

The following comments are directed at the report where the facts as we know them either do not support statements in the GAO draft report or where our information suggests that the report is not complete.

1. Page 3 - There are at least seven phases in the Enewetak project:
 - a. The initial radiological and engineering surveys and assessments conducted by DOE and DNA.
 - b. Development of cleanup criteria and recommendations by ~~DNA~~ DOE
 - c. Environmental Impact Statement (EIS) development and Project/Budget defense by DOE, DNA, and DOI.
 - d. Cleanup field operations managed by DNA with radiological support provided by DOE.
 - e. Rehabilitation performed by DOI with logistics support from DNA and technical support and advice provided by DOE.
 - f. Long-term radiological followup of the environment (except for the engineered features of the CACTUS crater encryption of contaminated debris but including monitoring of any effluent from the crypt) and residents of the atoll by DOE.
 - g. Long-term engineering followup of CACTUS crater debris disposal by DNA.

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than others.

Differences should state that most (but not all) tests at Bikini were conducted over water. For instance, shot ERAVO the largest ^{nuclear} test conducted in the Pacific Proving Ground, was conducted on an island at Bikini Atoll. Also, a comment is needed on the DNA material ^{that discusses} ~~on~~ the isotopic content of the contamination found on Bikini and Enewetak. Our data indicates that isotopic content of scrap and soils at these two Atolls is not enough different to support the point that at Bikini contamination is principally the result of fallout and Enewetak it is induced plus fallout.

Many Enewetak tests were on steel towers ^{on land}. Many Bikini tests were on steel barges moored near shore. There is induced radioactivity plus fission products in the fallout that contaminated the islands at both Atolls. One ~~case~~ ^{can} see differences in α isotopic content of contamination between islands at Bikini and Enewetak but there are just as large differences between islands within the same atoll. The only really unique island in our view is Runit. ~~Here~~ ^{On this island} chunks of Pu were deposited in surface soils in an area where tests gave no nuclear yield or essentially no nuclear yield. Nothing similar to this has been found at Bikini.

5. Page 9 - So far as DOE is aware, there is only one development related to living pattern restrictions at Enewetak requiring any change in DOE recommendations and this has nothing ~~whatever~~ to do with debris and soil cleanup and in fact nothing to do with any recent experience at Enewetak. Rather, the unacceptably high Cesium-137 ~~had~~ ^{body} burdens of Bikini residents and the failure of a recommended precaution against use of locally grown foods (particularly coconuts from Bikini Island) to limit these body burdens, ~~argues strongly that coconuts not be planted~~ ^{overwhelmingly against planting} in similarly contaminated soils at Enewetak or in soils anywhere near the Bikini levels. As a result of this experience, DOE deemed it prudent to recommend that islands in the northeast at Enewetak not be planted with coconut. Another thing learned from the Bikini experience is that whenever the preferences of the Enewetak (or for that matter Bikini) people conflict with good radiation protection practice, DOE must stand by its best judgement recommendations regardless of what ~~a~~ ^{the} Master Plan or other earlier documents may state. While we support all possible input from the people, radiation ~~levels and degree of cleanup~~ should take precedence in

dose estimates evaluated against applicable radiation protection standards and conclusions drawn therefrom must

with procedure from these planning agreements to allow all possible land to be planted, this option was modified to consider planting coconut trees on certain northeastern islands. Dose estimates were recalculated and while higher than before, were still within the criteria. The final recommended option contained a revision allowing coconuts to be planted on certain northeastern islands. From the Task Group viewpoint, DOE has reverted to an earlier preferred position. The lesson is this is not to try, with so many variables, to develop a cleanup and rehabilitation option that just fits within the criteria.

Philosophy relative to soil cleanup will require more soil be excised and some additional islands may have to be quarantined indefinitely due to lack of resources and time to clean them up.

