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NORTH MARSHALL ISLANDS ADVISORY GROUP MEETING

on

June 21, 1979

Hilton Airport Inn
San Francisco, California

Advisory Group Attendees:	W. J. Bair (Chairman), PNL C. W. Francis, ORNL R. O. Gilbert, PNL J. W. Healy, LASL R. O. McClellan, Lovelace C. R. Richmond, ORNL W. L. Templeton, PNL R. C. Thompson, PNL
DOE Attendee:	B. W. Wachholz
LLL Attendees:	B. Clegg M. E. Mount W. A. Phillips W. L. Robison
Purpose of Meeting:	Review and discuss with LLL scientists their draft report and future efforts on the post cleanup dose assessment of the Enewetak Atoll.
Recorder:	R. O. Gilbert

These notes typed July 6, 1979.

[redacted]

they want to know (a) what's the current situation, (b) what is the predicted assessment and (c) what were people exposed to in 1954 from the Bravo shot.

A medical survey has been conducted by the Marshall Islands government on one of the North Marshall islands. Various illness symptoms were noted and the government wants to know if they are radiation related. However, the validity of the survey is in doubt. DOE will probably do other medical surveys in the islands.

Bikini

The attorney for the Bikini people has replied to Clusen's May 15, 1979 letter to the Department of Interior regarding the possible return of the Bikini people to Eneu. He asked why the U.S. government once said Bikini was "safe" but now we say differently. He has a lot of questions regarding how doses would be changed by e.g., removing various amounts of soil (many other questions). There was a meeting

last week in Washington, DC, with Bikini people. They will get their own advisors (perhaps from Japan) to review the radiological assessment.

Ted Mitchell (Counselor to the Enewetak, Rongelap, and Utirik people)

Ted asked Wachholz for the present draft of the LLL post cleanup dose assessment. He or his consultants also wanted to attend this meeting of the Advisory Group. Wachholz did not give him the present draft because it is in too rough a form and quite incomplete. Ted felt it would help avoid a lack of confidence if he got the present LLL draft. DOE is discussing the possibility of providing a later, more complete LLL report to Ted, the same one that will be distributed to other government agencies.

On June 13 a cable from Ted Mitchell to Clusen was received. He wants a dose assessment conference during late July or August to discuss

- full report on radiological status of Enewetak Atoll,
- latest dose assessments, risk evaluations,
- possible resettlement schemes,
- master plan for development,
- discussion of dose assessment methods.

A second cable from Mitchell was received June 20. He requested a Sept. 18-25 meeting to discuss the feasibility of resettlement on Enjebi island. He wants the LLL dose assessment July 15 report to be available to anyone who would like to see it.

A return cable from DOE to Mitchell will be sent explaining that DOE can't meet with them during September 18-25 due to prior commitments.

Charter for Advisory Group

- There is no charter at the present time.
- Chet Richmond called Wachholz several times this month urging a charter be developed.
- Wachholz admits he just hasn't got to that job due to other pressing items.

should point out that DOE has requested this assistance (from the Advisory Group) and that assistance is being provided.

Richmond: The scope of this Advisory Group's activities is the important point. What are our responsibilities? This should be documented. Our impact and role should be documented for the historical record.

McClellan: Different forms of charter are possible:

- We don't need a "formal charter" that would put us under the Advisory Act.
- A "formal charter" is neither necessary or desirable.
- Wachholz should put together a letter for Ruth Clusen in which is outlined the reasons for the groups existence, who the key people are, their responsibilities, etc.

Bair: Suggests that Wachholz discuss this matter with Clusen while on the way to Enewetak this weekend.

Wachholz: We can avoid the Advisory Act if members are acting as individuals. It was not the intent of DOE to set up an advisory group that would be under the Advisory Act. How limiting and precise should the charter be?

McClellan: Wants a general charter; one that's not restricted to a specific area of concern.

Healy: Feels this Advisory Group overstepped its bounds when we "set" the 40, 80, 160 pCi/g limits for the cleanup of Enewetak.

<u>Discussion of LLL Draft Post Cleanup Dose Assessment (before LLL scientists arrived)</u>

McClellan: Draft is not well written. It must reach many different audiences.

Wachholz: DOE is committed to getting a LLL dose assessment document to DOI by July 15.

General Discussion: Identifying topics for discussion with LLL during rest of the day.

Thompson: The document should stop at dose assessment, i.e., it should not make comparisons with guidelines.

