

Reviewed by B. Schuette Date 4/30/97

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January 21, 1982

Mr. Jonathan Weisgall
Ginsburg, Feldman, Weil and Bress
1700 Pennsylvania Avenue, N.W.
Washington, D.C. 20006

Re: Bikini Resettlement

Dear Jonathan:

It was indeed a pleasure to meet with you recently so that we could have the opportunity to discuss the outgoing problems in the Marshalls, and in particular Bikini. I too feel strongly about the need for independent scientists to assess the radiological and radiobiological data from Bikini, it is the least we can provide these unfortunate people who have suffered for many decades.

As per your request, I will be most happy to expand upon the issues raised in our conversation. For clarification purposes, I will include the questions contained in your letter of January 7, 1982, which will be followed by my responses.

"1. Misstatements and errors in the 1980 DOE booklet ('The Morning of Radiation at Bikini Atoll') that you feel require correction by the Bikinians" independent scientists."

Response. This DOE booklet, like the companion booklet for Enewetak, is replete with deceptive and misleading language, all of which tends to downplay and underestimate the potential health risks associated with exposure to low-level radiation. The following statements are representative of those misleading distortions:

Page 2: "thyroid - A small part of the body located in the throat (page 17)"

The authors should have pointed out that the thyroid is essential for development and body metabolism, and that its injury led to the many cases of dwarfism and hypothyroidism in the Rongelap and Utirik populations. Also, the authors neglected to mention that thyroid disease in the exposed populations has a long latency period lasting many decades.

Page 2: "plutonium - A kind of radioactive atom, and an energy called 'alpha radiation' comes from it. Plutonium will not disappear for hundreds and hundreds of years."
The authors should have been more honest in pointing out that plutonium has a half-life of 24,000 years.

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induced at lower levels of radiation exposure due to the numbers of cells that may be spared for a later malignancy.

Page 2: "radiation - A kind of energy that comes from radioactive atoms as they change and become other kinds of atoms. This energy we cannot see, hear, smell, taste, or feel." Nowhere does it state that radiation is harmful to human health.

Page 4: "Of the atoms that are radioactive, some have always been a part of the world. These are God-made and it will take a very long time before they go away."
To invoke the name of God with the Marshallese, who are very Christian, especially as it relates to radiation, is a cheap shot which takes advantage of the peoples' religious beliefs. This statement violates the rule of logic insofar as it appeals to a higher authority--one almost gets the distinct impression that God sanctions radioactivity because it was present at the Creation. This entire page distorts the fact that unlike other locations in the world, Bikini is the site of 23 nuclear explosions--with many of these in the megaton range. I do not know of a single honest radiation scientist who would return the Bikini to raise a family, yet the language contained on page 4 gives the impression that the radiation at Bikini is not very different from other locations in the world.

Page 12: "No alpha radiation is able to reach people's bodies from the radioactive atoms in the soil."
This statement is false. Plutonium, an alpha-emitter, can enter the foodchain and be internally absorbed into a human body. Also, it takes only one-millionth of a gram of inhaled plutonium dust to cause a lung cancer. It would be like playing radiation roulette to see how long it would take for the returning Bikinians to contract lung cancer after living at their former atoll.

Page 14: "Some of the strontium atoms will leave the body when people eliminate, but many of the strontium atoms will remain in the bones, and radiation will continue to come from these radioactive atoms."
The authors failed to mention that whenever radioisotopes are ingested in the human body, they come into contact with normal, healthy cells. When this happens, the nuclei of normal cells are bombarded with radioactive particles and high- and low-energy rays which can alter healthy cells. The result of this nuclei bombardment can lead to cancer, and

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populations, and the persons treated in childhood with X-rays

will occur to a person who receives a large amount of radiation then to one who receives a small amount of radiation." It is hard to imagine that the authors of the DOE booklet did not read the 1977 Brookhaven report by Dr. Robert A Conard entitled 'Summary of Thyroid Findings in Marshallese 22 Years After Exposure to Radioactive Fallout.' On page nine of this report, Conard himself refutes the above statement where he says, "One can postulate that the thyroid doses in the Rongelap children (700-1400 rads) were high enough to cause many cells to die at mitosis because of lethal damage

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to the reproductive mechanism and thus to reduce the number of cells at risk for malignant transformation. At lower doses, as in the adult group, a greater number of cells would be spared for malignant transformation. The authors are obviously attempting to obscure the fact that low-level radiation may indeed be more dangerous at Bikini than the islanders might consider otherwise, and it is skin to a criminal act to hide this information from unsuspecting and unknowledgeable people.

