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SUMMARY¹

ENVIRONMENTAL ASSESSMENT FOR THE RESETTLEMENT OF
ENEU ISLAND ON BIKINI ATOLL,
REPUBLIC OF THE MARSHALL ISLANDS

APPENDIX E

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NOTES:

1. The full environmental assessment (EA) for the resettlement of Eneu is in preparation, to be published and distributed later. The format will correspond to Federal guidance (40 CFR 1502.10) so that the EA can be used by the lead Federal agency eventually assigned the responsibility for either resettlement or cleanup actions.

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PREFACE

Since the U. S. Congress is expected to appropriate money for the rehabilitation of Bikini Atoll, the lead agency that will act for the Government will need to prepare and co-ordinate an environmental impact statement. To accelerate the process of producing such a document, BARC has entered into an agreement with the Corps of Engineers for a "Proposed Draft Environmental Impact Statement", by December 1986. Meanwhile, it is desirable to produce an Environmental Assessment for Eneu, a much simpler task. Appendix E is a summary of the E.A., which will be ready by August 1986. These documents are written according to the official regulations, and must center on an evaluation of alternatives, including their economic, environmental and social benefits and costs.

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OF ENEU ISLAND ON BIKINI ATOLL
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MAJOR CONCLUSIONS

This environmental assessment evaluates various alternatives to return the Bikini people to their homeland on Bikini Atoll. Eneu Island was spared the heavy nuclear contamination that rendered Bikini Island, the largest and main inhabitable island on the atoll, presently unsuitable for resettlement. The economic, social, technical and environmental consequences of all alternatives were compared, and alternative sites, purposes and scales for resettlement were included in the analysis. This environmental assessment explores these alternatives in detail and concludes that the resettlement of Eneu Island by some of the Bikini people at this time will not result in significant adverse effects to the environment nor will it foreclose any other full scale resettlement option involving the cleanup of Bikini Atoll. In addition, it concludes that the resettlement of Eneu can be accomplished independently from the planned cleanup and resettlement of Bikini Island. Plans and combination of plans involving the early resettlement of Eneu are fully feasible and implementable at this time.

PURPOSE AND NEED FOR THE PROPOSED ACTION

The 167 inhabitants of Bikini Atoll were removed from the atoll in 1946 to make way for a U.S. nuclear weapons testing program. That program ended in 1958 after 23 tests which rendered the atoll unsafe for human habitation. The Bikini people were settled first

on Rongerik Atoll, then briefly on Kwajalein Atoll, and eventually on Kili Island. In 1968 the U.S. Atomic Energy Commission (AEC) advised President Johnson that the main islands of Bikini Atoll were safe, and permission for resettlement was given.

In 1969 the AEC and Department of Defense began to clear the atoll of waste, plant coconut trees, and build housing and other facilities, and many Bikinians were resettled on Bikini Island. However, in 1978, an examination of the settlers by Brookhaven National Laboratory revealed significant body burdens of the radionuclide cesium-137. As a result of these and other Dept. of Energy findings, the 139 settlers were evacuated from Bikini in 1978 and have not returned since. Presently the population of the Bikini people numbers approximately 1,270 scattered in several locations: 500 living on Kili Island, 200 on Ejit Island (on Majuro Atoll), 400 elsewhere on Majuro Atoll, 100 on Ebeye Island (Kwajalein Atoll), and 20 overseas as students.

The scarcity of land in the Marshall Islands, the cultural significance of land ownership, and the importance of community cohesion in maintaining the identity of the Bikini culture have made resettlement of Bikini Atoll a matter of overriding importance to the Bikini people over the years. Recently the Bikinians requested the help of the U.S. Government in this matter, and in 1982 the Bikini Atoll Rehabilitation Committee was set up by Act of Congress (P.L. 97-257) to determine the feasibility and estimated cost of a cleanup of Bikini Atoll. Since that time the Committee and its consultants, who operate independently of the Government and report their findings directly to Congress, have conducted a number of major studies and have published several progress reports on the existing condition of the atoll, and on the economic, technical, and environmental feasibility of various alternatives to clean up and resettle the atoll. However the suitability of several cleanup alternatives will not be fully evaluated for at least two more years. Since the economic, environmental, and social costs of most

of these alternatives would be much less than that of the most drastic and expensive alternative (removal of contaminated soil on Bikini and possibly other islands), the Committee has determined it is crucial to complete these evaluations.

