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September 13, 1968SECRETARIATAEC 604/115BIKINI ATOLL SURVEYNote by the Secretary

1. The General Manager has requested that the attached memorandum of September 12, 1968, from the Assistant General Manager for Military Application, with attachments, be circulated for the information of the Commission.
2. Additional information may be found in AEC 604/114- Resettlement of the Bikinians.
3. At Information Meeting 825 on August 27, 1968, the Commission noted the President's August 12 letter concerning the resettlement of the Bikinians and Acting Chairman Ramey's August 21 letter to the Secretary of the Interior indicating AEC's preparedness to cooperate in the development of and appropriate plan for resettlement and to assist in its execution.

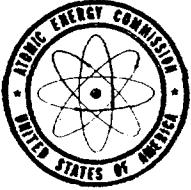
W. B. McCool

Secretary

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UNITED STATES  
 ATOMIC ENERGY COMMISSION  
 WASHINGTON, D.C. 20545

SEP 12 1968

Chairman Seaborg  
 Commissioner Ramey  
 Commissioner Tape  
 Commissioner Johnson

THRU: *for* General Manager *Donald C. Kull*

BIKINI ATOLL SURVEY

By White House letter of August 12, 1968\*, the AEC was requested to work with the Department of the Interior and High Commissioner W. R. Norwood of the Trust Territory of the Pacific Islands in planning and assisting in carrying out a comprehensive program for the return of the Bikinians to their home islands. During the period of August 29-31, 1968, Lt. Colonel Anthony A. Gomes, DMA; Tommy F. McCraw, DOS; and Alfred M. Carter, Holmes & Narver, accompanied the High Commissioner, his party and the press (see Attachment 1) on a planning survey of the Bikini Atoll. Provided below for your information is a summary report on the results of this survey.

In 1946 the people of Bikini Atoll were removed from their home islands in order to permit the United States to use the Atoll for nuclear test purposes. The Bikini people were moved initially to Rongerik and subsequently were relocated on the island of Kili in the southern part of the Marshall Islands. In 1967, a special AEC analysis of the radiological situation on Bikini Atoll resulted in the conclusion that the islands of Bikini and Eneu are now safe for human habitation.

The Bikini Atoll is situated in the northern part of the Marshall Islands and consists of fifteen islands and two island complexes with a land area of 2.32 square miles (see Attachment 2). The lagoon extends over an area of 229 square miles. Marine life in the lagoon is plentiful and shows no signs of adverse effects from the nuclear detonations.

\* In the Record, Secretariat

The island of Bikini (see Attachment 3), largest island in the Atoll, is approximately 2.2 miles long and 0.6 miles at its widest point, and provides some 400 acres that can be utilized for growing coconut trees and subsistence crops. Most of the island is now covered with wild vegetation which caused considerable difficulty in traversing the interior. The effects of the nuclear tests have destroyed the former coconut groves and only a few subsistence crops were found growing among the wild vegetation. It was determined that the remains of facilities used during the nuclear test period, including many wooden buildings and two steel towers, should be removed to permit rehabilitation of the area and to eliminate physical hazards. The concrete bunkers on Bikini are usable as shelters or storage areas and should be retained.

The island of Eneu (see Attachment 4), second largest island in the Atoll, is approximately 1.7 miles long and 0.36 miles at its widest point, and provides some 265 acres for growing productive coconuts and other crops. Eneu is also covered with wild vegetation and few coconut trees remain. Usable facilities found on the island were a large metal assembly building (approximately 125 feet by 400 feet), a large concrete room underneath a 100-foot radar tower, a 4,000-foot airstrip and two concrete bunkers. Remains of other test facilities and dangerous structures are to be removed.

The conclusions and recommendations resulting from the 1967 AEC radiological survey of Bikini Atoll are contained in Attachment 5. One of these recommendations was that radioactive scrap metal should be removed from the islands. Prior to this planning survey, Mrs. Ruth G. Van Cleve, Director of the Office of Territories of the Department of the Interior, had indicated that Interior would look to the AEC for assistance in clearing away radioactive debris. Thus, efforts of the AEC members on the survey team were primarily directed toward identifying the types and locations of this scrap metal or other contaminated debris such that plans can be made for its removal (see Attachment 6).

