

DAY 2

Ray: Yesterday, we just undoubtedly scratched the surface of questions you might have, and I expect that we will have many more this morning. I would like to suggest that we try for the early part of our discussion to keep (to) those questions related to what's in the pamphlet and what that means. And, then if there are things, other things, you would like to ask about we will either try to answer your questions here or take them down and answer them later, or perhaps even suggest other places that you might get those answers.

Ray: To repeat then, our purpose here for this visit is to report and explain the results of a particular survey that was conducted four years ago, and to give you this booklet to take back and use in informing the people you represent of the work that has been done and its results.

Ray: Copies of that booklet and the scientific report have been furnished to the government and have been and will be furnished to anyone who has an interest, including lawyers, independent scientists, anyone to whom you wish to refer. And we are pleased to have it reviewed and both reviewed by anyone you choose.

Ray: May we now proceed with your questions?

Marshallese: I am referring to the paper, the supplement paper. If I understand that correctly, the instrument or the way of measuring of the radioactivity on Utrik and Mejit, was it the same instrument. Because it appears to me that the population of Utrik was moved and yet on this paper it shows that the contamination of Mejit exceeds that of Utrik. (and then by implication) Our population was not moved.

Ray: In response to the first part of the question, the same techniques were used at both locations and so these numbers are comparable. They are, they come from the same base of information. The population of Utrik was

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moved because of a condition that existed at that time which no longer exists, and what this table shows, is conditions that exist from 1978 on. It does not relate to the one incident which occurred on March first in 1954.

Marshallese: Does this mean that the radioactivity at Utrik has decreased at a rapider rate than it has at Mejit?

Robison: Initially there was more activity, short-lived activity, on Utrik. And that exposed the people but went away very quickly. But, the radiation that is there now is going away at the same rate on both atolls.

Robison: And, the radionuclide concentrations at Mejit are less than at Utrik and the doses we estimate for Mejit are less than Utrik, although when you summarize the numbers they come out very close. But everything we measure and predict at Mejit is slightly less than at Utrik. It is less at Mejit than at Utrik.

Buck: So these figures represent for the body those for the actual atoll? (Background discussion.)

Robison: But they are close, there's not a big difference, but Metij's a little bit less than Utrik.

Marshallese: This paper says 75 for Utrik and 100 for Mejit.

Ray: We are making a check.

(Robison: Well, which one are they looking at, the annual? The maximum annual? Is that what they are looking at? (Further background discussion.))

Marshallese: Was that a typographical error, should it have been, that be 175 for Utrik?

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Robison: Just a minute, we are going to find out. Okay. I see what the problem is. The doses are calculated for two different diets because there is uncertainty in the diets. So we calculated doses for both the Ujelang survey and for the BNL survey as far as diet. Now depending on which diet you use they are either the same or Mejit comes out a little less, depending upon which diet you use. Okay?

Buck: And you said which, the Ujelang diet?

Robison: The Ujelang diet and the BNL diet, the Brookhaven diet. So there are two different diets we used. We calculated the doses for each atoll using both diets because of the uncertainty in diets. Now in one diet it turns out that Mejit would be a little bit less. In the other diet they are very, very close, the same as shows up in... It turns out that paper there was made up from the diet where they turn out to be very similar. Okay? Do you understand?

Buck: They see it as obviously higher. 100 is higher than 75. That's what they're...

Robison: Okay, that's right based upon the Brookhaven diet. Okay, and if you use the other diet, that is why I said I was looking at the other diet and there Mejit would be predicted to be somewhat lower. So it is just a matter of...(Changed tape)

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Marshallese: I wonder why a single diet wasn't used in your calculations rather than two. And we happen to have seen some of the Brookhaven data which seemed to be short on, for instance, on the amount of coconut liquid drunk, consumed. They predicted to say half a coconut a day and that's rather inaccurate.

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Robison: Well, we realize that there is, there is some uncertainty as to the diet at each atoll. The diet is atoll specific. It varies from each atoll, and it is very hard to find out what the diet is at any one place. So we have two surveys that have been conducted, the most detailed that we know of. We have also looked at other reports. A report called the Lohr* Report from Majuro a few years ago and some reports from a lady named . . . who used to be in the Marshall Islands and did diet studies. We have tried to find all the information that we can in the literature concerning the diets in the Marshall Islands, and the best we can do, we have a range of information available to us, so we calculated the dose for both, both ends of that, to show that there is a range, a range of information available.

Marshallese: Did one of those diets come from Ujelang?

Robison: Yes, one of the sets of numbers we give in here is based upon the Ujelang diet. The other is based upon the Brookhaven diet. The Brookhaven diet is the higher numbers. And, just let me complete that, and the Brookhaven numbers, the higher numbers, are the ones that were used to give estimates on the paper they have.