Nevertheless the Committee has determined (see Main Report) that Eneu Island, the second largest island of the Atoll, is inhabitable and safe for resettlement (on the basis of the expected diet). Furthermore, Eneu has a relatively large potable water supply. Resettlement of Eneu before selecting the cleanup operation for Bikini Atoll would have the advantages of accelerating the resettlement of the atoll; allowing some of the Bikini elders to live out their remaining years in their homeland; and facilitating the construction of an Eneu base camp and staging area for the cleanup of nearby Bikini Island, if and when the decision and details are finalized. The experience gained during the resettlement of Eneu would be valuable for planning future Bikini resettlement.

AREAS OF CONTROVERSY

A major area of controversy has involved the lengthy and complex history of delays associated with the return of the Bikini people to their homeland since their removal from the atoll in 1946. Other potential concerns include whether any resettlement of the atoll, including Eneu Island, should occur prior to the cleanup of the atoll; and whether sites for resettlement outside the atoll should be pursued concurrently.

ISSUES TO BE RESOLVED

Questions to be answered prior to any early resettlement of Eneu include: 1) whether resettlement of Eneu should be planned as a permanent settlement for some Bikinians, a future base camp for the cleanup of the atoll, or a combination of both; 2) determining

the size and makeup of the future resettlement population; 3) whether parallel resettlement projects (temporary) should be implemented concurrently outside the Marshalls; and 4) resolving potential conflicts on the allocation of private landholdings on Eneu for non traditional use and tenure, including community, commercial, and residential use by both landowners and non-landowners. In addition the Bikini people will need to incorporate their full requirements and express their full official preferences and support for the final selected resettlement plan.

ALTERNATIVES

This assessment considers the following alternatives including the proposed action:

1. resettlement of Eneu as a partial permanent settlement
2. resettlement of Eneu only as a base camp for future full scale cleanup and resettlement of the atoll
3. resettlement of Eneu both as a partial permanent resettlement and as a base camp
4. resettlement of both Eneu and Bikini Islands or only Bikini Island
5. resettlement of other islands at Bikini Atoll
6. settlement on Maui or other Hawaiian locations
7. settlement on other sites outside Hawaii and the Marshall Islands
8. improved living conditions at existing settlement sites in the Marshall Islands
9. delayed resettlement of Eneu until completion of the cleanup of the atoll
10. no Action

Each of these alternatives is summarized below.

1. Eneu as a permanent settlement for some of the Bikinians

This alternative, in effect, constitutes a first phase resettlement. It would accommodate Bikinians whose family lands are on Eneu; some elderly folks who want to live their remaining years on Bikini Atoll; workers (some with families) who might be involved in construction, cleanup or revegetation projects; and other Bikinians assigned to coconut grove rehabilitation, mariculture, silvaculture, other economic activity, and scientific research. Proposed island development would be scoped for a beginning population of 200, a turn-of-the-century population of 250, and continued growth of the resident population beyond the year 2000. Infrastructure for the permanent partial settlement might include:

- a) restoring the medium draft dock for large boats and ships that would call at the atoll,
- b) adding a protected shallow draft harbor basin and launch area for small boats,
- c) grading and stabilizing paving the airstrip and apron and adding a support building and rainwater catchment,
- d) building centralized community cisterns and pumps for storage of rainwater,
- e) a maintenance shed for aircraft and vehicles,
- f) a power plant and associated fuel storage tanks,
- g) a desalination plant, if necessary,
- h) a salt water sewerage system for domestic waste including an ocean outfall and treatment plant,
- i) a perimeter road with interior extensions or laterals,
- j) a solid waste disposal and recycling yard,
- k) a plantation area for coconuts, timber, etc.,
- l) garden plots for fruits and vegetables,
- m) ball fields and other recreational facilities, if necessary,

- n) a builders storage and supply yard for residents,
- o) housing for about 30 households,
- p) a ten-bed hostel for visitors,
- q) a barracks for construction workers,
- r) a community center, if necessary,
- s) a school for resident children, and
- t) a church and other community facilities.