Francis: Will there be a document that indicates what the cleanup actually accomplished in terms of reducing radionuclide levels?

Gilbert: Expressed his general concern about inadequate discussion of statistical aspects in the draft report.

LLL Scientists Arrive: Robison, Mount, Phillips, and Clegg

Robison handed out the following:

(a) Historical and Cultural Background of the People of Enewetak written by Bob Kiest (U. of Hawaii).
(b) Revised pages 8 and 9 of the LLL post cleanup dose assessment.
(c) Memos dated May 15 and 23, 1979 from Michael Pritchard to Robison and Mitchell regarding the Ujelang diet survey.
(d) Two summary tables of diet survey information.
(e) Revised Appendix A to dose assessment report (external doses).

Robison gives a review and update

Diet: A 12 oz. coke can was used to indicate food intake - "how many cans worth of a given food do you eat?" How frequently would you eat that much in week? This information was extrapolated to a month and year basis.

Approximately 150 people (≈25% were interviewed. The diet results for adult males were summarized first (this went into the first draft). Next they summarized the kid diets, then the females. It turns out that adult females eat more than adult males (according to the diet survey). Hence, the female diet rather than the male diet is limiting.

Based on casual observation by LLL scientists, it is reasonable to believe that Enewetak females eat more than males (they are fatter and get less exercise). The gram intakes estimated from the diet survey seem reasonable.

Healy: Doesn't like "normal" and "famine" diet terminology.

Robison: This terminology is used by the Enewetak people. Imported foods are now considered the normal way of life. They would import foods using cash if the Department of Interior didn't provide it. Robison read from an unpublished paper and thesis by Lawrence Carruchi that substantiates the use of the word "famine."

Robison indicated that it is not true that the diet of the Marshallese will revert to "famine" conditions when the U.S. leaves. The people's normal diet changed in the 1930's.

Richmond: Jack Tobin did a diet survey several years ago. His results indicated slightly greater intake of food than the present diet survey. His study was not as extensive as the present survey.

Wachholz: Janakiram (Jan) Naidu (Brookhaven) has recent diet data that was given to Wachholz June 19.

Healy: Jan went into people's homes, took food home and measured quantities. He also took pictures of people eating meals.

Thompson: Was increased intake of coconuts during extreme hot weather taken into account in the diet survey?

Robison: Yes! It's averaged in over the year.

Francis: Have you data for radionuclide concentrations in coconut fluid versus that in coconut meat?

Robison: Not at the present time, but this information will be available shortly.

Gilbert: Have you attempted to put error limits on the average diet intakes?

Robison: Not yet! We are still summarizing the data. We are looking at the data in different ways. We are going to get each individuals total

diet intake (all foods combined) so we can get a distribution (histogram) of intakes by individuals.

Gilbert: Good idea.

Bair: Should look at this distribution for different population groups.

Wachholz: Are the diet results biased?

Francis: The results of the different diet studies (Jan's versus the present diet survey) don't vary a great deal. Are we spending too much time worrying about the diet?

Robison: The Advisory Group should review the diet data handed out today.

Francis: What are the potassium levels in samples?

Robison: We are looking at the data. The calcium concentrations in native foods has been measured. It's about 0.8 g/day on Enewetak. It's about 1 g/day in the U.S.

Planting Coconut Trees

Robison: Doesn't feel it makes any difference whether coconut trees are planted on the northern islands. If a person lives on Enjebi then he will plant and eat coconuts from Enjebi If coconuts are planted on other northern islands, the concentration in those coconuts will be less than those on Enjebi. To the extent these coconuts are eaten the average radionuclide intake would decline. If people live on the southern islands, they won't go all the way to the northern islands to get those coconuts.

Maximum Individual

Robison: We are using $3\bar{x}$ as an indication of the maximum probable dose to an individual ($\bar{x}$ = maximum annual dose).

There are three major places of uncertainty in dose calculations: diet, radionuclide concentrations in food, and uncertainties in

[redacted]

Bair: Is there reason to believe the metabolism of cesium is different for the Enewetak people?

Phillips: We are using a 15% reduction in body and organ weights (compared with Reference Man) to make dose estimates. This appears to be about correct from available data if you exclude the two fattest men.

Advisory: Group as a whole: ICRP recommended parameter values should not be used if data applicable to the Enewetak people indicate other estimates are preferable. Everyone agrees

Robison: Can easily change the computer code to get new dose estimates if estimated parameters change (e.g., concerning short and long term retention of cesium in the body).