In February 1968, the Trust Territory prepared a preliminary resettlement plan for returning 500 Bikinians (300 from Kili and 200 from other atolls) at a total cost of \$625,500. The plan was divided into four chronological phases (planning, planting, construction, and move from Kili) spanning over a period of seven years (see Attachment 7). Eneu Island was suggested in the plan as the site to begin the agricultural rehabilitation work. The planning cost estimate for the planting phase was \$165,000 (see Attachment 8). The \$410,000 estimate for construction was based on unit costs for similar wooden structures built in 1966 by Global Associates for the Leb Island village, located 30 miles south of Kwajalein Atoll (see Attachment 9). The construction estimate may be low based on current costs or changes desired by the Trust Territory. The Bikinians have expressed a desire to locate the principal community village on Bikini Island near the present cemetery site.

## DOE ARCHIVES

The Trust Territory cost estimates of February 1968 are to be revised based on the findings of the present survey and the expressed desires of the returning Bikinians. Additional planning cost estimates to be considered in the final Trust Territory plan will include costs for removing contaminated debris and the cleanup of deteriorated test materials and facilities left on the islands. The AEC Honolulu Area Office agreed to provide these additional planning cost estimates to AEC Headquarters for transmittal to the Department of the Interior and also provide AEC Headquarters with a planning cost estimate for the construction phase of the program.

It is possible that the total cost for resettling the Bikinians may well amount to two million dollars over a seven-year period with additional costs for cleaning the islands and subsidy costs that will be required to sustain the Bikinians during the resettlement period. Any claims for damages contemplated by the Bikinians are not included in these estimates. The manner of funding this program will be determined at the Washington level after the Department of the Interior completes their planning phase sometime in late October. If the Trust Territory decides on a seven-year program, it may be possible to fund the program in increments over the seven-year period.

Follow-on actions will be taken to provide the Department of the Interior with a statement on the scope of effort and planning cost estimates required for clearing away the contaminated debris and cleaning up the deteriorated test materials left on the islands of Bikini and Eneu. It is understood that Commissioner Norwood will be in Washington in late October for further discussion on the plans and funding aspects for the Bikini resettlement program.

I will keep you informed as significant progress develops on this matter.

  
Edward B. Giller

Major General, USAF  
Assistant General Manager  
for Military Application

### Attachments:

1. Party - Bikini Atoll Survey
2. Map - Bikini Atoll
3. Map - Island of Bikini
4. Map - Island of Eneu
5. Conclusions and Recommendations
6. Consideration of Purpose and Objective  
for Radioactive Scrap Removal
7. Preliminary and Rough Estimates
8. Cost Estimate - Agricultural Phase
9. Cost Estimate - Construction Phase

## PARTY - BIKINI ATOLL SURVEY

August 29 - 31, 1968

Trust Territory High Commissioner and Staff

|                |                                    |
|----------------|------------------------------------|
| Norwood, W. R. | High Commissioner                  |
| Peck, W., Dr.  | T.T. Commissioner, Health Services |
| Black, V.      | T. T. Public Works Representative  |
| Libby, E.      | T. T. Official Photographer        |
| Smith, D.      | T. T. Press                        |

T. T. District Administrator and Staff

|                |                            |
|----------------|----------------------------|
| Heine, D.      | District Administrator     |
| Nakanishi, G.  | District Agriculturist     |
| Macwhelang, T. | District Sheriff           |
| Chutaro, C.    | District Community Officer |
| Tobyn, J.      | Bikini Project Officer     |
| Singletary, C. | Communications Technician  |
| Jenkins, T.    | Peace Corps Representative |
| Jacobs, B.     | Peace Corps Representative |

Department of the Interior Representative

|            |                       |
|------------|-----------------------|
| Milner, G. | Office of Territories |
|------------|-----------------------|

Department of Defense Representatives

|                      |                      |
|----------------------|----------------------|
| Millar, D. B., Col.  | Commander, Kwajalein |
| Dedera, J., Lt. Col. | AFWTR                |

Bikini Council (Natives) Representatives

PARTY - BIKINI ATOLL SURVEY (Cont'd)

August 29 - 31, 1968

Press

Williams, H.  
Uzzle, B.  
Wollaston, N.  
Mydans, C.  
Baker, B.  
Field, J.