If the residents decide to pursue aquaculture or commercial fishing then additional facilities would be needed: e.g. holding ponds, hatcheries, ice plants and/or a walk-in freezer. The cost of development might run as much as \$30 million.

2. Eneu only as a base camp

For this option, the initial emphasis would be placed on establishing a minimal base camp to support many of the actions for the future full scale cleanup of the atoll. A base camp on Eneu would be needed for the most drastic cleanup alternative involving the removal of soil and vegetation from Bikini Island. However, less drastic cleanup alternatives (saltwater irrigation, application of potassium fertilizers) may be implementable with a base camp required only on Bikini Island. Nevertheless some infrastructure facilities located on Eneu would still be required regardless of the location of the base camp: the improved medium-draft dock, continued maintenance and perhaps improvement to the airstrip and airport building, a temporary landfill or waste disposal yard, and a storage yard for shipped cargo and construction materials. A base camp located on Eneu would require the following additional infrastructure: maintenance shop, construction office, warehouse, central retail store for workers, testing laboratory, concrete block plant, a building yard, and a barracks for construction workers. Electric power, water collection and storage, and sewage disposal facilities would also be needed. The cost of this alternative might run as much as \$10 million. After cleanup

actions are completed, then base camp facilities at Eneu would be converted for use in the permanent settlement complex.

3. Eneu as a permanent settlement and a future base camp

The assumption here is that a permanent settlement would be first established on Eneu but with facilities and lands also planned to accommodate a future base camp for the atoll cleanup. Some details on the size and scope of the camp would be based upon the actual cleanup alternative eventually selected, but most requirements could be anticipated in advance. Sufficient strategically located lands would be set aside for the future camp, while jointly used facilities would be designed and built in a manner to avoid costs attributed to extra mobilization, demobilization, modification, demolition and other construction activity. Essentially all the items listed above in alternatives 1 and 2 would be built, but as a part of a single construction project. Total cost of this alternative would be less than the sum of the cost of the above two alternatives (\$40 million) because of expected cost savings from a single development and construction project.

4. Resettlement of both Eneu and Bikini Islands; or prior resettlement of Bikini Island

This alternative assumes that a permanent settlement is constructed on Bikini Island simultaneously or before construction of a permanent settlement on Eneu Island. Resettlement would occur prior to any future cleanup operations slated for Bikini and other contaminated islands; Eneu Island would not need to be cleaned up. The scope and cost of establishing a settlement community on Bikini Island would be larger to that of Eneu. The Bikinians have expressly requested that the main settlement of the permanent community be on Bikini Island and that a smaller settlement be on Eneu Island. Hence, the overall cost of resettlement of both Bikini

and Eneu Islands would be more than double the cost of an initial settlement only on Eneu Island (e.g. over \$60 million). Early settlement of Bikini Island would require temporary dietary restrictions by residents on the consumption of locally grown crops (including coconuts) until the cleanup is completed. A related scenario is that the dietary restrictions would be permanent if no further cleanup actions are taken at Bikini Island. However, the Bikinians have publicly stated that they would not want to settle on Bikini Island until after the cleanup.

Although full scale permanent resettlement would be expedited under this alternative, there are several other major drawbacks: 1) future cleanup actions, if any, on Bikini Island might require the temporary removal of its community and planned or inadvertent damage to crops and settlement facilities; 2) the cost of resettlement followed by cleanup and additional resettlement adjustments would be much higher than for alternatives involving first the cleanup of Bikini Island followed by its resettlement; 3) the possibility exists of unsuccessful enforcement of dietary restrictions, leading to the need for another evacuation; and 4) the groundwater supply under Bikini Island is neither potable or safe for consumption due to excessive salinity and contamination from nuclear testing. In fact there appears to be no compelling reason to support development of a settlement on Bikini Island before the island is cleaned up or before a settlement on uncontaminated Eneu Island is developed. As a consequence this alternative does not appear to be feasible.

