

Material for Eniwetok Cleanup/Rehabilitation DEIS

Alternative A - no cleanup

If only radioactive scrap and debris are removed, the environmental impact of cleanup operations will be minimal; however, the DEIS should describe and evaluate the environmental consequences of the man-made radioactivity remaining in the environment. There are certain large and important islands where radioactivity is minimal and where little or no cleanup will be necessary for rehabilitation. These areas should be described and shown on maps. Similarly, on large scale maps there may be shown structures, e.g., buildings in good repair and docks, which will contribute to living conditions. Uninhabitable islands and portions of islands may be described and shown on maps.

5-b-1 Proposed Actions - Cleanup Plan - Criteria - Radiological

Criteria for cleanup of radioactive scrap and debris developed for and employed during cleanup of Bikini should be applicable to Eniwetok, although these criteria should be reviewed by a group of experts for assurance of their adequacy in 1973-74. It should be noted that such cleanup has little effect on human population dose and is undertaken primarily to reduce the probability of high individual exposures. Specific statements should deal with radioactive waste crypts and any other locations where material has been concentrated.

Review radiological safety reports of last two test series at Eniwetok (records of task force radsafe and contractor) and any existent post test series surveys to identify any unusual conditions.

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e.g., loss of encapsulated instrument calibration sources to which attention may be given.

Consider type of instructions/orientation to be given to returning persons on steps to be taken in event of discovery of possibly hazardous material, this in the form of instructions from DOD to DOI (TTPI) for translation and distribution. Consider the use of photographs, especially for those items not well known to returning people or difficult to describe. It may be appropriate to note that there is possibility of finding material underwater in coral sand on lagoon side of islands.

Provide specific instructions with respect to craters, including any appropriate to Mike crater, as to hazards.

Develop permanent markers for hazardous spots or areas.

#### 6 - Environmental Impacts

##### (4) Effects on Life Systems

Undoubtedly the most significant effects of the residual radioactivity on life systems will be the potential consequences to health of humans who will live on the atoll. (See 6.(6) - DOS) Although it is a sociological topic, some reference should be made to effects of constraints on land use, e.g., denial of habitation on specific islands.

Add any information on experience with other Marshallese people concerning their attitude toward and respect of constraints on land use, including visits and permanent residence. In this context note in Tobin report, "The Enewetak People," the interest of these people in local, interisland travel.

(5) Effects on Food Chains

The residual radioactivity which has existed in the environs of the atoll for approximately twenty years has undoubtedly penetrated all food webs of atoll ecosystems. In the absence of detailed radiological data it is not possible to state the amounts in any food chain but it is likely that concentrations of several radioactive species are sufficiently high to contribute amounts of radioactivity to man through his diet which are of potential significance to human health. Both bone seeking isotopes and radioactive species which distribute uniformly throughout tissue are present. Long-lived iodine-129, will likely not be a problem of great concern. Meaningful assessment of the consequences of plutonium and other transuranics in the food chain as well as quantitative information on the contribution of radioactive fission and activation products in important food chains will have to await radiological survey results. It is unlikely, however, that concentrations are sufficiently high, even in the most highly contaminated areas of the atoll to cause disruption of food chains by radiation damage to components. Data from the radiological survey on several components of major food chains to man will be evaluated and available towards the end of May.

The proper assessment of radionuclide transfer through the food web to the natives will have to wait on analyses of samples collected to date. However, even though consensus believes no overt genetic and somatic damage will occur to the natives due

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to either external or internal doses, no previous information is available relative to the special concentration processes of the transuranics in tropical marine ecosystems--whether it be chemical, physical or biological. Therefore, one should be alerted to the unexpected. For example, the long-lived radionuclides of Ni<sup>63</sup> and Ag<sup>108</sup> were not suspect for the first two decades of study at the Pacific Proving Ground. However, when it became obvious that these species would have to be formed in the blast it became routine to find these in all parts of the food chains. On this basis, we would not rule out the existence of I<sup>129</sup>, Tc<sup>99</sup> and a great variety of transuranics showing up in various parts of the food chain.

The meager human diet, naturally available, will consist of sea foods found in the reef, tidepools, lagoon and open sea; fruits and vegetables which can be harvested; and sea birds and their eggs. Cleanup and rehab operations should be designed to provide a minimum of impact on these foods. Continuation of the dietary habits developed by the natives after moving to Ujelang - using imported rice, flour and sugar - will help reduce the daily ingestion of radionuclides.

Add information on current diet of the people on Ujelang, indicating amount from local, natural sources (sea and crops) and amount of imported food consumed. Give any available information on diet of infants and children which may be appropriate.

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Forecast, if possible, the composition of the diet if the people were situated on Eniwetok Atoll and living on the inhabitable land area. Include any U. S. or TTPI plans for regular supply of food items from other areas.

7 - Flora and Fauna

Provide information on the identification of the flora and fauna which have a traditional place in the diet of the Eniwetokese. When data are available from radiological survey, consider preparation of a chart of food items versus radionuclides in which uptake can be shown by symbols denoting small, moderate and substantial uptake/concentration.