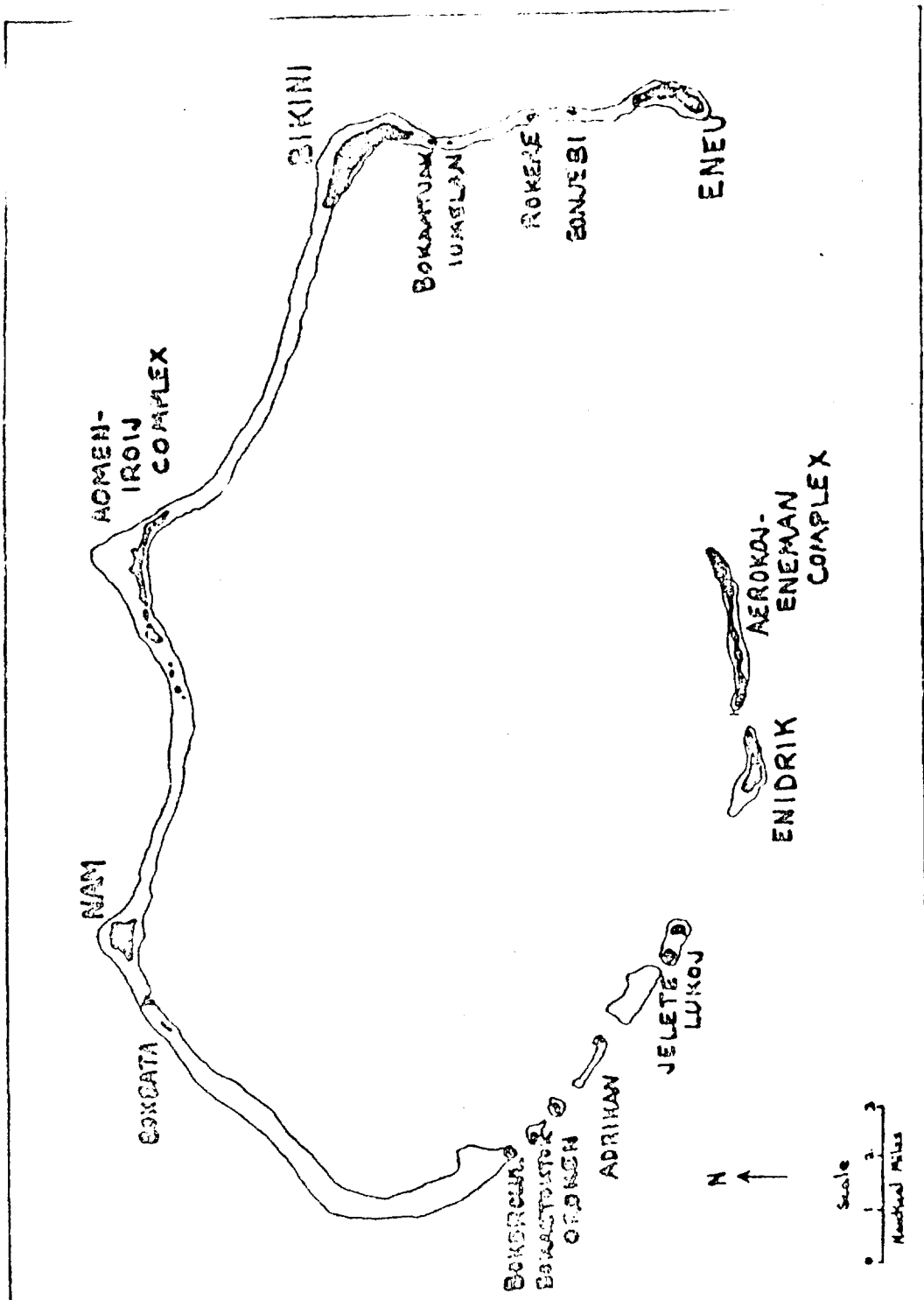
Seattle Times  
London Sunday Times  
London Sunday Times  
Life  
Honolulu Star-Bulletin  
National Geographic