Marshallese: I feel that all of the atolls, including Ujelang which is one of your samples which is one of the diets used, are in the northern segment of the Marshalls, and so that diet shouldn't really, significantly change atoll from atoll to atoll because they are all of the north. If you were to have compared a diet in the north with a diet in the south, like Joluit or some place like that, then there might be some changes. We would have more root plants that we consume. In the north, it is basically we have breadfruit, we have fish, we have crabs and then we have imported food, throughout the northern Marshalls. So why is that those numbers are so different, Ujelang and Brookhaven? That is the question.

* Spelled phonetically.

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Robison: Well, I think the answer to that is that there is a difference at the atolls as to how much imported food is consumed. Some atolls appear to have more imported foods in their diets than others. Others, some atolls rely on more local grown foods than other atolls do and that's why we see the difference and that's what's been reported to us.

Robison: But, we did calculate the dose at each atoll using both diets. So in a sense, we did apply the same diets everywhere. Two diets, but we applied them both to every atoll.

Robison: I might also add for your information that the Brookhaven diet we refer to, was done by, primarily by a man named [REDACTED] who some of you may remember having visited. He lived at Rongelap for awhile and at Utrik, I believe, and he has also been to Ailuk. And it was on the basis of his observations and his questionnaires to the people at those different atolls, that's how he developed the different diets that he thought applied to the different atolls here in the northern Marshalls.

Ray: [REDACTED] also, was also...

Robison: Ebelyn Crayhead.*

Buck: What?

Robison: [REDACTED] They might remember her. Ebelyn Crayhead.

Buck: [REDACTED] ?

Marshallese: So can we say that this supplement page isn't exactly accurate then?

Robison: No, it's, it's accurate. It's based upon the Brookhaven diet.

* Spelled phonetically.

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Ray: I think what should be recognized is that those numbers are very close together. Those, those numbers are hardly distinguishable from each other. If you look at the other page of numbers and look at the results in the cancers and birth defects between the results that were predicted between Mejit and Utrik, that the numbers are almost exactly the same. The difference between the 75 and the 100 between Utrik and Mejit is not a very big difference. They are both such small numbers that a very small change in the diet can make that difference and it really is not very significant.

Marshallese: How would you know that a person that died a month ago, died from cancer (I suppose he means from radiation induced cancer) on Utrik?

Ray: There is no way that we could identify or attribute a death from cancer to radiation. A specific death.

Marshallese: How do you know that a person died of cancer? That's the question.

Ray: We have no way of knowing except if there was a medical record made at the time that the person died. If the doctor's examination concludes that the death was caused by cancer.

Marshallese: I think probably that you are aware that we have no medical doctors on these outer islands. So that information is not possible. No one can inform you and tell you from the perspective of a medical doctor's diagnosis that a given individual did die of cancer. We don't have that verification so, how can you then predict how many might die of cancer? And these figures say that.

Ray: These figures are not records of what has occurred. They are predictions based upon the best scientific knowledge that is available to us today. Predictions of the results of these radiation exposures to people. They have nothing to do with past history or actual deaths. They are predictions of how many deaths, how many additional deaths might be expected to occur if people live on this or that island.

Marshallese: Do you base these figures on what has happened in the past?

Ray: Those are based upon what has happened in the past and upon experiments, studies that have been done with animals and examinations of people.

Bair: Not on past experience in the Marshall Islands.

Ray: No, not Marshall Islands experience.

Marshallese: So I would think then that these don't really apply to the Marshalls, these figures, then, because why would you need to go to a laboratory to get information like that? Why didn't you come and actually visit the Marshalls, and take your data from the Marshalls, and base these figures that apply to us on our actual experience?

Ray: These numbers represent the best scientific estimate we can make of the consequence of radiation, what contribution radiation may be expected to make, to deaths from cancer in the Marshalls. We have no way of identifying a specific death and saying that is due to radiation. But the world's experience at this time would indicate that with these radiation levels, whatever the number of cancer incidence is in the Marshalls would be increased by this much. We don't know what the incidence of cancer is in the Marshalls or has been because there are not sufficient historical records. We do know that, worldwide, of all the people that died in a year, of every 6 people that died, 1 of them probably died of cancer.

Marshallese: We feel that the DOE vessel makes regular trips to these atolls and so seeing that that would be a perfect opportunity to gather information from these atolls and base your information then on data you gathered on site in our area and, (implied), you wouldn't have to resort to worldwide figures.

Ray: Well, certainly as the DOE vessel visits the atolls of the Marshalls we gather as much information as we can. But in order to make judgments of

this kind we need large numbers over long periods of time, large populations over long periods of time, in order to develop an understanding of the likelihood that this will change as a result of radiation. There is no way that in the short time that we have been operating that ship and in the small population we are working with, we could improve upon the averages that we are now using.

Buck: May I please say something that you said in the last sentence, which was there was no way of knowing how many deaths from cancer there have been, have died. I failed to translate that. [Alice continued presentation in Marshallese.]

