE 361), measured the radiation in plankton, water, and fish samples collected near Bikini and Eniwetok Atolls. Fifty-three stations between 10° 15' to 14° N and 159° to 166° E were covered during the 3,300-mile cruise. A continuous record of the radiation in the surface water was obtained with a probe. Plankton samples from oblique tows to a depth of 200 meters and water samples from the surface and from depths of 25, 50, 75, and 100 meters indicated radioactivity at each station. Highest radiation readings in plankton and water samples were from stations north of Bikini Atoll. Radiation decreased around the periphery of the survey area.

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INTRODUCTION

During the planning stage of Operation Redwing, discussions were held by staff members of the Atomic Energy Commission, Division of Biology and Medicine, and the Applied Fisheries Laboratory of the University of Washington on the probable need for biological surveys to define and evaluate the distribution of radioactive materials to be produced by the 1956 series of nuclear experiments.

Following these preliminary discussions, a tentative outline of studies to be pursued during and immediately following the test series was prepared by the Applied Fisheries Laboratory and submitted to the Division (UWFL-45)*. This proposed program contained, among other suggestions, one that called for a survey and evaluation of the radioactive content of the water, plankton, and fish from areas about the test site, following somewhat the plan of Operation Troll**.

The specific assignment of the Applied Fisheries Laboratory to the survey project was made in a letter of March 28, 1956, from Dr. Charles Dunham, Director of the Division of Biology and Medicine. This letter addressed to Lauren R. Donaldson stated in part:

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* Program of the Applied Fisheries Laboratory, University of Washington, for the 1956 Test Series at Bikini and Eniwetok Atolls, Marshall Islands. February 7, 1956.

** Harley, John H., Editor, Operation Troll, NYO-4656, March 1956.

The Division of Biology and Medicine has assigned the Applied Fisheries Laboratory the following operations during and following the forthcoming test series:

1. Conduct two marine biological open sea surveys, beginning June 10 and September 1.

   The primary mission of these two surveys is to ascertain (a) the levels of introduced radioactivity resulting from the tests in the water, plankton, and fish, and (b) how far the activity extends westward in the North Equatorial current. It has been recommended to the Task Force,

   (a) that the ship should operate from the area of highest average fallout to the westward fringe of the detectable introduced radioactivity in the water, and

   (b) that you or Allyn Seymour and the ship's captain be briefed as to the location where fallout from each shot fell into the sea, prior to each survey.

   Each cruise should include the following:

   (a) continuous water monitoring throughout the cruise. The New York Operations Office will construct and install the necessary instrumentation.

   (b) water samples should be taken at 0, 25, 50, 75 and below 100 meters at selected stations.

   (c) Plankton tows should be made in areas of both high and low activity.

   (d) Fish should be collected wherever and whenever feasible.

Preparations for undertaking these missions were made during April and May, when equipment was assembled and shipped to the Pacific Proving Ground and a schedule of staff assignments was worked out. The field group, which departed for Eniwetok early in June, included Lauren R. Donaldson, Allyn H. Seymour, Edward E. Held, Frank G. Lowman, Arthur D. Welander, Paul R. Olson, and Neal O. Hines.

The ship assigned by the Task Force to the first of the two surveys was the USS WALTON (Destroyer Escort 361), a 306-foot vessel whose range and accommodations were considered adequate for oceanographical work in open waters. The WALTON arrived at Eniwetok on June 5, and shortly thereafter the survey equipment was installed on board. The survey was begun on Monday, June 11, and completed on Thursday, June 21.

The success of the survey is attributable to the support of the Division of Biology and Medicine, particularly Dr. W. R. Boss, and to the coordinated assistance given to the field team by the operational groups within Joint Task Force 7, particularly Task Group 7.3 (Navy). Members of the staff are especially grateful for the intelligent interest in the project demonstrated by Commander Arthur T. Emerson, Jr., captain of the WALTON, and for the very great understanding and assistance afforded by officers and members of the crew of the vessel.

The probe for continuous water monitoring was developed and constructed by the Instruments Branch of the Health and Safety Laboratory, New York Operations Office, under the direction of Mr. Harris D. LeVine, Chief. The use at Eniwetok of a gamma ray spectrometer was made possible through the kindness of Mr. Robert Graveson, Chief Engineer of the Electronics Section, Instruments Branch, HASL, who also assisted and instructed members of the staff in its operation. The Eniwetok Marine Biological Laboratory of the Division of Biology and Medicine was used as a headquarters, and shared with HASL personnel who were most cooperative in the exchange of the use of equipment and supplies.

PLANS, EQUIPMENT AND OPERATIONS AT SEA

The marine survey whose results are reported herewith was one of two such projects set up by the Division of Biology and Medicine for the purpose of collecting information on the levels and distribution of radioactivity introduced into the waters of the Eniwetok-Bikini area by the atomic testing program of 1956. A more extensive survey is scheduled for September 1956.

As originally conceived, the survey was to be made "from the area of highest average fallout to the westward fringe of the detectable introduced radioactivity in the water." Final plans were made upon arrival in the field when a review of information available on fallout patterns indicated the desirability of a survey pattern that would provide ample sampling of water and plankton in the areas immediately about Eniwetok and Bikini as well as to the west of Eniwetok during the ten days granted for the survey.

The cruise pattern thus projected, coordinated with Task Group 7.3 and reported to the Division of Biology and Medicine, anticipated the coverage of fifty collecting stations on a grid extending from a line approximately 180 miles west of Eniwetok to a line 30 miles east of Bikini. The north and south boundary lines were 11° N and 14° N (Fig. 7). This pattern was somewhat modified during the course of the survey because of the testing program. The survey, however, actually covered fifty-three stations between Monday, June 11, and Thursday, June 21, on a track of 3,300 miles over 78,000 square miles of