- c. Dose estimates have switched from averages to consideration of ^{worst} ~~best~~ regions.
- d. Recent EPA proposed guidelines ^{are} more stringent than ~~those of the~~ AEC Task Group, and ^{AEC} criteria have been made more stringent in effort to meet EPA guidelines.
- e. Initial Task Group cleanup guidelines considered only Pu-239, 240. These were later broadened to include all transuranium elements.
- f. Coconut intake of Enewetak people ^{has been} recently estimated to ~~be~~ ^{the cleanup} be 10 times greater than when ^{the cleanup} plan was developed.
- g. The 40 and 400 picocuries per gram criteria have been made more stringent.

Comments on Item a - The only development requiring a modified solution was the Bikini experience which led DOE to recommend against planting coconuts on the northeastern islands. ~~There~~ There has ~~x~~ been no other change in land use recommendations or living patterns restrictions from DOE. This item was covered ^{earlier} in ⁵⁹⁰ comments on Page 9 of the ^{draft} ~~given above~~.

Comments on Item b - DOE philosophy relative to radiological cleanup and rehabilitation of Enewetak Atoll and recommended radiological criteria for cleanup were fixed with the issuance of the AEC Task Group report in 1974. There has been no need for a

engineering task. Thus, the philosophy used is the philosophy associated with current radiation protection resources that are to guide Federal agencies in their radiation protection activities. DOE cannot unilaterally change the philosophy as the basis numerical standards that have been derived therefrom. It has also been our practice to employ in a factor of conservatism at only one place in applying Federal radiation standards to real world problems. This explains why the average or most likely value rather than worst case is used for the many parameters involved in developing dose estimates for comparison with the criteria selected. If worst case or maximum credible values were used, the answers derived would be ultra conservative. If cost of cleanup was not a factor, this kind of evaluation could be used, but we do not believe this is a practical approach in this instance.

for each parameter in the dose equations, the predicted dose would be much higher than presently predicted.
However, if compliance with restrictions is assumed to be possible then worst case values must be employed for all assumptions on use of land and food.
If it were assumed that at completion of cleanup when people return they will live somewhere they choose and grow food on any island, then dose estimates must be based on the worst case, i.e.,

In applying Federal Standards the Task Group selected 50 percent of the annual doses for individuals in the general public and 80 percent of the 30-year dose for the population for use in evaluating land use options. For cleanup of soil, the best available information indicated that at an average ^{Soil} level of 400 pCi/g, exposures of people living in the area may reach the standard. The Task Group selected 40 pCi/g or 10 percent of the 400 pCi/g as the level below which soil cleanup would not be required.

None of this has been changed or made more stringent. DNA ~~at first~~ objected but then agreed with the Task Group recommendation on cleanup criteria. Their concern was that if these criteria were set this low for cleanup of K Enewetak, a precedent would be set

of the residents.
The cleanup remains after cleanup. Radiological doses would with economy spent
Full island remains after cleanup. Radiological doses would with economy spent
people living and growing their food on the most contaminated area.

that may be difficult to meet elsewhere. ^{DNA} ~~Their~~ preference on such criteria was stated in a letter Johnson to Graves, ^{February 25, 1974} and the Task Group's reaction was summarized in a letter McCraw to B. Lee Marshall.
~~See enclosed copy.~~
See Enclosure II.

As to the indefinite quarantine of islands, to our knowledge only one island has ever been discussed in this context. This is Runit Island. The AEC Task Group considered Runit a special case and made no recommendations for cleanup specific to that island. The selection of Runit for disposal of contaminated debris and soil was made by DNA on advice from EPA. The AEC had no part in this decision and had ~~never~~ favored ocean disposal. Once DNA made the decision that Runit would be a dedicated disposal island, DOE did urge that any soil cleanup of Runit be placed at the bottom of a list of cleanup priorities.

Comments on Item c - DOE dose estimates use averages, not worst region. This item may refer to some recent dose estimates developed by DNA staff for which DOE and its contractors have provided comments. Our present intent is to continue to use island averages.

Comments on Item d - DOE has not made radiological cleanup criteria more stringent because of the EPA proposed guidelines. EPA staff are quite familiar with the AEC development of cleanup criteria for Enewetak. EPA provided an observer to attend meetings of the Task Group on Recommendations. Sections of the draft were provided to EPA for comments and suggestions ~~on~~ ^{as} the Group's report was developed. EPA participated in the review process for the Enewetak EIS which was based upon the AEC recommendations.