AEC

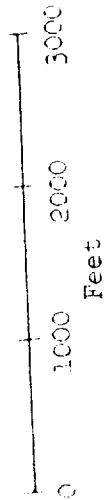
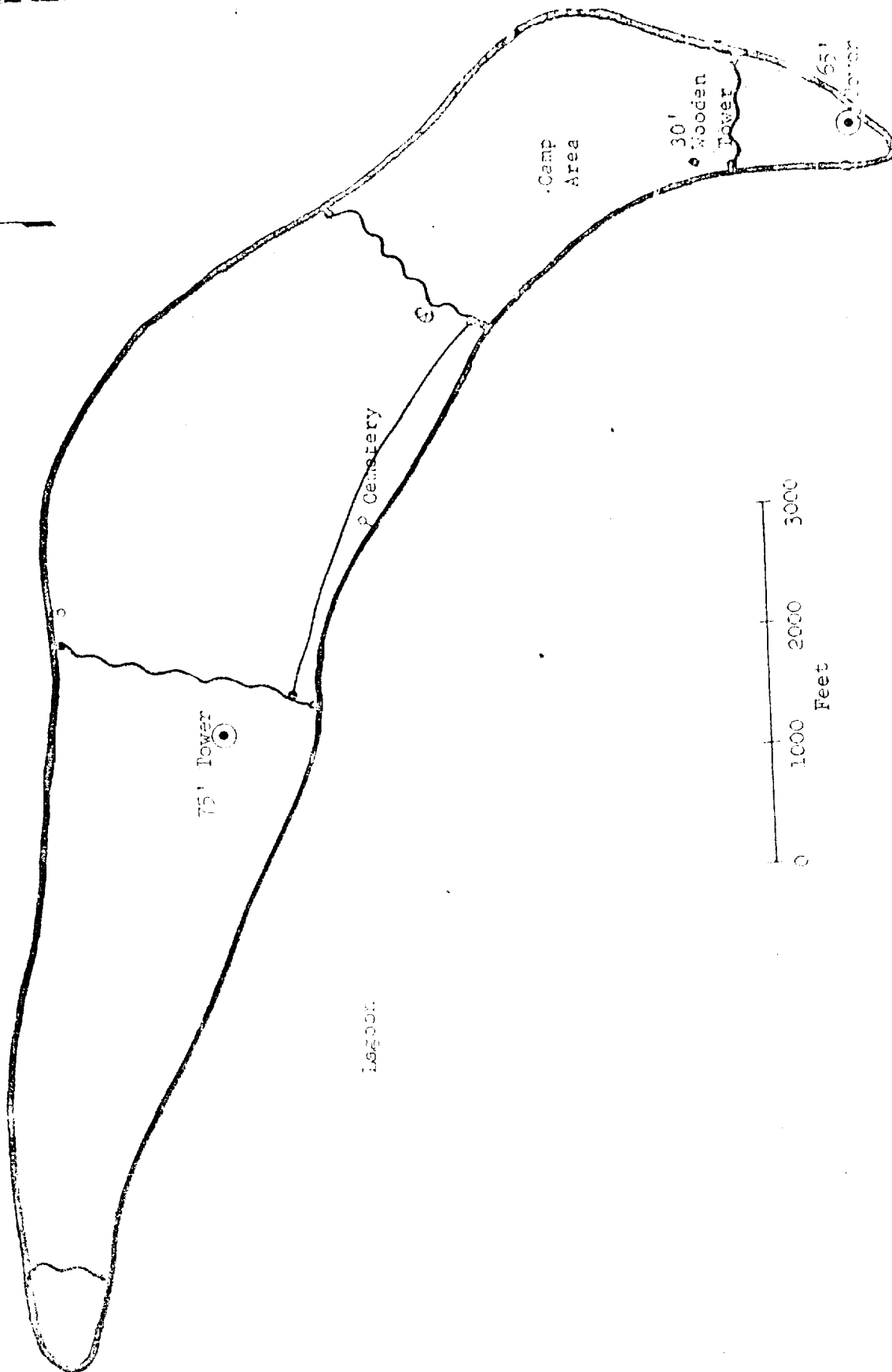
Gomes, A. A.  
McCraw, T. F.  
Carter, A.