Page 18: "If people will again return to live on Bikini Atoll in the future, scientists can again use this instrument (whole body counter) to measure the amount of gamma radiation from radioactive atoms in people's bodies as a result of their living on the atoll."
This is tantamount to admitting that the scientists know in advance that the Bikinians will be ingesting gamma-emitters at Bikini, such as cesium-137 and cobalt-60.

Page 19: "The U.S. Government and many other governments approve and follow these recommendations."
The authors, in mentioning the radiation standards of the ICRP, UNSCEAR, IAEA, and the EPA, neglected to mention that these radiation standards, far from being unanimously accepted, are probably the most controversial aspect of present-day radiation physics. The Bikinians have a right to know that there are many radiation scientists who feel that these radiation standards are extremely lax and that they grossly underestimate the potential hazards associated with radiation exposure. When one reads through this booklet, one gets the definite impression that there is universal consensus about radiation standards. Moreover, the Bikinians have a right to know that researchers such as Gofman, Mancuso, Carl Johnson, et al. have had their Government-funded studies terminated because their findings suggested that the accepted radiation standards underestimated the health risks of radiation exposure.

Page 21-27: The scenarios and accompanying risk estimates on these pages are conservative calculations, i.e., "best-cases" verses "worst-cases." The Bikinians have a right to know this, especially in light of the history of repeated mistakes by Brookhaven, the DOE, Interior, et al. in the Marshalls. Specifically, the fact that the "unexposed" Rongelapese who returned with the "exposed" islanders in 1957 after Bravo became exposed to residual radiation should be relevant here. In this connection, the Japanese scientists who came to the Marshalls in 1973 reported that the Rongelapese should not have returned in 1957 must be mentioned. Also, the lesson or the catastrophic Bikini return in the 1970s should not be ignored.

As an addendum, the authors of the DOE booklet have failed to mention the psychological impact of the weapons tests in

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should have these fears. As a social scientist, I submit that the people's fears and anxieties are a medical disorder directly related to the actual radiation-induced pathologies.

If the Bikini people return to their former atoll, it is my belief that they too will suffer from the knowledge that their environment is still radioactive and that it contains "poison"--the Marshallese equivalent for radiation. Additionally their resettlement failure a few years ago will loom ominously in the background to remind them that the scientists can make mistakes.

I might mention that I am deeply troubled about the government's tendency to minimize health risks associated with radiation exposure. For example, in the 1980 BEIR Committee Report, it is stated in the chapter on the thyroid gland (page 304) that "A minimal latent period of 10 years seems to be reasonable" (which follows the 9-year latency period in the Rongelap group) and "A peak incidence perhaps 20 years after exposure is suggested by some studies." This last part troubles me, especially since the BEIR committee specifically refers to Conard's

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Rall of the National Institutes of Health addresses this question in reference to the Marshallese. In discussing the thyroid uptake of the radioiodines in the exposed populations, Rall says:

"Another peculiar and interesting property is that the uptake of iodine by the thyroid is generally about the same in children as it is in adults. That is, the fraction of iodine ingested which goes to the thyroid is about the same in a child as it is in an adult. But a child of a year has a thyroid which weighs one gram, and an adult thyroid weighs about twenty grams, so if you put the same amount of material in one gram you get twenty times as much radiation. So children get substantially higher doses."
(AAAS symposium, page 18, emphasis added).

In addition to the above, it should be noted that if the Bikians are returned to their home atoll, children will be at a much higher risk for possible cancer induction because they-- by definition--will have a longer residence period on the atoll in which to contract a possible malignancy.

"4. Fish at Bikini. My notes state that you were told by a University of Hawaii graduate student who accompanied DOE missions to the Marshalls that there are between 800 and 1,000 different species of fish at Bikini. Are all of these species highly migratory or are there special problems at Bikini related to consumption of fish there? Are these species found only at Bikini? Where is the underlying data?"