Marshallese: You have been examining the Marshallese population for a period of 28 years, I believe. Isn't that a long enough time to make some kind of assumptions?

Ray: We have been examining a very limited population of Marshallese people for that period of time and they were people who were exposed to very large doses, relative to these they were very large doses. We have a pretty good understanding of the results of that kind of exposure. But here we are talking about very much lower doses over a long period of time. There we were talking about a high dose over a short period of time and they are not comparable.

Marshallese: This paper seems to indicate that the contamination of Mejit exceeds that of Utrik, and so isn't that enough for the Americans, the U.S. government, to say, to actually announce that Mejit has more contamination? They are making compensation to the Utrik population, but not to the Mejit.

Robison: Let me try, let me try to do this, to explain why it looks this way. If, if we look at the radiation in the soil and in the plants at Mejit it's less than at Utrik. But the Brookhaven people have two different diets, and Brookhaven has told us that they believe that over on

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Mejit people eat a lot more local food, so that the consumption of the local foods is much higher in the diet used on Mejit than the one we use on Utrik, and, therefore, that makes it look the same when you predict the number of cancers.

Robison: If, if we actually use the same diet and made the calculations on the same diet at both atolls, then Mejit would be less than Utrik.

Robison: It's because the Brookhaven diet, the information we have from the Brookhaven people on their diet, says that there are more imported foods used at Utrik than at Mejit. In other words there are more local foods at Mejit and that's why it makes that look the same.

(Buck to Robison: Make it look the same?)

(Robison to Buck: Well, we are saying that they're similar. Say similar! It's very hard to distinguish between those two numbers.)

(Buck to Robison: I am afraid that's what's misunderstood.)

(Robison to Buck: It looks like a big difference to them.)

(Buck to Robison: Yeh, looks like a big difference.)

(Bair to Robison: Bill, it shows on page B-3, it shows the soil concentrations.)

(Robison: Yeh, that's what I am saying.)

Robison: If you, do you have this report everybody?

Buck: September 30.

Robison: B-3 in the back. In the back of the book.

Buck: B-3

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(Background discussion)

Robison: Okay, now, if you look at this first, second column of numbers. This column. Look at Mejit, 0.56. If you look at Utrik 2.4. And that's, that's the concentration that we find in the soils, so that, so that Mejit is less than Utrik, but because of the Brookhaven diet saying there are more imported foods than Mejit, it makes them come out about the same.

Marshallese: Is this book, was this book made in 1978, or just this last year because supplementary food to Utrik just began last year?

Robison: These numbers are calculated starting as of 1978. And when we say, when we say for 30 years then, it's 30 years beginning in 1978.

Marshallese: What food did we eat beginning in 1978? I am from Utrik, what food did we eat at that period beginning in 1978 from outside. We were eating just like the Mejit people. We were eating from our own soil.

Ray: The... Let me come back to your question in just a moment and first say something about diet. When we first starting doing this sort of calculation, its purpose was to make, to assist the Enewetak people in making some plans for resettlement at Enewetak. With all of the best advice we could get about the diet of the people, we did not feel that we had a good understanding of what might be the diet of an Ujelang people now removed and living at Enewetak.

Buck: Of an Ujelang people removed...?

Ray: The Enewetak people who were then living on Ujelang were to return to Enewetak, and we did not feel we were confident that we could predict what their diet might be at Enewetak.

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Ray: Micronesian Legal Services, Ted Mitchell, offered to do a survey and advise us on behalf of the people of Enewetak what they thought their diet would be and asked us to use that diet in doing calculations for Enewetak. That diet then, that diet study was not one done by us, it was done in behalf of the people of Enewetak by their council.

Senator John: I would like to speak on behalf of that information which we have just heard which indicates that the assumptions and data are based on something done by our lawyer named Ted Mitchell. (and) I have no confidence in that man and besides I don't believe he came to me in any respect. I can't really trust his data. If he provides you that data and I know that man and I can say that I would not trust that information.

Ray: And I accept that as what you say, Senator. I was simply explaining, "What is the Ujelang diet that we have been talking about?" Why do we have something called an Ujelang diet? We requested that the people of Enewetak cooperate with their attorneys to provide us that and that became the Ujelang diet. Whether it is good or bad I don't argue, but that's where it came from, for the benefit of others here.

Marshallese: This is what has caused confusion then, because...

Ray: All right, but may I continue though?

Senator John: I would like to just further say that that man, Ted Mitchell, was a lawyer and not a scientist. So it seems strange that scientists would use data provided by a lawyer.

Ray: We understand. And for, as a matter of information it was Mike Pritchard rather than Ted Mitchell who did this, but that is neither here nor there. Mike Pritchard, also a lawyer, went to live with the people for a period of time that he felt was satisfactory. We had no choice but to accept what the people's council told us should be used. Now, I want to get on to the other diet, though, and how we progressed to what we have now.