DMA  
DOS  
H&N

BIKINI ATOLL

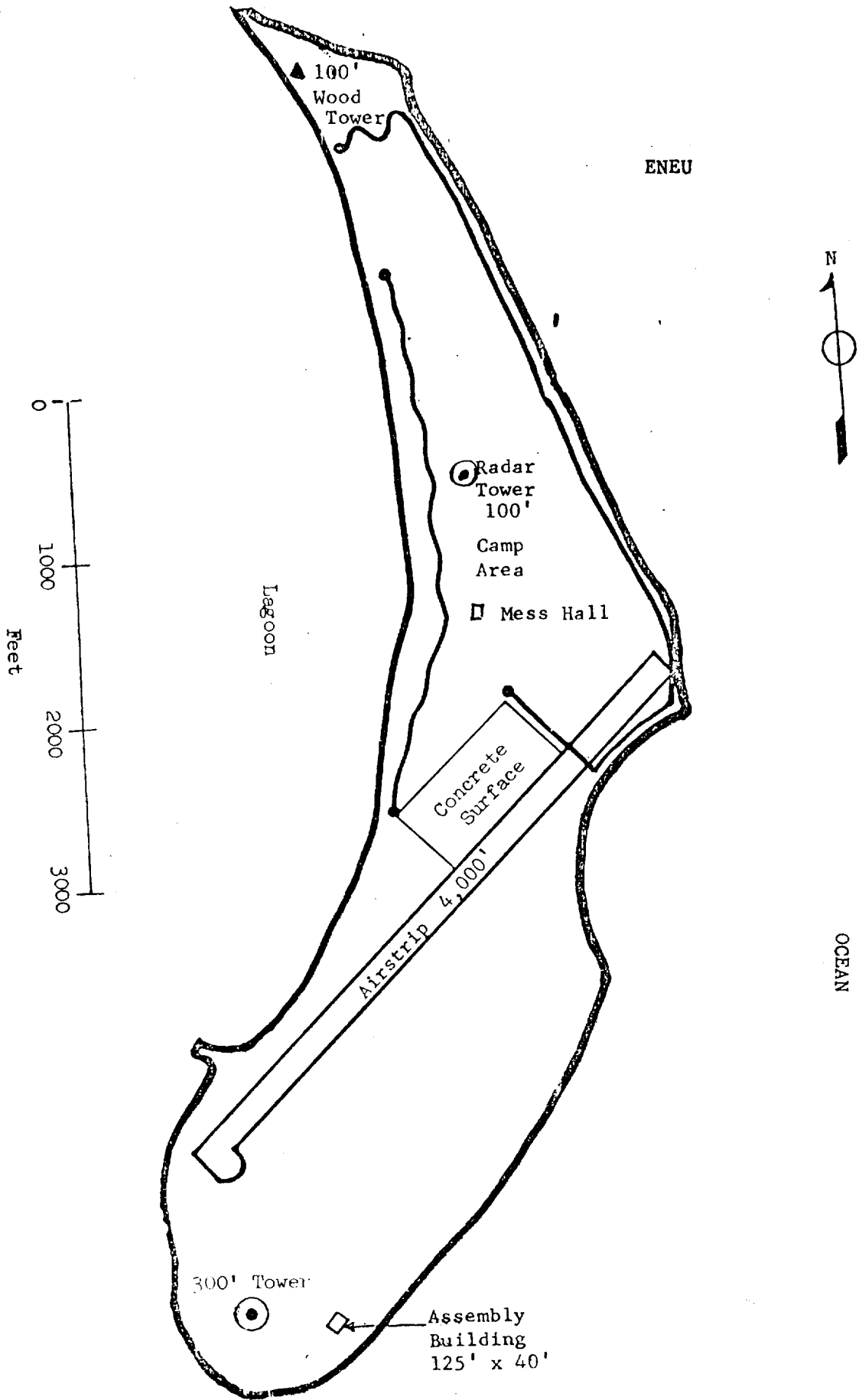


ISLAND OF BIKINI





ISLAND OF ENEU



CONCLUSIONS AND RECOMMENDATIONS RESULTING FROM 1967 RADIOLOGICAL  
SURVEY OF BIKINI ATOLL

1. The exposures to radiation that would result from the repatriation of the Bikini people do not offer a significant threat to their health and safety.
2. Such exposure may and should be further reduced by the following simple measures:
  - a. Restrict rehabilitation for the present to the islands of the Bikini-Eneu complex.
  - b. Establish the first village and immediate food crops on Eneu. No radiological precautions will be needed on Eneu because of its very low contamination level.
  - c. Any village construction on Bikini Island should involve the covering of the site with coral rock as is the local custom.
  - d. Radioactive scrap metal should be removed from the islands adjacent to former shot sites.
  - e. The population of land crabs should be sharply reduced because of their high content of  $^{90}\text{Sr}$ .
  - f. If pandanus trees which produce edible fruit are planted on Bikini Island, two inches of topsoil should be removed from the planting sites. The area of removal from each site should be equal to the area covered by the crown of mature trees.
3. Determinations should be made of body burdens of  $^{137}\text{Cs}$  and  $^{90}\text{Sr}$  at the end of the first year of residence on the Atoll and as appropriate thereafter. Resurveys of environmental radiation levels on the Bikini Atoll and estimates of radionuclides in food should be made periodically. These surveys will provide a continual check of the radiation status of the people and environment and will help form a basis for decision as to the time of rehabilitation of islands outside of the Bikini-Eneu complex.
4. Special efforts should be made to ensure a balanced and adequately nutritious diet. For example, a dietary supplement of powdered milk would materially reduce  $^{90}\text{Sr}$  uptake by relieving the calcium deficiency usually associated with their diet.

