MHS 3-2

C51

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July 25, 1974

SECY-75- 81

POLICY SESSION ITEM

SUMMARY SHEET

Subject: RADIOLOGICAL CRITERIA FOR ENEWETAK ATOLL

Purpose: To obtain Commission approval of proposed radiological criteria for cleanup and rehabilitation of Enewetak.

Category: This paper covers a major policy issue requiring Commission approval.

Issue: The paramount issue is whether and under what conditions the Enewetakese can be returned safely to their Atoll which is contaminated with debris and fallout from some 43 weapons test explosions.

The staff recommends radiation criteria and plutonium soil contamination limits that provide a conservative margin of safety for people living there. Meeting these criteria will require that village sites be confined to the southern (low level contamination) islands, growing of all food (except coconuts) be limited to the southern islands and the quarantine of YVONNE be continued until the plutonium contamination is removed. No restrictions are required on visits to the other islands and on seafood.

Those Enewetakese whose homes were on the northern islands will be disappointed with the restrictions on village sites in the north. JANET was a major village site.

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The Defense Nuclear Agency (DNA), has taken exception to the proposed criteria, although by letter dated June 7, 1974, to the Chairman, the Director of DNA states that he "will not contest the standards recommended by the Commission." DNA believes that radiation standards applicable to the general public are not appropriate for the small Enewetak population and that such use could establish an undesirable precedent for other situations of environmental contamination from nuclear explosives. In their view, application of standards for the general public does not allow adequate consideration of the desires of the people, especially as to establishment of a village on JANET. The DNA also recommended a risk-benefit analysis that they believe would justify the selection of higher radiation dose levels for the cleanup criteria. Standards for radiation workers, or comparisons with situations where people live in higher ambient radiation, i.e., monazite sands areas of India are cited as precedence for use of higher doses.

The Environmental Protection Agency (EPA) has commented favorably stating that they accept the proposed criteria on an interim use basis. The Department of the Interior (DOI) has deferred to AEC judgement.

Comments received from DNA, EPA and DOI are included in Appendix 1.

Decision Criteria:

Neither national nor international bodies have established radiation standards or criteria for cleanup that would apply specifically to the Enewetak situation. Currently, cleanup criteria are developed on an ad hoc basis with consideration given to such pertinent factors as: exposure levels, food chains, pathways to man, land use, cost, feasibility of cleanup, impact of cleanup, etc. The staff has applied the principle that cleanup of contaminated property for use by the general public must (1) keep predicted radiation dose levels within a conservative interpretation and

application of Federal guidance on radiation protection, and (2) meet the "as low as practicable" criterion considering factors of practicality and effectiveness.

These principles were followed in the Bikini Atoll cleanup, the most appropriate precedent for Enewetak. The Enewetak cleanup and rehabilitation recommendations, including the restrictions, are similar to those for Bikini. About the same order of conservatism was used in applying the standards.

While there are no national or international criteria for plutonium cleanup, the staff recommendations are consistent with a recent, independent study performed by LASL entitled, "A Proposed Interim Standard for Plutonium in Soils," LA-5483-MS, dated January 1974. EPA plans to develop cleanup guides for plutonium contaminated land but these will not be available for some time. Plutonium contamination on the islands of Enewetak is confined principally to well defined and relatively small areas. The exception is the contamination on YVONNE; about half of the 94 acres of this island is highly contaminated. There is a wide range of particle sizes, and the distribution in the soil is not uniform. The recommended criteria for cleanup of plutonium in the soil are intended for use throughout the islands of the Atoll. Specific recommendations for cleanup of YVONNE are also given. Decontamination of YVONNE is seen as an iterative process to be conducted by a team of experts. There remains the difficult problem of disposal of the contaminated soil which is a responsibility of DNA. However, by the time cleanup is started, a method for disposal may be available. If not, then the plutonium debris throughout the Atoll should be retained on YVONNE and the quarantine of that island continued until contamination is removed. Further study is needed on possible removal of the plutonium contamination

from soil to reduce the bulk of material requiring disposal. AEC should be prepared to take the lead in any such studies that are made.

Alternatives:

(1) Apply radiation criteria with the objective of maintaining exposure and radioactivity levels in the natural background range and equivalent to pre-test conditions. (Such criteria are equivalent to prohibiting occupancy of the Atoll.)

(2) Apply maximum levels allowable for individuals within the general population as contained in current Federal standards such as 500 mRem/yr, and 5 Rem in 30 years whole body doses and inhalation and dietary intake of radionuclides equivalent to those doses.

(3) A middle course based on maintaining exposures "as low as practicable," and limited to a conservative fraction of the Federal standards for individuals within the general population in order to account for uncertainties in dose estimates.

Discussion:

Weapons tests were conducted at Enewetak Atoll from 1948 to 1958. The remaining contamination from 43 explosions includes fallout, fission debris, neutron activation products, plutonium debris from safety tests and buried waste. Test locations are shown in the attached map with names of tests enclosed in boxes.

In April 1972, the U.S. announced that Enewetak Atoll would be placed under Trust Territory control at the end of 1973. Resettlement of the Enewetakese people would depend upon the results of a survey of the Atoll using the same pattern followed at Bikini, i.e., radiological survey, cleanup, rehabilitation and resettlement. The responsibilities were divided among Federal

agencies at an interagency meeting on September 7, 1972, as follows: AEC-radiological survey and cleanup and rehabilitation criteria; Defense (through DNA) - cleanup; and DOI - rehabilitation and resettlement. EPA opted not to become involved formally, but agreed to advise and assist.