The effects of radioactivity existing in any part of the atoll on individuals and populations of plants and animals are likely to be very small. If they are detectable at all it will be only through long range studies employing sophisticated techniques in the more heavily contaminated areas of the atoll. Radiological survey data on the distribution of radioactivity in the environs and in life forms will permit quantification of the above statements and the identification of any problem areas that might exist as a result of special physical, chemical or biological concentration processes. However, it appears highly unlikely that these processes would occur to the extent of producing large effects on any significant portion of the flora and fauna of the atoll.

Alternative B - Cleanup for complete rehabilitation

5.b.1. Proposed Actions - Cleanup Plans - Criteria - Radiological

Criteria for cleanup actions beyond debris and scrap removal and leading to significant reductions in population exposures and, hence,

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to a reduction of potential health consequences should have two objectives:

- (1) To assure that individual exposures are below levels at which there is an unacceptable health risk.

It is likely that doses exceeding those recommended as upper limits by FRC, NCRP and ICRP (170 mrem per year) for exposure to population groups will be acceptable for this purpose.

- (2) To reduce population exposures to as low as practicable.

Specific measures to effect such reduction should be based on cost-benefit considerations. Since soil manipulation is likely to be the major method of dose reduction, particular attention will have to be paid to evaluating the environmental consequences and costs of these procedures.

Criteria will necessarily depend on detailed radiological survey data for it will be necessary to establish what can be accomplished toward reducing exposures by cleanup actions in reference to costs and to methods for reducing exposures by methods other than cleanup.

Instructions and orientation will be given to the returning people on those measures essential to radiological health safety. Provisions will be made to assure that this procedure will cover returnees, early or late, as long as there remain reasons for precautions. Any plans for visits by TTPI health personnel for this purpose may be mentioned.

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Since DOS-AEC has the responsibility for establishing cleanup criteria, they should have the last word regarding input to DOD-DOI in this area.

6. Environmental Impacts

(4) Effects on life systems

Soil manipulation (mixing, removal, addition\*) for the purpose of cleanup or exposure reduction is likely to have minimal direct effect on human inhabitants of the atoll. However, such procedures if extensively employed are likely to have significant immediate, long term and perhaps irreversible effects on life forms present on and near the atoll. By affecting life systems on which man depends this will also affect human inhabitants of the atoll. For areas in which radioactivity is uniformly distributed, population exposure will be reduced in proportion to the area manipulated. For this reason such procedures are likely to be most effectively pursued on a selective basis in areas where local high concentrations of radioactivity exist or where inhabitants will spend large fractions of their time. It will be exceedingly difficult even when detailed soil profile data from the radiological survey become available to balance the benefits of population exposure reduction against the consequence to life systems of extensive soil manipulation. Soil removed will have to be deposited somewhere. If deposited in the ocean adjacent to the atoll, the physical effects on marine forms could be severe and will have to be evaluated as will the consequences of adding additional radioactivity to the marine environment.

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Reduction of dose by covering contaminated areas with imported uncontaminated soil from sources outside the atoll could introduce foreign plant disease and parasites.

(\* Before the discussion of soil addition becomes an established option in the DEIS or cleanup/rehabilitation plan, consideration should be given to the sources of the soil, i.e., where it will come from, and its effect (both as shielding and as soil for support of Eniwetok plant life). Is there evidence that it will remain in place for the time required, for example?)

(5) Effects on Food Chains

Soil manipulation procedures are likely to have direct impact on most terrestrial food chains. Direct destruction of vegetation by these procedures is likely to be less important than the disturbance of surface soil relationships necessary for sustaining both animal and vegetative growth. In the case of at least some soil manipulation procedures (i.e., deep plowing) it appears possible that the long-term environmental costs of these procedures would significantly exceed the direct costs to conduct the procedure.

Alternative C - Cleanup of some areas

This alternative is perhaps the most likely of the three. Specific criteria for cleanup actions and the environmental consequences of these actions can be derived by application of the relevant considerations of Cases A & B to individual areas, islands or groups of islands of the atoll. The desires of the Eniwetok people will have an important influence on the selection of this alternative.

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Additional material to be considered for working in to DEIS:

General. Indicate throughout the DEIS those items which must be discussed with and have concurrence of Eniwetok People.

3g. In order to describe the present condition of the islands it should be reiterated that (a) NVOO (Nervick) will assist DNA with the results of the survey plus (b) we (DBER) should add the integrated results of the biogeochemical study of the atoll which will help evaluate the ecological health of the whole atoll.

5.b.1. Do we have a responsibility for the cleanup-health survey for nonradioactive debris such as the beryllium on Engebi (Irene)? If so, that should be included in the criteria.

6 Environmental Impacts on --

(2) Water Quality - It is possible that nuclear detonations on or near islands have permanently altered the island surface and subsurface structures which provide the boundary between lagoon and ocean salt water and the fresh water in the lens. If so, the habitability of the islands may have to be evaluated with respect to water supply.

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