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Ray: Pritchard, Michael Pritchard.

Ray: We have been told by a number of people, that that diet which we used called the Ujelang diet, was not an accurate diet, not a good one, and that we should not rely upon that in this survey.

Ray: It is for that reason that _____ participated in this survey, to spend time living on various of the atolls and studying the diet for us.

Ray: In fact _____ was in the northern Marshalls, I believe, at Rongelap and Utrik for about 6 months.

Marshallese: I would like to correct that for your information. I think he was at Utrik only three days.

Ray: During the survey I think that is correct. However, earlier, I don't know how long he was at Utrik but he was some months at least at Rongelap, I believe. I might, well, we don't have Rongelap here.

Marshallese: I lived there and I know that he was only on our island three days.

Ray: I understand. I don't question that. But I do know that he lived in a Marshall village, I believe it was either Rongelap or Utrik, and it must of been, then, Rongelap for a number of months.

Marshallese (probably from Utrik): So is this figure, 0.56, that is in this report, can I go back and say that that is inaccurate because Ted Mitchell did it?

Robison: No. No, that, that data...

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Buck: Oh, 75.

Robison: Oh, 75. Okay.

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Buck: Excuse me, excuse me, 75. Oh.

Robison: That's based on the Brookhaven data.

Marshall: May I say that the 75 figure which is on this page is actually the result of Ted Mitchell's calculations and so I can inform my people that it is inaccurate?

Ray: No. That number is based upon the _____ numbers. Whether they are good or bad, it is based on the _____ numbers.

Buck: But this will be a cause of consternation or confusion among my people if I go tell them that these figures were based on an assumption that they had diet, had things added to their diet from outside, supplementary foods beginning in '78 because that's not the case. We did not have that since '78.

(Background discussion)

(Robison: That's speaking from where, Mejit? That's from Utrik?)

(Ray: Yeh.)

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(Robison: That's from Utrik?)

Ray: It is based on some imported foods, but that is a rather high intake for local foods.

English Speaking Unknown Male Person: There was some _____? _____ with the school lunch program as I recollect. I am almost positive. Maybe you can check with...Maybe that had something to do with it. But there was some U.S. Department of Agriculture food on the islands.

Buck: That, that's a good point to bring up, but I believe that that same provision of USDA food was also made for the people of Mejit, not just Utrik. So that, that would be a problem, possibilities...

Marshallese: If you are going to compare the school age population, Utrik has fewer school age children than Mejit.

(Background discussion.)

Ray: That too influences your diet. The distribution of age, age distribution in the population.

Robison: Not really. These are calculated adult doses, and the childrens' doses are always less.

Ray: Well, I am sure that we could discuss this diet for the rest of today and I don't want to stop that discussion if you feel that it is productive. It seems to me that it might be appropriate to suggest that if the Mejit council or if the Utrik council feels that the diet which is spelled out in this report is in error and would inform us of that and how it is in error, that a new calculation could be done.

(Buck to Marshallese: He is the chairman.)

(Buck to Ray: You have to acknowledge one of these.)

Ray: Yes, sure.

Buck: He has given that...who are you acknowledging?

Ray: This gentleman right there.

Marshallese: I am very pleased to be recognized. I appear in response or represent or with the interest of Mejit at heart so I am very pleased to be

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recognized. Thank you. I have a few questions. Because of the survey, my first question deals with the fact that the Wheeling, U.S.S. Wheeling, came in 1978 and you are saying that by coming and surveying our island at that year, you are able to predict how it is going to be for the next 30 years and you can say that with fair accuracy and you claim to know more about that than you do about the preceding 30 years? You can do that kind of..., this information, you are able to talk about, which is not yet here on the basis of that survey, better than what preceded that?

Ray: That's correct.

Buck: The years preceding...? (Oh, all right.)

Marshallese: I would like to say, with 1978 as a starting point, you are moving forward and say that you can give information regarding that time slot and are not giving information about the time slots preceding '78 back to the time of the bomb tests? That interval?

Ray: Our purpose in this survey was to make those predictions and so this survey is, was an attempt to learn everything that we could about each of the atolls, Mejit included, starting at that time. Had we taken a different, had a different purpose, to write a history about what had happened before, we would have done a completely different thing. And we are not reporting on that now, we are reporting on this survey.

Marshallese: When the Wheeling did come, you gathered samples of soil which had in it residue from something that happened prior. You took samples of pig and chicken and even blood samples of people and that is all, it seems to me, a record of something that happened rather than your data is gathered by something that precedes that year, and yet you are not talking about that, you are talking about the future. Is that accurate?

Ray: That's correct.

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Marshallese: That is your purpose? That is your major purpose?