5. Resettlement of islands at Bikini Atoll other than Bikini and/or Eneu Islands

Under this option, islands other than Bikini or Eneu would be initially settled. All of these outer islands are much smaller, lower in elevation, more prone to natural disturbance from wave action, and lack potable groundwater resources. The islands of

Nam, Enidrik, and perhaps Aerokojlol and Aomen were traditionally occupied by either very small communities or only for temporary periods of times by the Bikinians to facilitate seasonal or opportunistic fishing, harvesting and gathering of food. None of these islands would be suitable for long term habitation due to potential hazards from waves and storms, lack of sufficient water and lack of sufficient staples (such as breadfruit, coconuts, etc.). Only Nam constitutes a remote possibility for settlement but not before it is cleaned up of radiological hazards. Besides Nam, possibly other islands were heavily contaminated by earlier nuclear testing and may require additional cleanup actions. None of the outer islands have logistical facilities or assets that have survived to this time. There is no logical reason why any of these islands would serve as a permanent settlement site prior to resettlement of Eneu. As a consequence this alternative does not appear to be feasible.

6. Hawaiian locations (including Maui) as a site for temporary settlement of some Bikinians

Settlement in Hawaii is being viewed by the Bikinians as an opportunity for educational and socio-economic development. The residents of a settlement would be selected on the basis of English language ability, desire to learn about American culture, willingness to hold jobs and work for pay, and educational aspirations. This alternative would also accommodate a possible need for some of the Bikinians now temporarily settled in the Marshall Islands who may need to be moved or evacuated on short notice. In either case a Bikinian settlement in Hawaii would be very limited in scale. Sites evaluated on Maui to date have included rural grazing lands along the north coast and a condominium building in the urbanized and resort area of the central isthmus of the island. The plan would be to purchase the property and make the necessary modifications to facilitate "temporary settlement." Although the plan involves eventual repatriation of the temporary settlers to Bikini Atoll once the atoll is cleaned up (and possible

sale or rental of the vacated Maui property), it is likely that at least some of these temporary settlers may chose to stay on Maui. Other sites in Hawaii are also being evaluated. There would, however, be both socioeconomic advantages and disadvantages to a large scale move of Bikinians to Maui (or elsewhere in Hawaii). Such a settlement would require considerable orientation and preparation of the families beforehand and adjustment into the community after arrival. Specific costs on a move have not been identified at this time. Congressional approval would be required to use funds for resettlement of Bikinians outside of the Marshall Islands. Any permanent resettlement outside Bikini that involves only a part of the Bikini population would not eliminate continued erosion of the Bikinian cultural identitu nor contribute to their untimate goal for community cohesion at a single large settlement site.

Other sites in the Marshall Islands are not available to the Bikinians for settlement. Thus, if resettlement of Eneu involving at least 100 to 200 settlers is not realized in the near term, the Bikinians may be forced to turn to Hawaii or elsewhere to find a suitable relocation site for Bikinians that may be displaced from their existing settlements in the Marshall Islands.

7. Temporary or permanent settlement at sites outside Hawaii and the Marshall Islands

Over the years sparsely inhabited or uninhabited atolls and islands in the tropical Pacific have been briefly considered as sites for small to large scale resettlement of the Bikinians. These included Ant Atoll a few miles offshore from Pohnpei Island in the eastern Caroline Islands, Palmyra Atoll in the northern Line Islands, and most recently the Mariana Islands (Saipan, Tinian, Rota, and Guam). Most of these sites do not appear to be available to the Bikinians at the present time. Unlike a Hawaii settlement

alternative, a settlement on a large available atoll or island might be suitable for the entire Bikini community rather than a carefully selected segment of the population. Such a settlement would contribute to the Bikinian goals of retaining cultural identity and community cohesion, but not to their desire to return to their homeland.