Response: During the June 1975 DOE survey to Utrik, I met a doctoral student from the University of Hawaii who was doing research with the Department of Oceanography. He told me that he was studying reef fish niche in Pacific atolls, and I remember my amazement when he told me there were "between 800 and 1,000 different species of reef fish at a typical atoll in the Marshalls." This student--whose name I unfortunately cannot remember--told me that most of the reef fish (as their name implies) were sedentary and usually did not venture out into the open ocean. As opposed to the migratory fishes,

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such as tuna and mackerel, the roof fish inhabit specific niches in the atoll's lagoon, and the student was studying the interplay between fish niche and fish community in Pacific atolls.

There are two studies of fish population at Bikini, both of which are relevant here. Those studies by Leonard P. Schultz are titled "The Biology of Bikini Atoll With Special Reference to the Fishes" (Smithsonian Institution Annual Reports for 1947: 301-16, Washington, D.C., GPO, 1948) and "Fishes of the Marshall and Mariana Islands" (U.S. National Museum Bulletin 202, Washington, D.C., 1953). In the 1953 study, Schultz states that "In the biological cycling of materials there is not only an abundance of organisms but also a wide variety of species--some 700 among the fishes alone--so that whatever is not utilized by one is quickly taken by another." (Quoted from Jack Tobin's doctoral dissertation, "The Resettlement of the Enewetak People: A Study of a Displaced Community in the Marshall Islands," 1967, University of California at Berkeley, page 54.)

While on Utirik between the years 1975 and 1977, I recall that the islanders regularly ate between 30 and 40 different species of roof fish. Many of these fish--like the parrotfish--subsist by eating coral, and it is my guess that certain radionuclides (e.g., strontium-90) probably got recycled in the man-environment foodchain complex. If this hypothesis is correct, the Marshallese are in trouble: no less than one-third of all the fish I ate for two years on Utirik were parrotfish, and many of the others were likewise coral-eaters.

In this regard, I direct you to a study of ecosystem contamination at Bikini and Enewetak by researchers from the fish laboratory at the University of Washington at Seattle. This study is titled: "Polonium-210 and plutonium-239, plutonium-240 in the biological and water samples from the Bikini and Enewetak atolls," and appears in Nature, volume 255, May 22, 1975, pp. 321-23. It is rather curious why the researchers of this study--who were funded by the DOE--restricted their analysis to only the aforementioned isotopes, while they completely ignored cesium-137, strontium-90, cobalt-60, americium-241, etc. The authors did mention, however, that "The overall result indicates that inside the lagoon the radioactivity values of plutonium were more variable than those of polonium-210 (page 323, emphasis added)." This statement leads me to suspect that we are still shooting in the dark when we discuss possible radionuclide uptake for the people of Bikini, should they decide to return home.

"5. Restrictions on access to Bikini and compliance with prescribed diet. Your experiences in the Marshall Islands would be useful in this regard."

Response: While in the Marshalls early last year as a consultant for the Marshall Islands Litigation Project, I interviewed several people from Utirik who recounted their experiences after their evacuation following the 1954 "Bravo" hydrogen test. Most of the people from Utirik told me how they were instructed not to eat the local foods from Utirik when they returned home after their three-month evacuation to Kwajalein. The following excerpt from an

(cont'd.)

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Marshall Islands through the Territorial Affairs Office of the Interior Department, where he is employed. When I asked DeYoung about the feasibility of the proposed dietary restrictions for the returning Enewetak islanders, he said, "It is unrealistic to expect artificial living conditions, i.e., the restricted diet and living patterns, to be adhered to for 30 years." A more expansive version of my conversation with DeYoung appears in my article "A Tale of Two Islands: Bikini and Enewetak," in The Ecologist, volume 11, number 5, September/October, 1981, pp. 222-27.

In my estimation, I think it is fanciful to expect the people of Bikini--who have already violated their previous past with the Interior Department during their aborted relocation--to restrict their intake of locally grown feeds at Bikini Atoll. I am not convinced that the people truly understand--and this is the key--the long-term effects associated with living in a mildly radioactive environment. There is nothing in the Marshallese experience or cultural configuration which relates to an action in the present and a consequence 20, 30 or 40 years hence.

"6. DOE model diet. As I explained to you when we met, the diet used in DOE's 1978 survey assumed a daily intake of coconuts of approximately 300 grams, which amounts to a little over one coconut. This diet was connected by Micronesian Legal Services Corporation, and I suspect that they have purposefully chosen a low number. Do you know of other diet studies in the Marshalls?"