Ray: That is correct. That was the assignment that was given us, to do that. There is no question that some of the information that we obtained during the Wheeling survey could be used for a separate study, if one chose to make such a study, of what that means about what was 10 years ago. It would not be as precise as what we can do about predicting toward the future. But we could make some, we could draw some conclusions from what we see today as to what was there 10 years ago.

Marshallese: I still feel a little confused with that information but let me go on to my third question. So, now regarding the diet of Mejit and the, specifically the foods grown in the soils at Mejit, I want to know is there any harm to us, the population of Mejit, by our eating plants that are grown in our own soil at our own atoll, our own island?

Robison: The doses that we estimate and that are on the sheets and in the pamphlets we have, are based upon the Brookhaven diet and those are fairly high amounts of intakes of coconuts, and the doses we predict for Mejit are no higher, the total dose we predict on Mejit, are no higher than what most other people in the world live in and get exposed to, in fact, less than most.

Marshallese: My question is will we have any harm result from our eating this food? Will we have harm come to us or not?

Bair: You should not have any harm come to you from eating the food from Mejit. If you look at the table you will see that the highest amount that anybody on the, on Mejit would receive in one year is 100 mrems. All over the world the governments are prepared to allow their people to have as much as 500 mrem per year. That's a radiation standard that is accepted all over the world. So you see that even the highest person, which is..., the highest person would only receive 100 mrem. This is one-fifth of what would be allowed in all countries of the world.

Bair: I might just add that most people, almost all people on Mejit will receive much less radiation than the 100.

Marshallese: So I just understand now you to say that we would not have any harm come to us from eating food raised on our island.

Bair: I don't think so.

Marshallese: I have one more question but may I have your name please, that answered me, that question?

Bair: Dr. Bair.

Buck: Dr. Bair. B A I R.

Buck: Bill Bair. William Bair.

Ray: Alice, show him that name in the back of the pamphlet.

Marshallese: I have one final question. I am _____? I want to describe two surveys we have experienced. We experienced the Wheeling trip and that survey which I have already mentioned was quite extensive. Plants, animals both land and sea, and our personal, our bodies, our health, our blood samples and so forth. Since that time the Loma Linda team has come, a man and a woman came and also conducted a survey at Mejit. They spent one week on our island and they just brought a book and a pencil and a camera, in other words they had very little equipment with them, and they asked questions such as what is the population and then we were invited to ask questions and we asked could we be examined, have physical examinations and they said no.

Marshallese: We also asked could they please tell us what they understood about our island, our soil, our food. Is there, what do they understand about the radioactivity, say of our plants, and they said we cannot answer

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those questions. They asked us what animals, what animal life do you have on your island and we answered that we have pigs, chickens, cats, rats and dogs. We fed them, we gave them food to eat while they were with us of our diet and then they left. And so I am not a doctor and I sure don't know the answer to this, but how can you accept their data and use it as part, of say, your survey or anything if that is all they did while they were with us.

Ray: I believe that was the year after the Wheeling. Is that right? Soon after the Wheeling was there that the Loma Linda group visited. Their purpose, that Loma Linda group, was to do a study to advise the Department of the Interior in their health planning program. To plan health planning, what changes in health care might be needed and should be adopted in the Marshalls. They were not there to examine people or to do any radiation studies. They are not radiation specialists at all. They were looking at the conditions under which health care is delivered in the outer islands in order that they might help the Department of Interior with plans for future health care.

Ray: Their studies were entirely separate from ours and we do not depend on anything that they learned as a part of this study.

Marshallese: Okay with that answer, then I do have one more question. Did I hear accurately that there was a part of the Loma Linda research used in anyway in this report?

Ray: No. In no way.

Marshallese: It seems like I heard one of the other men refer to the Loma Linda people when they were talking just a few minutes ago about comparing Mejit and Utrik.

(Ray to Robison): You did mention some other people,

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Robison:

Ray: . And was there another, somebody else at Berkeley? I know what it was, you made reference to a Laurie Report?

Robison: Laura Report, which was developed here at Majuro a few..., Laura Report.

Buck: Laura Report (unclear) Loma Linda, Laura?

Robison and Ray: No. No, not Loma Linda.

Buck: That's what I say. It was not Loma Linda. It is Laura.

Robison: The Laura report. It was one developed here in the Marshalls on Majuro and that was what I was referring to. It just had some information in there about, about average daily intake of coconuts, that's all.

Buck: I and . That's a man and a woman. They were from Loma Linda?

Ray: They are Brookhaven, Brookhaven.

Marshallese: I am requesting permission to ask my magistrate if he has anything further he would like to ask before conceding to other members of this party.

Marshallese: I appreciate this opportunity but I don't have any pressing questions at this moment. Perhaps later on I will. But thank you, I am satisfied with what they said.

Ray: We have one in the corner that has been waiting a long time.