Even if a suitable island or atoll would be available, considerable time and money for the lease or purchase of lands and development of settlement communities would be required. The Bikinians would be less familiar with any settlement site outside the Marshall Islands. At best, this alternative represents a possible long range plan should options in Hawaii, Bikini or elsewhere in the Marshall Islands not be realized. Congressional approval would be required to utilize funds for resettlement outside the Marshall Islands.

8. Improved living conditions at existing settlements for Bikinians in the Marshall Islands

This alternative assumes that permanent or temporary resettlement at Bikini or elsewhere is not possible in the near term, which would require renovations, repairs, and improvements to be made at existing settlements in the Marshall Islands. In fact this alternative is presently being planned or implemented for the community facilities on Kili, Ejit and for households elsewhere on Majuro Atoll. In addition there are major plans by the Kwajalein Development Authority for residential development on islands at Kwajalein Atoll to facilitate the dispersion of the crowded population on Ebeye Island where some Bikinians now live.

These actions collectively would tend to improve living conditions at the various settlement sites and accommodate to some extent the rapid natural population growth presently being experienced by the Bikinians (nearly 5% per year). However, these

plans would not contribute to a major reunion of the various Bikini settlement communities and would not alleviate the concerns over erosion of the Bikinian culture, identity, and cohesion. These actions would neither accommodate a possible emergency evacuation of residents from Ejit due to land ownership disputes nor possible emergency evacuation from any site due to natural catastrophe (typhoons, etc.). This alternative essentially represents a last resort to prevent the present poor standards of living experienced by the Bikinians from deteriorating further. Present and future plans to improve living conditions at existing settlements would be influenced by the scale and location of future settlements at Bikini Atoll and outside the Marshall Islands.

9. Delay resettlement of Eneu until after the cleanup of Bikini Atoll is completed

Although this alternative is feasible, there are no compelling technical reasons why resettlement of Eneu Island should be delayed any further. Delay would not benefit the Bikinians economically or socially; the longer the delay, the more likely and extensive will be the need for the contingency settlement actions. The Bikini Atoll Rehabilitation Committee and other knowledgeable scientists have reached a consensus that Eneu is safe for reoccupation at this time. Thus, the concerns over the safety of the settlers due to previous cleanup and resettlement failures should no longer be valid.

10. No Action

This alternative assumes that the status quo will remain unchanged. The Bikini people would continue to live under present conditions on Kili, Ebeye, Majuro, and a few scattered elsewhere. This alternative is unrealistic since the United States Government and the Bikinians have an agreement to rehabilitate Bikini Atoll.

Furthermore the Bikinians are already making plans to improve conditions at existing settlements, and the recently ratified Compact of Free Association will provide Trust Funds for the Bikini people that could be used to sponsor resettlement programs -- if not at Bikini Atoll -- then elsewhere at less desirable sites.

AFFECTED ENVIRONMENT

Eneu Island is the second largest island of Bikini Atoll. The island is about 4 miles in circumference, approximately one mile wide, and 304 acres in area. Eneu Island is located at the southeast corner of the atoll. Its principal geographic features are the 4,500 foot long airstrip, and the coconut plantation which covers most of the land surface exclusive of the airstrip, and its paved parking area. The southern-most corner of the island (the narrow pointed end) borders the largest and shallowest pass, Eneu Channel. The northern-most end of the island (the larger rounded end) borders a shallow reef flat.

Gross features of the water circulation patterns at Bikini Atoll influence the exchange of lagoonal and open ocean waters around Eneu Island. The northeast trade winds are a dominant feature throughout most of the year driving wave action and oceanic waters over the windward reef flats and into the lagoon. The net flow of water out of the lagoon under these conditions is facilitated by the numerous, narrow, deep passes on the southwestern side of the atoll and by the large, shallow channel adjacent to Eneu Island. During periods of variable light winds, the flow of water in and out of Eneu channel is influenced by the rise and fall of the tides. The geomorphology of the island and nearshore marine environment is largely influenced by large open ocean swells from northern and particularly southern Hemispheric storms.

Geomorphology and ecology:

The affected marine and terrestrial environment of Eneu Island can be categorized as (1) ocean reef slope, (2) windward reef flat, (3) pass, (4) lagoon slopes, and (5) terrestrial plant habitat.