CONSIDERATION OF PURPOSE AND OBJECTIVE FOR RADIOACTIVE  
SCRAP REMOVAL AT BIKINI ATOLL

The contaminated scrap metal on Bikini Atoll has been observed on islands adjacent to test locations. These adjacent islands which lie along the northern and southern rim of the Atoll islands have been subjected to heavy fission product fallout as well as blast, thermal, and prompt radiation along with water waves. The scrap metal on these islands consist of a wide range of sizes. Not all metal pieces in a given area are radioactive. Though two items may be similar in appearance and located side by side, one may show indication of radioactivity while the other does not. Pieces of pipe may show significant levels of radiation on one end and none on the other. Some of the scrap is on the surface, some protrudes from concrete footings, and some is near the ground surface just out of sight. The latter can be found using radiation detectors and scraping the soil to uncover the object.

Results from the 1967 survey indicate that a major contributor to the radiation field in these scrap metal areas is  $^{60}\text{Co}$ . This radionuclide is not a fission product, but rather is induced radioactivity in items of iron and steel which have been subjected to neutron irradiation.  $^{60}\text{Co}$  was found both in the scrap metal and in the soil samples by the 1967 survey.

It is unlikely that removal of the contaminated scrap metal from the islands adjacent to tests will make a significant reduction in the external radiation fields observed there. For the present, the resettlement program is to be limited to the Bikini-Eneu complex, and no use is to be made of the near test islands except possibly short visits to collect food items such as birds, turtles, and their eggs. Removal of contaminated scrap that would otherwise be available can avoid some unnecessary exposure. The effectiveness of this precaution can be further strengthened by periodic surveys of village areas and work areas to ensure that no contaminated scrap is collected on Bikini and Eneu. Therefore, the purpose and objective of the radioactive scrap removal effort are to make this contaminated material unavailable to the population of the Atoll and thereby to prevent radioactive source buildup through scrap collection activities on Bikini and Eneu. The following recommendations are made to achieve the above-stated objective:

1. There should be radiation monitoring capability to support clearing operations on Bikini and Eneu for determining whether test-related objects that are turned up contain elevated levels of radioactivity. This would include a survey of the area on Eneu (when it is cleared) that was used as an aircraft decontamination location.

2. The island complex and separate islands along the northern and along the southern rim of the Atoll should be cleared of contaminated scrap metal. These would include the Aomen-Odrik complex, Iroij, Nam, Enidrik, and the Aerokoj-Enenan complex. The level of effort desired is the complete removal of all scrap metal on or near the surface of these islands. The final disposition of this material should be such that it is unavailable to the returning population.
3. Undamaged or lightly damaged concrete bunkers should be left in place throughout the Atoll. These are judged to provide a benefit to the returning population as shelter against storms and temporary residence for short periods at locations where no other buildings exist. The observed levels of radiation in reinforcements of bunkers can be expected to be reduced at the same rate or possibly faster than levels in adjacent soil. The bunker with iron aggregate on Aomen should be repaired such that no further flaking of the iron can occur. The steel doors should be removed from all bunkers to prevent accidental entrapment. Rusting climbing rungs, stairways, and any protruding steel on the outside or inside of bunkers should be cut off with disposal along with contaminated debris, with the exception of the large diagonal structural members on the large bunker on Aerokoj which should be left in place. The damaged bunker at the end of the sand island west of Nam should be removed because of the physical hazard it presents and because of its lack of any useful purpose. For the sand island bunker, the radiation level in the twisted steel members is also a consideration.
4. The steel members protruding from concrete footings or forms on the islands listed in 2. above should be removed for disposal. These have no utility for native use and many of the metal members show elevated levels of gamma radiation. Both the steel and concrete parts should be removed.
5. A followup survey should be made within 12 months after return of the population and at appropriate intervals thereafter to ensure that no contaminated scrap has found its way into the village or work area on Bikini or Eneu.