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Marshallese: Thank you, very much (in English). I have a question regarding operation for thyroid cancer or, whatever. I just wonder from the beginning of such operations has it been necessary to make a quite a large incision (evidently horizontal as he was showing on his neck)? Is that the way thyroid operations have been conducted? Is that the pattern, is that the usual and historical way to perform that kind of an operation?

Ray: Dr. Bair.

Bair: It is. That is exactly the way operations are performed in the United States. I have a friend who had a thyroid cancer in the United States. He had the same kind of surgery; clear across.

Buck: Who do you recognize?

Ray: Well, follow on, I think.

Buck: Okay.

Marshallese: I am not a doctor either so I am not sure of the meaning of these terms, but I have heard these two words used related to the thyroid, that sometimes they are benign and sometimes they are malignant. Now, is the same kind of incision used if it is a benign one or is it different if it is benign and if it is malignant, its another kind of incision? I just really want to know about this because I've heard there are two kinds of thyroid. Cancers in the thyroid.

Ray: That's certainly true that there are benign, and benign thyroid tumors and malignant tumors. It is also true that they are varying in size and so in that aspect the incision might be smaller with a smaller tumor.

Buck: Is benign smaller than malignant or is that...

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Ray: Not necessarily.

Buck: No, not necessarily.

Ray: It is just a matter whether one is cancerous and the other is not.

Bair: Maybe we should point out that there are far more benign tumors in the thyroid than there are cancers in the thyroid.

Ray: I guess I would like to also point out that we do not have a thyroid surgeon here answering these questions and, and if that is something the gentleman would like to pursue it would be better to do it when we have a physician or a surgeon here.

Marshallese: If we are considering bringing a doctor for this kind of consultation cause our interest is high I would request that we have more than one doctor. I would like to have a doctor from the U.S. and a doctor from Japan.

Ray: I think that is a request that we that should be discussed with the government of the Marshalls and we'll certainly discuss it.

Buck: Okay to recognize...

Ray: Yeh. I don't see any more.

Marshallese (in English): I have got two more.

Ray: Okay.

Marshallese: This isn't necessarily a question, it is a comment or an observation that I personally have so I would like to just bring it out right now. I am aware of the fact that women who wish to have an operation performed so that they will no longer have be pregnant, I suppose it would

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be like a hysterectomy. Formerly that used to require quite a large incision and now that has been refined to the point that it is very, kind of a small incision for that particular operation. So I am wondering why there hasn't been an advance or that same kind of improvement made in the thyroid incision. How come it is still just as big as it has ever been?

Ray: I suggest that that's another one to refer to Doctor Dobbins or one of the thyroid surgeons who comes out, on the regular visits.

Marshallese: Now my question is referred to studies that are made by the Department of Interior, as well as your own studies, and I'm wondering if the incidence of diabetes and the incidence of thyroid cancer or thyroid, is that the same between the Marshalls and Yap?

Ray: I don't believe we are competent to answer that question unless Dr. Bair has something to say about it. I think that's a question for the health services people, to answer. Those who have records of health care.

Marshallese: Well, then this gives rise to my next question which is, isn't that, isn't our diet, the assumption about diet, isn't that something that actually a physician should be addressing and talking about?

Ray: Not for our purposes. Our purpose in discussing diet is not to be discussing nutrition and the value of the food that you eat, too, to your body and whether that diet itself causes illness, but rather to use the diet as a measure of how much radioactive material is taken into the body. We do not concern ourselves, when we talk about diet, with whether that diet might result in diabetes or any other illness. That's beyond our, the scope of our study.

Marshallese: All right, it is clear, it is clear that you are not talking about nutrition but you are talking about the entrance into the body of radionuclides through the food chain. And you are not doctors, so how do you know this. How do you know, how, what..., how can you tell us the

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effect that that, in our diet to the various parts of our body which was described. You're not doctors and yet you have approached this subject.

Ray: Yes, Dr. Bair.

Bair: I am a scientist. I am not a physician. I have studied radionuclides in experimental animals for 30 years, so I feel that I do know what happens when radioactive elements are taken into the body and the effects that can result from that.

Bair: One other thing. We know in comparing our studies with what information is available about human beings, that animals and human beings are the same. The information we have from animal experiments can be applied to human beings.

Marshallese: Yes. I think I understand. Thank you for your reply and I understand in this way that by being a scientist and studying animals, you are able to, then, also understand how certain things affect human beings because animals react very similarly to human beings in this respect. (and) So I am just assuming like you may have a rabbit in your laboratory and you may feed this rabbit and observe it, then, and by determining that when you find out that the rabbit gets something, for instance becomes diabetic, then you can assume that there was a relationship between what it was eating and it having that disease. (and) Then you say because of that information you can also apply this to people. Is that accurate, is that what you are saying your study of field of expertise is?

Bair: That is accurate, although I would like to mention that in none of our experiments have we seen diabetes caused by radioactivity.