During September 1972 to March 1974, AEC conducted an extensive radiological survey. A Task Group was established to evaluate the survey results and to prepare recommendations for cleanup and rehabilitation. The Task Group report was coordinated with DNA, DOI, and EPA.

SECY 74-542, Outline of a Staff Paper on Enewetak Atoll, was discussed with the Commission at Session 74-74 on April 23, 1974. The Commission generally accepted the proposed staff rationale which would allow the people to occupy part of the Atoll with certain practical restrictions on living sites, food sources, etc. This is consistent with the staff position that exposures should be "as low as practicable" and based on conservative interpretation of Federal Radiation Council (FRC) guidelines.

The Task Group report is available in the Secretariat and is summarized in Appendix 2. Key conclusions and recommendations are as follows:

(1) FRC guides for whole body, bone, and gonads for the individual, and the philosophy of Alternative (3) should be used to evaluate predicted radiation doses. Owing to uncertainties in dose estimates, the values used to evaluate cleanup alternatives were the FRC guides reduced by 50 percent for annual doses to individuals and by 20 percent for the 30-year gonadal doses. Thus:

Whole body and bone marrow	- 0.25 Rem/yr
Thyroid and bone	- 0.75 Rem/yr
Gonads	- 4 Rem/30 yrs

(2) Plutonium soil cleanup should be handled on a case-by-case basis considering all radiological conditions. Cleanup of contaminated soil should be implemented by a team of experts in the field using the following general guidance applicable to this specific operation.

Below 40 pCi/gm	- no action
40-400 pCi/gm	- appropriate action
Over 400 pCi/gm	- cleanup

(3) Decontamination of YVONNE is seen as an iterative process that amounts to a search for the higher plutonium levels in soil with removal and storage according to the guidance provided. If a method of plutonium disposal is not available during the cleanup phase, the quarantine of the island should be continued.

(4) Villages should be located on southern islands, ALVIN through KEITH.

(5) Visits may be made to all islands except YVONNE.

(6) Commercial and subsistence food production should be limited to southern islands, except for coconuts.

(7) Fishing is permitted anywhere.

(8) Radiation levels on JANET prohibit re-settlement now. Resettlement may occur when test plantings of subsistence and commercial crops show radioactivity levels within FRC standards.

(9) There should be base-line surveys of body burdens of selected radionuclides for the Enewetak people prior to return and periodic resurvey of the people and environment after return.

(10) The above restrictions result in the following calculated radiation doses:

Maximum whole body dose - 0.13 Rem/yr
Maximum bone marrow dose - 0.15 Rem/yr
Estimated 30-year dose -

gonads - 2.2 Rem
bone - 11.5 Rem

(11) In contrast, unrestricted living on JANET would result in the following radiation doses:

Maximum whole body dose - 0.76 Rem/yr
Maximum bone marrow dose - 1.1 Rem/yr
Estimated 30-year dose -

gonads - 14 Rem
bone - 135 Rem

Staff recommendations were derived following consideration of various options for reduction of radiation dose below the criteria including modification of the diet, plowing and removal and replacement of layers of contaminated soil. Associated ecological damage and soil disposal problems are unavoidable consequences of large scale decontamination actions. The Task Group did not view partial soil removal as an effective and dependable method of reducing radiation doses. Consideration of restrictions on food production locations, although undesirable, is absolutely necessary if radiation doses are to be reduced to acceptable levels.

DNA has recommended that a risk-benefit study should serve as a basis for the decision on dose criteria. The Task Group did consider estimates of risks associated with radiation criteria derived from FRC guidance. Because of many uncertainties associated with predictions of effects of long-term low level doses from

external and internal emitters for a base population of a few hundred people, the Task Group had severe reservations about the validity of the estimates. The recommendations of the Task Group are considered to be practicable and feasible. The largest cost item for the recommended cleanup would be the support base; the second largest item would be removal and disposal of contaminated and uncontaminated scrap and the cleanup, removal and disposal of plutonium contaminated soil. Since the recommendations do not contemplate extensive decontamination of residual radioactivity in soil of northern islands such as JANET, the cost should be less than any approach involving extensive soil removal, disposal, and replacement actions.

Following consideration and approval of the Task Group findings, the staff will inform DNA and DOI. A briefing will then be developed and rehearsed for presentation to the people of Enewetak and their advisors during a joint AEC-DNA-DOI trip to the Pacific. This presentation will be designed to be a vehicle for U.S. Government consultation with the people on the AEC recommendations and the proposed DNA-DOI Draft Environmental Impact Statement (DEIS). Opening remarks at the briefing would be delivered by senior AEC, DNA, and DOI officials. In more detailed discussions to follow, AEC recommendations and the DEIS would be discussed by the AEC and DNA technical representatives. After the visit, AEC staff will inform the Commission of results of these discussions.

Recommendations:

1. That alternative 3 and the associated criteria be approved.

2. Note that the responsibility for disposal of contaminated material, including plutonium, rests with DNA.

3. Note that action on reducing the quantity of plutonium contaminated material requiring disposal has been deferred for further study. The AEC should be prepared to take the lead in conducting a study to see if such reduction is feasible and practical.

4. Note that the follow-on radiological surveys and monitoring of the Atoll and people will be conducted by AEC to insure exposure criteria are not exceeded and to determine when JANET and other northern islands become habitable.

5. That consultation with the Enewetak people as discussed be approved.

Coordination: This paper has been concurred in by DMA, BER, and OGC, and has been noted by PA.

Scheduling: For consideration at the August 6, 1974 policy session.

John A. Erlewine
General Manager

Contact:
M. B. Biles, OS
X-3157

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