Wachholz: DOE must have a revised LLL dose assessment by July 15 to send to DOI so they can make a decision whether or not coconuts should be planted on the northern islands of the Enewetak Atoll.

Robison: We are making a "limiting" run where a child is born after the 8 year period when planted coconuts will start producing, then follow him for 70 years.

Could also look at the fetal dose.

The marine pathway is included in the present draft document but not discussed.

Cistern water pathway is not included, but it will contribute very little dose.

Richmond: Noshkin (Health Physics, 1974) reported ground (well) water exceeded guidelines.

Robison: People use surface water.

Wachholz: The Bikini people have raised the question of well water.

Robison: We will include well water in dose calculations.

Wachholz: DOE does not want another Bikini situation, i.e., returning people to the islands, then pulling them out.

Healy: Future measurements may be taken under situations where the model is inappropriate and a dose exceeding guidelines (on a short term basis) may result. Then DOE will be in hot water again. Should the dose assessment paper discuss such scenarios?

Wachholz: Questions will be asked as to what changes (in diet, living patterns, etc.) can be made that would change dose estimates.

Robison: Get much lower doses if coconuts are not consumed.

General discussion of coconut intake.

Francis: Is Cobalt-60 a problem? There is quite a bit of Co-60 in soil, but the uptake of Co-60 is very low. Some Co-60 was reported in rats in NVO-140.

Robison: Co-60 contribution to dose is very slight.

Healy: You should mention in the report the reason for not including Co-60.

Robison: We will produce dose estimates for Co-60.

Bair: Did females have higher Cesium burdens than males on Bikini?

Gilbert: What additional data will be available for making dose assessments?

Robison: We don't intend to use the 50 meter grid soil data. We think the 100 meter grid data presently being used is adequate.

On Enjebi we intend to look at the soil data by Watos (parcels of land). The NW quadrant has the highest concentrations of the four quadrants on Enjebi and it is owned by one individual.

We will also be looking at well water concentrations in an area denuded of vegetation.

McClellan: Two major points

1. What is the purpose of the dose report? How will it be used? Is it a reference mark for future monitoring? Is it a document that really assembled all of the data? Should dose estimates be compared with guidelines? What should the flavor of the document be? Presumably the results reflect "our best judgment." What about other procedural estimation options that weren't used? How detailed should the appendices be? What do we want and how long will it take to get it done?
2. We must have a clear established position on what should be done with all the data, output, and details. We need an institutional memory so that all this information can be dug up.

Richmond: Who has the responsibility to do this?

McClellan: DOE! But, DOE can delegate that responsibility to a laboratory.

Francis: Should estimated doses be compared with guidelines in the LLL report?

Robison: This report is not a DOE position paper.

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the LLL dose paper to risk. DOE should do the risk analysis first.

General Agreement: LLL should not make comparisons between estimated doses and guidelines (EIS or FRC) in the present dose assessment effort.

Healy: Questioned whether LLL has considered all the variation in the dose model. Perhaps we should be more conservative in our dose estimates.

Wachholz: It is DOE's responsibility to make dose assessment-guideline comparisons. DOE cannot ignore EIS guidelines. EPA says the maximum dose is the EIS guidelines.

McClellan: The comparison of doses with guidelines (all of them) should be put in a separate document!

Wachholz: Mitchell has raised the question of the applicability of U.S. dose standards to Enewetak.

Should the EIS guidelines be considered upper limits?
The 250 mrem limit may not be acceptable today.

Healy: Criteria should come from EPA

Thompson: Or DOI!

McClellan: The July 15 deadline is too early to get a "final" dose assessment.

Thompson: Will the document needed by July 15 be identified as a preliminary document to be followed by updated versions?

Robison: The July 15 document is not a final version. LLL has given no written response to DOE outlining what would be done by July 15. This paper is evolving over time. For example, resuspension material was inadvertently left out of the present version.

McClellan: The minimum things this July 15 report can address should be identified.

Healy: The expectations of the Enewetak people makes the July 15 data important.

McClellan: We should be realistic as to when an adequate assessment can be prepared and tell it like it is.

Lunch

2:00 pm

Wachholz: At the December 1978 Enewetak Atoll meeting Joe Deal gave a commitment that DOE would have a dose assessment by May 1979. The date now proposed is September 1979. The cost of planting coconuts goes up about 1 million dollars after August 1, 1979. Perhaps the Enewetak people could plant the coconuts to reduce cost. DOI doesn't want to go back to congress to ask for more money.