Ray: I'd like to make one additional point on that subject. In addition to doing these predictions, when we use the diet that we assume, and then from that conclude that a certain amount of radioactive material will be taken into the body and stay there, thus, there to cause radiation of the

body. We have a check on that, in what's called whole body counting. You are aware of that effort. And you find that in most cases the diet model is validated by that. That in fact the prediction as to what this diet, what result this diet might have in introducing radioactive material in the body is verified by the whole body counting, so there is a check on this. And none of that is a medical procedure, that's a scientific study.

Marshallese: I don't have any further questions at this time. I appreciate the answers I have heard and I just thought I would give my personal greetings to our translator.

Ray: Before we take another question I wonder if it might not be a good idea to take a break.

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Ray: Next question.

Cowan: I have a question.

Ray: Suzanne.

Cowan: Yeh. I think the fact that this report doesn't address the period prior to 1978, particularly when you mentioned that some amount of radiation stays in the body, concerns everybody and the thing that concerns me is that you made projections of the harm that will happen to people based upon the conditions that were found in 1978. Back then and looking forward. And how do you take into consideration the amount that people already consumed prior to 1978? In particular, because the half-life of two of the most common radionuclides is around 30 years. I speak of cesium and strontium.

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Ray: Well, I refer you again to the purpose of the study. The purpose of the survey and the study. It is and has been to determine whether or not it is reasonable for people to continue to live in these locations, or whether there are things there that would influence us to make recommendations, either about changing the diet, changing the lifestyle, changing the place of residence or otherwise. Those things we can do something about if we know, if we were to find in this study that there is some practice which is leading to unnecessary exposures to radiation. We can then make a suggestion to the people concerned as to how they can moderate that as would be done, for example, when we find that the foods from the northern islands of Rongelap are significantly more contaminated than those in the southern islands. The suggestion there would be that people not take a substantial part of their diet from the northern islands but use, to the extent that they use locally, locally grown foods, the foods that come from the southern islands. I repeat. That's something we can do something about. By giving advice and recommendations we cannot today do something about what happened ten years ago. And the purpose of this, although there are other studies that look at ten years ago or twenty years ago, this is not that study but what we are reporting upon is a study as to what conditions are there now, in order that people can make decisions about their own lives.

Cowan: That does not answer my question. My question is how can you make recommendations for the future without taking into consideration what they already ingested, people already ingested?

Ray: The recommendations that we make have to do with whether or not there will be unnecessary future exposures, exposures or doses that could be avoided. We have also separate from this study, we have also knowledge of the doses and exposures that people have had. We have knowledge, by virtue of the whole body counting program, of how much radioactive material people have in their bodies. We have had those studies going on for sometime. Those are not what we are reporting here. If you would like to read about those, we have extensive reports on those. This is talking about a survey for a very specific purpose. Providing for future planning of people of the northern Marshalls.

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Ray: A principle of radiation safety is something that we call As Low As Practicable, not as low as possible, As Low As Practicable. And the thought there is that one may accept some exposure to radiation for some presumed or expected benefit and it is in order to help people make that judgment that we need to have these numbers. These numbers have to do with the future.

Cowan: I understand the intent of the course for future planning but another theorem of radiation is accumulated whole body exposure. That's the amount accumulated over one's lifetime. I, I question the validity of predictions based on '78 forward, they don't take into account somehow the amount that has already been accumulated.

Ray: Well, that is why I referred to the principle of... (I'm sorry go ahead and translate it.)

Cowan: You didn't factor this into these predictions?

Ray: Let Alice translate your question.

Ray: We recognize that there have been exposures of people in the northern Marshalls. But the degree or the amount of exposure in the past does not affect the prediction of what the exposure will be in the future. They are independent of each other.

Ray: You have one Phillip?

Muller: My first question, I was, I think that it has been announced or recognized that there are four atolls that have primary contamination and those are the ones listed, Enewetak, Bikini, Rongelap, and Utrik. So why study other islands if actually there are only four that have high contamination. Why bring in other atolls to this study?

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Ray: Other atolls have been studied in past years but not as intensively you're right, not as intensively as Enewetak, Bikini, Rongelap and Utrik. That is because our records from the test days showed that the relatively higher contamination levels were on those four atolls. Anticipating that at some point our surveillance or our measuring program will begin to disappear, because we will have learned everything that we can learn or need to learn. We felt that before that time came we should take one comprehensive look beyond the four to atolls close in, but further out than these four, to assure that there is not someplace that we had missed or that there is not some condition that we had missed.

Ray: Some of the techniques that we developed in the studies, especially of Enewetak and Bikini, made it possible for us to do this wide area search of many hundreds of islands, or several hundred islands in a reasonable time. A capability that we had not had years before. As soon as that capability was there and since we had to bring the ship out especially to look at Bikini, we decided that it made very good sense to go and make this last check to be sure that there was not something there that we did not know about.

