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From  
NMB-K

Frank Cluff, Safety Advisory Group, NV

## DISPOSAL OF SCRAP MATERIAL AT BIKINI ATOLL

In response to your request for consideration of proper disposal of contaminated scrap material for the Bikini cleanup operation, the following is provided:

Background - Past surveys and particularly the 1967 survey identified a number of locations among the islands of Bikini Atoll having quantities of scrap material containing induced radioactivity. Such scrap locations are described in the Health and Safety Laboratory report HASL-190 entitled, "External Radiation Levels on Bikini Atoll-May, 1967", dated December, 1967. These locations, which are on islands near former testing sites, may be identified as: (a) the Aomen-Iroij complex in the north-central part of the atoll, (b) the island of Nam and the blasted bunker just west of Nam and Bravo Crater in the northwest part of the atoll, and (c) an area generally defined as the island of Enidrik and the western portion of the Aerokoj-Eneman complex in the south central part of the atoll. Also, the possibility cannot be ruled out that there may be some contaminated scrap on Bikini Island, as increased levels of radiation were observed there on a cable spool and only a small fraction of the area was checked due to dense vegetation. Additionally, there are three test facility locations in shallow water on the reef between the Aomen-Iroij complex and Nam which were not monitored during the '67 survey and which should be checked for contaminated scrap.

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The Ad Hoc Committee established by AEC to evaluate the radiological hazards of resettlement of the Bikini Atoll recommended a number of measures one of which was that "Radioactive scrap should be removed from the islands adjacent to former shot sites." In discussions on the need for such removal it was pointed out that this material is scrap metal containing induced radioactivity and that natives collect and find use for all such materials. The scrap is in the form of metal embedded in concrete, chunks of metal lying on top of the surface, and scraps of metal mixed with the top layers of sand and soil. It is not expected that removal of the scrap containing induced radioactivity will make any great reduction in radiation levels on the near test islands since there are quantities of radionuclides, primarily  $^{60}\text{Co}$  and  $^{137}\text{Cs}$ , in the top layers of sand and soil of these islands. It was concluded that some radiation exposure could be avoided through removal of contaminated scrap metal such that it would be unavailable to native collectors.

Objectives - Following the August 1968 trip to Bikini, a report on the visit was prepared by AEC staff containing an attachment addressing the question of purpose and objective for scrap removal at Bikini Atoll. Recommendations 1 through 4 of this statement, known as Attachment 6 to that trip report, appear to be a proper assessment of what is needed. This Attachment 6 is provided for your use.

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Scrap Disposal - Ideally, and if cost, time, and man-power were unlimited, disposal of scrap metal containing induced radioactivity in the very deep ocean outside the reef would be preferred. More realistically there are a number of factors to be considered:

1. The location of channels in the reef through which boats loaded with scrap must pass is such that disposal outside the reef for scrap locations in the northern portion of the atoll will involve a 25 to 30 mile round trip.
2. Disposal of metal, which will sink to the bottom, in water 175 to 200 feet deep inside the lagoon will make the scrap as unavailable to the natives as in deeper water outside the reef.
3. The lagoon floor in the area of test locations already contains a total quantity of scrap in excess of that found on land. In fact, the added quantity from the land areas would be a very small fraction of this total.
4. Disposal inside the reef will make scrap removal operations less weather and wind dependent since trips into open water and possibly into rough seas would not be needed. In this regard, operations inside the reef should be safer for boats and crews.

With these factors in mind it is suggested that the following guidelines be applied:

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1. Disposal of metal scrap containing radioactivity in water having a depth of about 200 feet or greater will make these materials unavailable to the native population. This depth is approximately equivalent to the deepest parts of the lagoon.
2. A disposal site for each of the several island areas containing the scrap may be chosen, inside the reef, marked for easy location, and a record of position made and included in final reports. Markers should be removed at the end of cleanup operations.
3. Considering the possibility of future salvage of ships, metal scrap containing induced radioactivity is not to be placed within the prohibited area located in the east end of the lagoon (refer to H. O. 6032 published by U. S. Naval Oceanographic Office).
4. Except when collected by those authorized to do so, no samples of metals containing induced radioactivity are to be retained or transported from Bikini Atoll.
5. Scrap containing no induced radioactivity such as towers and other materials from Bikini and Eneu requires no special precautions for disposal. It has been suggested that dumping in some location within the lagoon may provide additional cover and thereby improve fishing. Obviously, these materials should not be dumped into any channel through the reef or in any other place where they would be a hazard for navigation.

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On the near test islands containing scrap with induced radioactivity there are also quantities of scrap showing no elevated radiation levels. Such materials are intermixed and radiation measurements on these islands will reflect the presence of an overall elevated gamma level from radio-nuclides in the soil. Therefore, it is suggested that all metal debris should be removed from these near test islands while the job of cleanup of contaminated scrap is being done. This will avoid much decision-making on whether this or that item requires disposal. Consideration of disposition of undamaged or lightly damaged bunkers in item 3 of Attachment 6 takes into account their radiological status and possible utility. There is the additional need to obtain Trust Territory concurrence that reflects desires of the natives.

Finally, it is realized that the distribution of scrap found on these near tests islands extends into the shallow water shore areas and on into the deeper parts of the lagoon and ocean. It is suggested that location and removal of this underwater metal scrap is generally not feasible and that any problem with such material is best handled by followup surveys as suggested in item 5 of Attachment 6. It is not intended that item 5 will apply to the cleanup phase of recovery and rehabilitation of Bikini Atoll. Rather, this is in the nature of a safeguard to be conducted as a part of followup studies.

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The above suggestions must be qualified in that they are based upon what is known about contaminated scrap in Bikini Atoll as determined from survey team observations during the 1967 visit.

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