There have been staff level discussions between EPA and DOE as work progressed on the ^{development of} proposed EPA guidance. ^{for transuranic elements in soil.} An important

point to recognize is that the AEC recommendations for cleanup of plutonium in soil were derived from basic Federal standards and therefore ^{the recommended criteria} are related to dose to man. The criteria selected for Enewetak, while expressed as ~~a~~ concentrations of radioactivity in soil, ^{are directly} ~~is~~ ^{terms} ~~is~~ ^{to lung and bone,} related to dose. The proposed EPA criteria is expressed in ^{these} units of doses and soil concentrations are to be derived from ^{these} doses using appropriate pathway models.

It is our view that if cleanup of islands at Enewetak is accomplished according to the Task Group criteria, ^{and the resident centrally compares with N. Island} ~~exposures of~~ ^{their exposures} residents to transuranium elements will meet the proposed EPA criteria. EPA is using conservative dose values in its proposed recommendations. Informally, EPA staff have indicated that if predicted doses at Enewetak associated with the AEC soil cleanup criteria are at or near their proposed ^{dose} criteria, the ^{cleanup} project would meet the intent of their guidance. The published proposal mentions Enewetak cleanup but does not make any recommendations specific to this project.

Comments on Item e - The statement that the Task Group's radiological cleanup guidelines considered only Pu-239, 240 is incorrect. The published scientific report that provided the key information relating concentrations of radionuclides in soil to dose to man, ~~and allowing recommended criteria to be expressed in useful terms, namely something measurable at Enewetak,~~ assumed a distribution of transuranium elements in the soil that ^{would be} ~~one might~~ expect from a nuclear weapon detonation. Included in the considerations in this report were all of the long lived transuranium element alpha emitters that would be residual to a nuclear detonation. It was known that the ratios of transuranium elements in Enewetak soils would vary from place to place. Even if the ratios found in soil samples were

different from that assumed, the same degree of cleanup would be accomplished so long as the totals for the mixtures were the same ^{when} expressed in units of ^{Curie of alpha} radioactivity ^{in soil}. The intent from the beginning was that all such elements would be included in the measurements of radioactivity in soil. ^{since they all contribute to dose to man.} The mistake was that the language in the AEC report used the term plutonium ^{plutonium-239} when it should have used the term transuranium. ^{This point was clarified with DOE before soil removal began.}

Comments on Item f - A much greater intake of coconut (about 10 times greater than used earlier) has appeared in a report prepared by DNA staff. Comments from DOE to DNA have raised serious questions about the validity of such ^{an} ~~are~~ assumption. We are not aware of the status of the report and whether it has ~~ever~~ been published.

Comments on Item g - The recommended criteria of 40 and 400 pCi/g intended for use in decisions on cleanup of contaminated soil at Enewetak have not been changed or made more stringent. In the EIS soil levels below 40 pCi/gm were judged not to require cleanup. This is still our recommendation. It was recommended in the EIS that soils having greater than 400 pCi/gm should be cleaned up wherever these levels were found. This is still our recommendations and the value of 400 pCi/g is ^{to be} ~~being~~ ^{by DNA} used in the cleanup of the Aomon crypt. Islands having soil concentrations in between these values (from 40 to 400 pCi/gm) were to be treated on a case-by-case basis. DNA requested and received additional advice on how to make these case-by-case decisions. DOE provided the following:

- Less than 40 pCi/gm - Village Island
- Less than 80 pCi/gm - Agricultural Island
- Less than 160 pCi/g - Visiting Island

DNA has apparently been satisfied with this. They have not requested any further advice regarding soil cleanup criteria.

8. Page 19 - DOE is committed to perform long-term radiological followup of Enewetak residents and their environment including monitoring any effluent from the disposal of contaminated

transuranium elements in soil, see comments on item a
above.

Enclosure I.