Response: I have not yet seen the data for dietary patterns which formed the basis for Micronesian Legal Service's Enewetak dose assessment, nor have I seen Jan Naidu's material on the Marshallese diet which he collected for Brookhaven National Laboratory. The following comments will be based therefore on Nancy Polleck's 1970 doctoral dissertation titled: "Breadfruit and Breadwinning on Namu Atoll, Marshall Islands," as well as my own information. As an agricultural and cooperative advisor on Utirik for two years, I became quite familiar with the Marshallese diet--especially the role of coconuts in the diet--insofar as my role as an agricultural

(cont'd.)

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advisor pertained specifically to the production of copra meat from coconuts.

In her discussion of the role of coconuts in the Marshallese diet, Pollock is correct in stating that "The coconut cannot be classified as a staple food but as a most important additive to the diet (page 181)." She goes on to mention that an average of one coconut per person is consumed daily in the form of a beverage, and is here referring to the green coconut (page 181). Pollock then describes the Marshallese method of using shredded (or grated) coconut meat as an additive for other dishes--usually mixed in with rice to make a porridge or merely to sweeten the rice. She states that an average of between "3 and 15 nuts per meal are grated" for each household (page 182). According to my census figures for Utirik, a household contains an average of ten persons. Also, it should be noted that this rice dish with grated coconut is consumed with at least two meals per day per person. If we take the average number of coconuts used for each meal--between 3 and 15 coconuts--we arrive at nine coconuts. Nine coconuts are therefore consumed by ten persons at least twice a day, which yields 1.8 coconuts per person per day (9 coconuts x 10 persons equals 0.9 coconuts, which when multiplied by 2 meals per person per day equals 1.8 coconuts).

Another food from the coconut is the "iu," or the embryo of a mature nut which has sprouted small leaves and has a tap root. These coconut seedlings will become new coconut trees if left alone, and are keenly sought out by Marshallese--especially children--as an ideal and tasty food. It was my experience that while in the coconut groves preparing copra, people would send their children out to round up many of these "iu" coconuts to eat while cutting copra. Also, a sweet porridge is made from the "iu."

The sap, or "jokaro," from the coconut tree is a highly prized beverage in the Marshallese diet. This is the fresh sap of the coconut collected by placing a bottle under the freshly cut end of the coconut spathe (Pollock, page 324). Several bottles (usually emptied 16-ounce soy sauce bottles) are collected at both dawn and dusk per household, and the "jokaro" is considered a nutritious beverage and is consumed by all members of the household.

"Jekamai" is a household syrup made from boiled "jokaro." This sweet syrup is used as a sweetener for beverages such as tea and coffee, and is loved by the Marshallese.

A Marshallese candy, called "amotoum," is prepared by grating many coconuts into the boiled sap ("jokamai") and then boiling this mixture over a fire for a period of time. The result is a molasses-like concoction which is then rolled into small balls and eaten as candy.

These are some of the ways in which coconuts enter the Marshallese foodchain, and it is an error to think that Marshallese merely consume coconuts--as we do when we purchase them from the store--by eating them directly from the husk. In the following paragraph, I will itemize my estimates of coconut consumption in the Marshallese diet, and it should be readily understood that such variables as the ratio of imported versus local foods, relative quantities consumed per individual, frequency of field ship service with food shipments, etc., should be kept in mind. The following estimates of coconut intake

(cont'd.)

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are based upon the 236-gram per coconut figure given in Bowes and C.P. Church's Food Values of Portions Commonly Used (Lippincott, New York and Philadelphia: 12th edition, 1975, page 107), which is an authoritative nutritional text.

Estimated Marshallese Daily Diet

<u>Item</u>	<u>Estimated No. Grams</u>
1 green drinking coconut (this is Pollock's figure--my estimate would be 2 drinking coconuts per person per day)	236 g.
1.8 grated coconuts used in rice and rice porridge (using Pollock's estimate of between 3-15 nuts per household per meal. I calculate the mean of 9 nuts per 10 persons to be 0.9 nuts x 2 meals, or 1.8 coconuts per person per day)	425 g. (1.8 x 236 g.)
0.5 "ju" from coconut embryo	118 g. (0.5 x 236 g.)
10 ounces of "jokaro" (this is my approximation)	280 g. (10 x 28 g.)
2 ounces of "jokamai" (my approximation)	56 g. (2 x 28 g.)
Total average daily grams of consumed coconut	<hr/> 1,115 g.