1) The ocean reef slope along the eastern margin of the atoll extends from the algal ridge (a semi-emergent physical structure built by calcareous algae in the wave break zone) seaward to depths of about 60 m. Corals and calcareous algae living on the ocean reef slope produce calcium carbonate sediments which contribute to the formation of sandy beaches and the island of Eneu itself. Dense populations of frondose red algae, (in particular Asparagopsis, a commercially important species in Hawaii) are characteristic of this area. Fish populations are high on the ocean reef slope but are less accessible to fishermen due to the wave action.

2) The windward reef flat begins at the algal ridge and extends to the ocean side of Eneu Island. The algal ridge is a wave resistant structure formed by calcareous red algae. This structure is not well developed at Eneu Island. Highly productive microscopic algal communities (turf algae), and microatolls (formed by corals living at extremely shallow water depths, their shape molded by the depth of the water at high tide), are the dominant organisms on the reef flat. This reef flat zone is narrow compared to a similar environment off Bikini Island. It is, however, the most metabolically active region of the nearshore marine environment of Eneu Island. Edible fish and lobster populations are abundant in this habitat. Natural groins of coral rubble flats have formed at irregular intervals along the length to the reef flat. Each groin extends from a hard beach rock basement on the oceanside of the island, seaward across the width of the reef flat. Erosional features characteristic of the ocean side beach include, pitted

beach rock, erosional berms at the seaward extent of the terrestrial vegetation zone, and narrow, coarse grained sediment beaches. Overall, the windward reef flat environment at Eneu Island is poorly developed in comparison to a similar environment off Bikini Island.

3) The shallow water reefs around Eneu Island located in the pass are exposed to both open ocean and lagoonal waters and wave action. The reefs and associated fisheries on these reefs are extensive. The nearshore reefs of the southern most tip of the island harbor the highest densities of reef fishes and most healthy coral growth of any of the other nearshore reef environments. Dolphins and large sharks are common inhabitants of this area.

4) The nearshore lagoonal environment generally consists of poorly developed reefs and low densities of reef fishes. A dock was built in the middle of the lagoonal shoreline and is currently being repaired by a marine construction company. The lagoon shoreline is primarily influenced by periodic physical disturbances in the form of large oceanic swells that enter the lagoon from the shallow pass during southern Hemispheric storms. Consequently, the beach on the lagoon side of the island is poorly developed and dominated by a limestone rampart consisting of large, boulder-sized rubble.

5) The terrestrial vegetation is dominated by coconut trees planted on a precisely laid-out 30-foot square grid system. There has been no maintenance of this plantation since the Bikini people were removed in 1978. The physiognomy of the plantation varies from luxuriant, with dense tall undergrowth and tall coconut palms (to 10 m.), to sparse, almost lacking undergrowth, and variously stunted palms. In more open or sparse areas of coconut palms, the ground is covered by tall grass. No terrestrial plant species on Eneu are listed or candidate endangered or threatened species and most are widespread, strand plants or exotics typical of low coral island floras and of all the islands of Bikini Atoll.

No significant historical or cultural resources have definitely been found on the island. A few possible prehistoric cultural deposits, firepit features and some artifacts related to traditional fishing technology, have been identified and are presently being examined by an archaeologist to determine age, function, and significance. Seabird and terrestrial bird populations on Eneu appear not to be significant.

ENVIRONMENTAL CONSEQUENCES:

The nearshore marine and terrestrial environment may be affected by the establishment of a base camp or permanent settlement on Eneu Island. However, with proper design and location, significant adverse effects can be avoided. Short term impact may result from construction activities, i.e. dock restoration and construction of temporary and permanent structures on the island. Long term impact potentially may result from the resettlement of the base camp, i.e. pollution from domestic wastes, construction of an all weather harbor, mining of armor rock for revetments, and depletion of nearshore fisheries.

Restoration of the medium-draft dock at Eneu Island was begun in November 1985. No adverse impact is expected from this activity as the pre-existing dock is positioned in a suitable location along the lagoon shoreline away from valuable fisheries and reefs.