BIKINI-ENEMETAK
SIMILARITIES

ABOUT SAME NUMBER OF PEOPLE INVOLVED.
NUCLEAR TESTS IN SAME GEOGRAPHIC LOCATIONS.
NUCLEAR TESTS ABOUT THE SAME TIME PERIOD.
LARGEST ISLAND IN SOUTH AND LIGHTLY CONTAMINATED.
LARGE AREAS SUBJECTED TO LAND CLEARING.
MANY BUNKERS AND CONTAMINATED SCRAP.
MOST COCONUT AND OTHER FOOD PLANTS ARE MISSING.
FISH AND SHELLFISH HAVE LOW RADIOACTIVITY.
TERRESTRIAL FOODS HAVE THE HIGHER LEVELS OF
RADIOACTIVITY.
LAGOON WATER HAS VERY LOW RADIOACTIVITY LEVELS.
DIET AND LIVING HABITS OF THE PEOPLE ARE ABOUT
THE SAME.
BASIC RADIATION STANDARDS ARE THE SAME.

BIKINI DIFFERENCES

AT BIKINI - ELEVEN SHIPS ON LAGOON FLOOR.

GILLIAM	SAKAWA	PILOTFISH
ANDERSON	ARKANSAS	SKIPJACK
CARLISLE	SARATOGA	APOGON
LAMSON	NAGATO	

AT BIKINI - CLEANUP AND REHABILITATION ACTION IN 1969.

AT BIKINI - FIRST 40 HOUSES BUILT, SOME OCCUPIED.

AT BIKINI - ALL NUCLEAR CRATERS UNDERWATER.

AT BIKINI - NO AREAS OF HIGH LEVEL PLUTONIUM IN SOIL.

AT BIKINI - PEOPLE TRADITIONALLY LIVED IN VILLAGE ON BIKINI ISLAND IN SOUTH OF ATOLL.

AT BIKINI - NO EXISTING FACILITIES. TENT CAMP IN SOUTH BUILT FOR CLEANUP. CLEANUP IN 8 MO. LITTLE WORLD WAR II DEBRIS.

ENEWETAK DIFFERENCES

AT ENEWETAK - SAFETY TEST CONDUCTED (NO NUCLEAR YIELD).

AT ENEWETAK - NUCLEAR CRATERS ON LAND.

AT ENEWETAK - AREAS OF HIGH LEVEL PLUTONIUM IN SOIL.

AT ENEWETAK - ALMOST TWICE AS MANY TESTS AS BIKINI (42/23).

AT ENEWETAK - CLEANUP AND REHABILITATION NOT YET DONE.

AT ENEWETAK - PEOPLE LIVED IN TWO GROUPS, ONE IN SOUTH AND ONE IN NORTH OF ATOLL.

AT ENEWETAK - NEPA/EIS REQUIREMENTS.

AT ENEWETAK - OCEAN DUMPING LEGISLATION.

AT ENEWETAK - INCREASED CONSERVATISM IN APPLICATION OF RADIATION PROTECTION STANDARDS.

AT ENEWETAK - INCREASED CONCERN FOR PLUTONIUM.

AT ENEWETAK - MICRONESIAN LEGAL SERVICES CORP, INVOLVEMENT.

AT ENEWETAK - NO JTF-8. CLEANUP MAY TAKE TWO YEARS. SOME WORLD WAR II DEBRIS.

AT ENEWETAK - EXISTING BASE CAMP IN SOUTH NEEDS MUCH UPGRADING.

Would create social and economic problems for them, and thus negate many of the benefits of returning to their homeland.

b. Permit growing of food on all islands with the exception of pandanus and breadfruit for which some restrictions or special provisions might have to be made on some islands.

c. Establish maximum permissible levels of radioactivity consistent with the maximum allowed segments of the US population, e.g., US citizens living in Grand Junction on tailings. This standard should be .74 rem per year for whole body doses. Supporting arguments are stated in my 15 October 1973 letter to General Camm.

Using the US equivalent standard and applying limited restrictions or clean bedding of pandanus and breadfruit it appears that the desires of the Enewetakese to fully utilize their homeland can be satisfied. The inclosed charts provide more detail in this regard. These charts are modified versions of those used in our 15 February meeting.

a bit more tactfully. Believe we have
a good solid relationship between our
staff & figured this wouldn't really bruise
any feelings, so rather than rewrite -
I'll "hedge" in this PS.