Bair: Copra data won't be available for months.

Discussion of Risk

Richmond: Some agency has to do a risk assessment, an assessment that goes beyond the current LLL dose assessment effort. An assessment of non-radiological risks should also be included. He doesn't see that happening.

Wachholz: Ted Mitchell's people will be in on the evaluation of the next LLL dose assessment draft.

Bair: We should make a list of the immediate and long term issues we need to discuss this afternoon.

Robison: Offers to give a summary of the present data status:

Status of Present Data

1. External Doses

The data base is essentially in. This consists of EG&G 50 meter grid IMP data for Enjebi and all northern islands except Pearl.

2. Ingestion Doses

These doses are developed from concentration ratio data: pCi/g in fruit versus the weighted soil profile data in the root zone of sampled plants. A separate ratio is obtained for each sampled tree and the average of the ratios is used as the average concentration ratio. The 100 meter grid soil data have been used thus far for estimating average island soil concentrations. The more detailed 50 meter grid data can be used. The island average concentrations from the 100 meter grid are multiplied by the average concentration ratio to get the estimated average plant concentration. More data on veg/soil ratios will be available in the future. Soil data appear to be lognormal.

3. Inhalation

Of the total observed mass loading (56 $\mu g/m^3$), about 34 $\mu g/m^3$ is due to sea-salt spray. Hence, 22 $\mu g/m^3$ is due to terrestrial origin. We assume 19 hrs/day of normal activity conditions and 5 hr/day of high activity conditions. We use the ICRP model. We have a reasonable good hold on doses from inhalation. They are extremely low. For estimating doses from Pu in the lung model, we use the average Pu/Am ratio for each island and multiply this by the island average Am obtained from the IMP data on a 50 meter grid.

Healy: (a) The methodology of converting IMP data to μr/hr and then to rads at 1 foot height should be in the July 15 paper.

(b) Looks like you are ignoring everything inhaled except the respirable part.

Robison: No! We use the entire inhaled material.

Healy: (c) Doses from ^{241}Pu should be in the dose assessment paper.

Robison: These data aren't available yet from Eberline and DRI. The dose from ^{241}Pu will be very small.

Healy: (d) Ingestion. There are no data in present LLL draft giving pCi/g concentrations for diet (animals, marine).

Be sure that in the report you say what you have done and where the data come from.

Robison: How do we generalize animal data to other animals?

Healy: Would like some discussion of dose models themselves in the dose paper.

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McClellan: Robison should write a better introduction which includes a general outline of how the dose assessment was done. There are three levels of detail: (1) general description of how doses were estimated (in main body of the report), (2) a very detailed description including equations (in appendix) and (3) worked examples (in appendix).

Bair: You must also give limitations and assumptions.

Templeton: You must consider the case of children playing in the dust.

Robison: Doesn't know how to handle estimating doses for this case.

Healy: Does Spiers modeling approach for Sr-90 apply to children?

Robison: I don't know.

Templeton: Questions Bennett's Sr-90 bone model as to whether it relates to pCi/g or pCi.

Robison: We will put in more discussion of Bennett's model in the July 15 paper. We have been trying to contact Bennett (he's presently in London). We have talked to John Harley.

McClellan: You should include supporting evidence that doses due to H_2O, inhalation, ^{241}Pu, and dirt are negligible.

Bair: You need to define "famine" in the report.

Robison: We will do that. We will also use both Enewetak and English island names.

Healy: Concerning the diet, does coconut crab consumption depend on normal or famine conditions?

Thompson: Questions the drastic cutback in gram intake under "famine" conditions.

Robison: True famine conditions can exist when imported food is not available.

Gilbert: You should use graphical plots to show dose rates over time. This will help the reader.

McClellan: Should the 50 meter island averages be computed for Cesium to check the 100 meter grid averages?

Robison: We will do that.

Healy: You should explain the soil concentration data in Appendix D of the present draft.

Robison: The units are pCi/g. The error terms is $SD/\bar{x}$ where SD is the standard deviation between locations.
- We will delete the SD since we will be giving the data distributions.

Thompson: He is concerned about the political implications of some sentences in the present draft.
Example: First two paragraphs of draft report.

Bair: Should DOE lawyers look at the July 15 version?

General Discussion: Who should review the July 15 version? General agreement that the Advisory Group plus other outside individuals should review it.

Healy: You should have a document number on the July 15 version.
- The July 15 version should also state that the NW islands are not included in the assessment.
- Don't forget to mention Runit in the report.