As may be readily seen from my analysis of the estimated Marshallese daily diet, the figure of 1,115 grams of coconut per person is more than three times the estimate provided by Micronesian Legal Services. I am rather curious how they arrived at their 300-gram per capita rate. After having lived with Marshallese on Utirik for two years and subsisting on a Marshallese diet, this dietary estimate is as close as I can come to an approximation of the daily

(cont'd.)

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coconut intake by the outer island Marshallese.

As a final comment, I would like to suggest the names of some interested radiation scientists whom you may wish to contact in relation to additional independent assessments of Bikini:

Karl Z. Morgan, health physicist, Georgia Institute of Technology

Joseph Wagoner, epidemiologist, Springfield, VA (202) 523-7144

Carl Johnson, epidemiologist, Rocky Flats, Colorado (303) 232-2328

F. Raymon Fosberg, botanist, Smithsonian Institution, (202) 381-5559

(Fosberg, the long-term editor of the Atoll Research Bulletin, accompanied Conard and the Brookhaven team during their 1957 annual Marshalls survey after the "Bravo" test. When he noticed abnormal vegetation patterns as he flew over Rongolap Atoll- and which he later confirmed in a field study--he speculated that these were caused by the fallout from "Bravo." When he tried to publish his findings, Conard attempted to suppress his article on radiation-damaged plants in the Marshalls. After having his article rejected by Science, Fosberg had it published in Nature in 1959. He maintains that Conard tried to cover up information about the fallout damage from "Bravo." Fosberg says he would like to be included in an independent survey of radiation damage in the Marshalls.

If I can be of further help to you with regard to your Bikinian clients, please feel free to contact me at any time.

Sincerely,

Glenn H. Alcalay
Department of Anthropology

Enclosure: Kotrady 1977 report (xerox)

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THE RADIATION-INDUCED RISK
OF RESETTLING BIKINI ATOLL

BY

HENRY I. KOHN AND NANCY A. DREYER
with an appendix by
JOHN H. HARLEY

EPIDEMIOLOGY RESOURCES, INC.
P.O. BOX 57
CHESTNUT HILL, MA 02167

November 7, 1981 -- May 28, 1982

PREPARED FOR THE DEPARTMENT OF ENERGY
UNDER CONTRACT NO. DE-AC01-82EP12040

ABSTRACT

The Department of Energy (DOE) has concluded that the Bikini atoll is unsafe for resettlement. In response to the Bikinians' request for an independent review, we have examined the following DOE findings: (a) radionuclide contamination of Eneu and Bikini Islands, (b) radiation dosage to those who might resettle the islands, and (c) risks to the health of such settlers. X

We are in practical agreement with the DOE estimates. Resettlement of either island in 1983 would lead to a range of annual or 30-year cumulative doses that exceed the Federal Radiation Council (FRC) guides for the general population, but not those for occupation exposure. By 2013 resettlement of Eneu probably would be permissible. X

The principal source of radiation dose is local food, especially coconut, owing to contamination of the soil by cesium-137. A precise estimate of dose is impossible because an accurate projection of the diet is impossible. The availability of imported foods would lessen local food consumption, but not sufficiently to meet the FRC guides for the general population. The 30-year cumulative index dose is 61 (25-122) rem for Bikini, and about 8 (3-16) rem for Eneu.

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THIS TRANSMISSION CONSISTS OF _____ PAGES (EXCLUDING COVER SHEET)

up guidelines in a letter to Dr. Liverman which was prepared by a number of scientists at the time of the Livermore review of all AES Pacific activities on June 27-29, 1972; DOD has a heavy commitment to the cleanup of Enewetak Atoll and to a technique of disposal that has changed with time and will shortly begin to expend considerable effort in soil removal and disposal activities; and ERDA has commitments to provide certification of Enewetak cleanup and long term radiological followup of the Atoll when it is resettled.

You are invited to participate in a review of:

1. AEC recommendations for cleanup and rehabilitation of Enewetak Atoll and specifically the criteria for plutonium-239 in soil, and
2. Environmental and health implications and long term monitoring requirements for crater disposal of contaminated debris and soil on Runit Island.