TRUST TERRITORY  
PRELIMINARY AND ROUGH ESTIMATES  
REGARDING RETURN TO BIKINI

February 1968

Suggested Phasing, Time Table, and Costs:

- A. Giving the "go-ahead"; consult with people. Take representatives to Bikini. Develop plans. Get outside help regarding village planning.
- Time: 90 days  
 Cost: \$5,000.00
- B. Advance party, bushing, planting, and later grove maintenance program. Eneu as base. Relieve advance party after six months. Replanting time: 1 year. Grove maintenance for 4 years. Construction of interim camp site.
- Time: 5 years  
 Cost: \$165,000.00
- C. Construction program. "Contract", Leb Island village construction criteria. Wood frame school.
- Time: 1 year  
 Cost: \$410,000.00
- D. Move from Kili. Physical exams in Majuro. Relocation allowance. U.S.D.A. surplus feeding program for 1 year.
- Time: 14 months  
 Cost: \$45,000.00
- E. Total time span until resettled and off government subsidy: 7 years.\*  
 Total cost of resettlement program: \$625,000.

Some thought should be given to an economic loan program for the Bikinians to help them achieve self-sufficiency. The cost of such a program is not included here. Their proven ability as producers (e.g., the famous Kili handbags) of much desired handicraft should establish them as "good loan risks."

\* 1 year planting. 6 more years for palms to grow until bearing nuts. People move to Bikini at sixth year after replanting. Will be on government subsidy for one year.

TRUST TERRITORY PLANNING COST ESTIMATE  
FOR THE  
BIKINI AGRICULTURAL PHASE

February 1968

| Item  | Cost      |
|---|-----------|
| 1. Labor: 40 laborers at 50¢/hr for 210 working days              | \$ 33,600 |
| 3 equipment operators; 1 mechanic at<br>70¢/hr                    | 4,700     |
| Maintenance of groves (four-year period)<br>10 laborers at 50¢/hr | 33,600    |
| 2. Heavy Equipment:   |           |
| a. Rental of two crawler-type tractors<br>w/bulldozer blades      | 4,000     |
| b. Rental of front end loader                                     | 1,000     |
| c. Rental of LCU landing craft                                    | 1,500     |
| 3. Seednuts: 104,500 seeds required at 5¢                         | 5,300     |
| 4. Fertilizer: 205 tons at \$100/T FOB Majuro                     | 20,500    |
| 5. Subsistence  | 30,000    |
| 6. Petroleum, Oils and Lubricants                                 | 4,000     |
| 7. Lagoon Transportation (Boats and Outboard Motors)              | 3,000     |
| 8. Housing: Construction of Temporary Quarters                    | 10,000    |
| 9. Personnel Transportation                                       | 5,000     |
| 10. Tools and Supplies  | 3,800     |
| 11. Miscellaneous   | 5,000     |
| TOTAL   | \$165,000 |

TRUST TERRITORY PLANNING COST ESTIMATE  
FOR THE CONSTRUCTION PHASE

February 1968

|   |               |
|---|---------------|
| a. 50 Houses @ \$2,500 each                   | \$125,000     |
| b. 50 Cookhouses @ \$600 each                 | 30,000        |
| c. 50 Bathhouses @ \$200 each                 | 10,000        |
| d. 50 Privies @ \$300 each                    | 15,000        |
| e. 50 Cisterns @ \$350 each                   | 17,500        |
| f. 1 Church                                   | 5,700         |
| g. 1 Council house                            | 2,200         |
| h. 1 School                                   | 11,800        |
| i. 1 Community warehouse (Use Eneu warehouse) | -0-           |
| j. 25 Copra drying cribs @ \$200 each         | 5,000         |
| k. 2 Lagoon boats @ \$2,000 each              | 4,000         |
| l. Clear and grade site                       | 8,000         |
| m. Marine support                             | 10,000        |
| n. Camp support                               | 18,000        |
| o. Crates for livestock                       | 2,800         |
| p. Other                                      | 15,000        |
| q. School furnishings                         | 9,600         |
| r. Housing for teachers                       | 20,000        |
| s. Public Health Facilities                   | <u>57,800</u> |
|   | 367,400       |
| Contingency                                   | <u>42,600</u> |
|   | 410,000       |