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

March 11, 1974

Martin B. Biles, Director
Division of Operational Safety

COMMENTS ON TASK GROUP REPORT ON ENEWETAK
CLEANUP

In the short time available, since our Task Group meeting on March 6, I have tried to characterize the differences of opinion and the general comments received on the Task Group draft report of February 1, 1974. Written comments have come to us from DOI, DNA, EPA, HEW, and AEC staff. These were discussed with our technical advisors, division liaison members, and interagency liaison representatives in a day-long session last Wednesday.

While there were points of differences on numerous technical details, all attending the session supported the AEC approach of using conservative radiation exposure criteria and objectives for exposure reduction promulgated by recognized standards bodies in evaluating the Enewetak radiation environment except for DNA. The Task Group listened to the briefing that has been used to describe the DNA position and discussed this approach at considerable length. We briefed on the Task Group approach and this was discussed. We have agreed that to the extent possible, those actions and alternatives favored by DNA will be discussed in the next version of our report in the context of items considered (DNA has not presented any action that the Task Group has not heretofore looked at), but we made no commitment to support or recommend one or another of these.

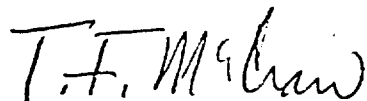
We are evaluating the suggestions received on the February 1 draft. The approach for selecting radiation criteria is to be switched from emphasis on ICRP to FRC guidance. The FRC philosophy is very much the same. The numerical standards are similar except for the dose for bone. Fifty percent of the FRC guide will be 0.75 Rem/yr instead of 1.5 Rem/yr that appears in the February draft. The guide for bone marrow remains the same. The guide for gonadal exposure is being reduced from 5 Rem/30 yrs, which is 100% of the generally accepted value, to 4 Rem/30 yrs. The reason for this comes from our deliberations with EPA staff.

We have asked LLL for additional exposure estimates for whole body and bone to include annual values for children for comparison with the selected annual exposure criteria. About a week will be required to obtain these estimates. LLL is also examining the situation with iodine-129, a point raised by the HEW contact. We are adding more specific recommendations regarding follow-up in response to the EPA comment on this question.

As for any significant changes in content and format, we are removing Appendix IV, Disposal of Radioactive Debris, in response to an EPA suggestion and will use additional statements in the report section on this subject. The new Appendix IV will be two sections reproduced from the BEIR report. Appendix I and II that are an abstract and summary of survey findings will not change. Appendix III on Review and Summary of Radiation Protection Standards will change only slightly.

Members of the drafting group are preparing revised material agreed upon. We anticipate preparation of another revision of the Task Group report in about two weeks, assuming there are no unexpected difficulties.

The enclosure is a brief review of the more important issues affecting the Task Group's deliberations. It appears there are steps that can be taken to accommodate and to develop a compromise for most of the suggestions and recommendations from DOI, EPA, and HEW. These generally do not involve any unsolvable philosophical, policy, or standards' matters. The differences between the Task Group approach and the DNA approach involve issues that are so fundamental that to try to change the approach and adopt their position would bring us into conflict with both the spirit and letter of regulations that govern Federal agency radiation protection activities. It is not possible to conform to their wishes by merely putting forth a wider spectrum of cleanup alternatives. The Task Group has adopted quite different radiation criteria and cleanup objectives.



Tommy F. McCraw
Special Assistant to the
Assistant Director for
Health Protection
Division of Operational Safety

Enclosure:
As stated

cc: L. Joe Deal, OS, w/encl.
W. Gay, MA, w/encl.

down to a specified external gamma level with no other clean-
up or restrictions required. Support the concept of "fall-
back positions" to be used if all necessary cleanup funds are
not available. Hold that availability of money will determine
extent of cleanup. Reject the "as low as practicable" re-
quirement.

successfully defended against criticism from those who
are familiar with current Federal regulations and standards.

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Reviewed by H. Schuetz Date 4/30/97