0 Assistant Administrator
for Environment and Safety

Enclosure:
As stated

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The Department of Energy is providing radiological support to the Defense Nuclear Agency and Department of the Interior in the cleanup and rehabilitation of Enewetak Atoll. DOE is providing technical advice to these agencies and certain other services including radiological monitoring, a radiochemistry laboratory plus an instrument calibration and maintenance facility, and data processing and analysis. Also, DOE is to certify completion of cleanup on an island-by-island basis according to an agreement with Defense Nuclear Agency. Field services are being provided at Enewetak by the Nevada Operations Office and its contractors funded by OES. The cleanup project is expected to continue for about 2-1/2 to 3 years.

Pursuant to these activities, there is need for an overview of this project by a group of experts not directly engaged in the work, who will periodically evaluate these operations and advise the Director, Operational and Environmental Safety, (OES), and where applicable, the Assistant Secretary for Environment. OES anticipates a schedule that calls for a programmatic review of DOE Enewetak radiological support activities about every 6 months or more frequently if needed. An initial orientation visit to Enewetak will be made with later visits if needed.

This letter will confirm our telephone invitation for your participation in the Advisory Group on Cleanup of Enewetak Atoll. The first meeting is scheduled for April 13-14, 1978, at the Nevada Operations Office in the Main Conference Room, at 9 a.m. An agenda will be provided at a later time.

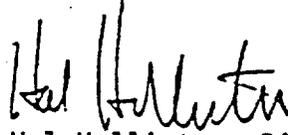
Enclosure I is a draft charter, subject to revision. Enclosure II is a preliminary draft report, "Assessment of Potential Doses to Populations From the Transuranic Radionuclides at Enewetak Atoll," for review. Another cleaned-up and corrected draft with additional information (numbers in Tables will not change) should be available before the April meeting.

Multiple Addressees

2

APR 4 1978

The OES contact is Tom McCraw, FTS 233-3721. We greatly appreciate your willingness to participate in this Advisory Group.



Hal Hollister, Director
Division of Operational and
Environmental Safety

Enclosures:
As stated

cc w/encls: Roger Ray, NV
cc w/o encls: J. L. Liverman, ASEV

DRAFT

Enclosure I

Charter

Advisory Group on Cleanup of Enewetak Atoll

Objective: To secure a body of expert advice and judgments on DOE radiological support of cleanup and rehabilitation of Enewetak Atoll.

Approach: An Advisory Group of experts not directly related to the project is established and given responsibility for performing periodic reviews of DOE radiological support activities at Enewetak Atoll. This review will cover:

1. Cleanup criteria and recommendations.
2. Field operations:
 - a. Monitoring and sampling
 - b. Sample analysis
 - c. Data handling and analysis including statistics
 - d. Advisory activities in support of cleanup commander
 - e. Application of cleanup criteria and recommendations
 - f. Certification
 - g. Post cleanup conditions including disposal of contaminated debris and soil
3. Dose estimates and applicable standards

The Advisory Group will report to the Director, Operational and Environmental Safety (OES), and where applicable, to the Assistant Secretary for Environment. The Group will observe DOE field operations at Enewetak, as needed, review progress reports and situation reports, participate in program reviews that are to be conducted every 6 months, review and evaluate certification actions and documentation, and will report findings and provide advice to OES. The Review Group's work will be completed when DOE concurrence is given that Enewetak Atoll cleanup is completed and DOE has discharged its advisory role to the Department of the Interior on rehabilitation of the Atoll.

bcc: JJ Fuquay
File/LB



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May 12, 1978

Mr. Hal Hollister
Director
Operational and Environmental
Safety
Office of the Assistant Secretary
for the Environment
Department of Energy
Washington, D.C. 20545

Dear Hal:

In response to your letter of April 4, 1978, I am pleased to accept membership on the Advisory Group for Cleanup of Enewetak. I also agree to serve as chairman, with the understanding that you should feel free to replace me at any time you believe the activities of the Advisory Group are not receiving adequate attention.

Sincerely yours,

A handwritten signature in cursive script that reads "Bill".

William J. Bair, Ph.D.
Manager
Environment, Health, and
Safety Research Program

WJB:ms