Francis: Put in an example calculation.

McClellan: Concerning followup, how does the July 15 assessment relate to followup work? July 15 estimates are baseline for future comparisons.

Wachholz: DOE needs long range plan.

Robison: Bob Watters' (DOE, OHER) long term plans are to continue getting a handle on transfer coefficients.

Robison will continue going back to Bikini since coconuts are now producing.

McClellan: There is no need for an excessive linkage between a research plan (Bob Watters type) and a followup plan. Followup studies must be done and if we can get research data from it, so much the better.

The word "subsistence" is not defined in the paper.

Healy: What diet should be used in this report?

Give some example in the July 15 report that indicates the sensitivity of the dose estimates to changes in diet.

Robison: Wants to get the best possible dose assessment and leave decisions to others.

Healy: Copra production will never be acceptable on the world market until the radiation furor dies down.

Robison: Comparative risks should be considered in comparing radiation risk versus that due to sharks, typhoons, lack of medical care, etc.

Wachholz: Should DOE do these comparative risk studies?
DOE itself doesn't have the expertise.

Richmond: At Three Mile Island the added dose was compared to 10 extra days of background radiation.

At this point the LLL scientists departed for home.

Continued discussion of the Advisory Group

Wachholz: Discusses preparations for meeting with the Enewetak people in September o· October to discuss dose assessment. Visual material is very important. Bair and Healy will be at this meeting (on Enewetak) to discuss risk aspects of the dose assessment. Bob Kiest (cultural anthropologist from the U. of Hawaii) spent several days at PNL in mid-June to help Wachholz prepare for this meeting.

Richmond to Wachholz: What do you want this Advisory Group to do concerning the July 15 report?

Wachholz: DOE would like the Advisory Group to review it and give your advice whether the July 15 document should be distributed.

Bair: There is no way we can endorse an incomplete draft.

McClellan: We can review the July 15 paper as individuals.

Healy: If one member of the Advisory Group finds the paper unacceptable what will DOE do?

On the matter of diet, how do we feel about the diet as used in the present LLL draft. (Healy has reservations.)

GAO Document

Wachholz: The restricted GAO report (reported by Walter Pincus, Washington Post, May 22, 1979) was not mentioned at the May 16 meeting between DOE, DNA, DOI, lawyers and representatives of the Bikini people.

Wachholz read portions of the document to the Advisory Group and indicated he would send us copies.

The GAO report recommends a separate and independent technical assessment by non-DOE experts of the Enewetak cleanup project.

Bokan

Wachholz: There is a problem in the Kickapoo area of Bokan.

(a) Transuranics are embedded in the offshore coral reefs. During storms pieces of the coral wash ashore. The military clean it up after storms but what happens when the military leaves? We know nothing about the amount of contaminated coral offshore. This is a long term problem.

(b) The recent fission product survey picked up subsurface transuranics on Bokan. An additional 1500 cubic yards will be removed.

Miscellaneous

Wachholz: DNA is funding H and N to fund a document concerning the cleanup operation. Roger Ray wants DOE to fund H and N to write a document for DOE (200K requested).

There is some competition between LLL and Brookhaven. This partly explains the lack of communication between the two.

Wachholz had to work up (in a couple days) projected funding for North Marshall Islands projects over the next 5 years.

A new funding center within DOE may be set up that would include North Marshall Islands projects.

Ted Mitchell is asking why DOE isn't studying modifications to the Enewetak environment (such as adding chelates to the soil) that might lower the radiological hazard. Wachholz will send a memo to Bob Watters asking for information.

Concerning the 13 Atoll Survey, Congressman Yates requested in March 1979 a status report. The high commissioner apparently decided that all islands surveyed that have letters on the maps are contaminated. This is obviously incorrect. Confusion in the Marshall Islands community reigns about how to interpret results of the survey.

Concerning Palomares, a New York Times reporter (based in Paris) has contacted Iranzo wanting an interview. The JEN has not yet approved the meeting.

Bair: If the Advisory Group members receive calls from reporters we should refer them to DOE headquarters (Wachholz). We should let Wachholz know if this occurs so he will be aware of what's coming.

Wachholz: A letter will be sent from Ruth Clusen to the laboratories concerning her need to call on experts (the Advisory Group) to advise here. The letter will include justifications, etc. Is this OK?

Advisory Group: OK!

MEETING ADJOURNED ABOUT 8:15 pm.