Short term impact owing to construction activities on Eneu Island will affect the terrestrial and nearshore marine environment depending on the level of construction and manner in which it is conducted. Bulldozing and construction activities to build houses and storage structures may destroy portions of the plantation and other vegetation; however, removal of some of the vegetation may increase the available drinking water stored in the water table. The coconut plantation, if maintained properly, may serve as an important source of food for the base camp. Removal of tall

vegetation on the windward side (eastern side) of the island will alter air circulation patterns possibly resulting in decreased protection from strong trade winds for the island residents. Exposure of surface soil at close proximity to any shoreline may result in an increase of sedimentation rate into the nearshore environment. This could result in adverse impact to benthic marine communities directly by smothering corals with sediment or indirectly, by reducing dissolved oxygen concentrations in seawater by increased microbial activity from dissolved and particulate terrestrial organic matter input. These impacts can be prevented by minimizing ground disturbance and ground clearing activities within the immediate shoreline zone.

Long term impact from the establishment of a base camp on Eneu Island will vary with the size of the resident population. Domestic waste disposal will affect the nearshore marine community, if disposed in the lagoon. In the absence of trade wind conditions (predominantly the summer months) water circulation patterns on the lagoon side of Eneu Island are variable. The use of septic tanks may result in the eventual leakage of sewage to the water table and eventually to the nearshore marine environment. Nutrient enhancement of the nearshore marine community from this leakage could result in localized increase in phytoplankton growth and hence turbid water conditions. Increased phytoplankton populations in the nearshore waters will not necessarily lead to the increased production of edible fish stocks. An ocean outfall located outside the lagoon on the south end of Eneu Island where flushing and dilution conditions are optimal will probably result in the least amount of impact of sewage disposal on the marine environment.

The construction of an all weather harbor inside the lagoon at Eneu Island will be needed to store boats for inter-island transportation during the clean-up activities and for eventual resettlement of the Bikini people. Construction of a harbor on the southern end of Eneu Island will affect the most productive reef

found on the lagoon side of this island and should be avoided. Construction of a harbor in the middle or northern end of the island will probably result in the least amount of impact to the nearshore marine environment. Harbor placement and design should be designed to withstand wave damage from infrequent but substantial southern storms that hit the atoll during the summer months.

The construction of docks, harbors, or revetments will require armor rock. The impact of mining armor rock from the windward reef flat of Eneu Island will depend on the amount and location of material removed. The windward reef flat of Eneu Island will be the most important nearshore fisheries site for the resident population. Removal of significant amounts of armor rock may destroy fisheries habitat and increase the potential for ciguatera poisoning by the disturbances of the substratum. Small quarries properly designed, i.e. to maximize seawater flow and minimize turbidity, may enhance fish stocks by providing protective habitats from predators.

Long term impact of resettlement on nearshore fisheries will depend on population size, diet, and fishing techniques employed by the resident population. In the absence of controls, fish, lobster and giant clam stocks near Eneu will be quickly depleted by overfishing the reef flat habitat. Early initiation of an aquaculture program, such as to enhance giant clam stocks by reseeding the reef flat, may alleviate an inevitable overfishing problem. Protected harbor facilities will also enable greater boat access to fishing sites further away from Eneu. This in turn would reduce fishing pressures on stocks closer to the island. Seasonal, size limits, bag limits and traditional forms of control could also reduce the likelihood of overfishing.

Judicious development plans should minimize any impact to cultural, historical and archaeological resources. Completion of archaeological studies and a survey of birds at Eneu island are

presently planned . Mitigation to reduce potential impacts to birds, if any, will be considered.

In summary, the impacts resulting from the construction of resettlement facilities and the return of 200 to 250 Bikinians to Eneu island can be reduced or avoided by proper design and location of facilities and activities. The environmental assessment lists and describes these and other mitigative measures to avoid significant adverse impacts. As a consequence, the resettlement of Eneu will not constitute a major federal action significantly affecting the quality of the human environment. An environmental impact statement will not be prepared. At the appropriate time and on the basis of this report a lead agency for the Federal Government could prepare and coordinate a Finding of No Significant Impact for this project.