Ray: The result of this, of this survey has verified that the choices we made for study in earlier years were good choices.

Marshallese: So now this chart or the maps on page 8 and 9 indicates that there is some contamination of other atolls besides the four that we all have been familiar and knew had some contamination. So America, as a government, the United States government, is willing to obviously then recognize that fact and say, yes, there is contamination of other atolls besides the four that we have been working with prior to this time.

Ray: Yes, there is some and the amount is reported in the survey report.

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Marshallese: Now I would like to also, then, repeat the question that I asked yesterday. Does this indicate that these atolls are all within safe standards for people to live and eat the food that is grown on those atolls?

Ray: We do not normally try to characterize a location as safe or not. It is a matter of amount of risk and the amount of risk is set forth here.

Marshallese: It seemed like yesterday the statement was said that actually the amount of radiation in the Marshalls is similar to that of other places in the world. And so that would indicate that, well people live fairly freely in their places, other places in the world, and if we are like them, that it seems to me that we ought to have that same description of our conditions, that it is safe to be there. And yet, no, we hear that actually we shouldn't eat certain things. So you seem to be talking double talk. It seems like you say in one statement, we are like other places, and in another statement you are saying, no it is different.

Ray: What we are saying is that with the exception of Bikini Island, the, all of the locations we have studied, Bikini Island rather than atoll, all of the locations we have studied would meet the standards, stay within the standards living in those places. However, there are places where choices can be made to keep the radiation exposures of people lower, even, by, for example, restricting the intake of food from the northern islands of Rongelap. That seems a smart thing to do if there is an alternative and there is.

Senator John: Thank you for your reply and it seems like now that's a little different from what I understood you to say yesterday. It seems like yesterday you were saying everything was fine and dandy and now you at least say, separated Bikini island out. I would like to now ask about Enewetak. I would like to ask about that if you are going to talk about Enewetak. And then I would like to be heard again after he's finished.

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Ray: All right, Senator.

Senator John: I was interested to hear you say that the island of Bikini is different from all of the other islands in these atolls. But now I want to ask pointedly, face to face, how about Runit and Enjebi?

Ray: You are correct, Senator, that I should have mentioned Runit because it is a special case. I was thinking of it as an island that is not now and has not been intended to be, for some years, a residence island. It certainly is an exception. It's not quite the same situation as Bikini but all of us agree that residence on Runit would not be advisable. As to Enjebi, Enjebi is, has been reported to the people of Enewetak, and the, and the dose expectations for living on Enjebi have been reported. It falls within this same range, the range of numbers that we're talking about here. Bill you can help me with what they are.

Robison: It is very near the guidelines. It is right around the guidelines for that island.

Ray: Enjebi is very close to the guideline, very close to the standards.

Buck: Close to the standard?

Ray: Close to the guidelines.

Senator John: Okay, well, I would really like a clarification on Enjebi then, since I have heard what you have just said. I understand, that, I know that there has been plenty of breadfruit planted for experimentation, for observation at Enjebi and we are in a situation now where we're hungry. We have, and there are plenty of ripe breadfruit at Enjebi. Would I have your recommendation, permission to notify my people that they can eat breadfruit from Enjebi, that breadfruit which is grown there and that was in a test situation but is ripe and ready to eat and we need it? We are out of food at other places, so can we go to Enjebi and harvest breadfruit there?

Ray: Well, I think the answer is clearly, yes you can. But if there are substitute locations, substitute sources which would have lower radiation levels we would recommend that those be used.

Senator John: Well, thanks, I'm, I'm glad to hear that, that we can use those breadfruit from Enjebi. But it seems funny that you add a "but" right away as soon as you say that, when in actuality we've had a storm hit us and we only have very young trees planted on other islands in the atoll and, even though they weren't full grown, they had produced some breadfruit, sort of out on their trunks almost, not even on the ends of the limbs where they usually appear. But they were there, but these have been blown away. We really can't harvest breadfruit from other islands, but they are at Enjebi. We got good breadfruit at Enjebi and, so, we don't have a choice. You say if we had that choice you would recommend using some other. Well, that choice isn't there, but we do have those breadfruit there, so, I'm glad to hear, then, that you say we can use those.

Ray: That's correct. I would like Bill Robison to comment on that.

Robison: Yes, Senator, we planted the breadfruit and pandanas and coconut trees on Enjebi, as you know, as part of our program in order to better evaluate Enjebi Island. As you know there were no foods available for us to directly measure and we had to predict what we thought the concentration would be in food products at Enjebi by knowing what was in the soil. So we planted the crops, so that we would have samples to directly measure and, therefore, we could make a much more precise estimate of the doses on Enjebi. And therefore, we need those for samples, and it takes quite a number of breadfruit and quite a number of pandanas fruit and a quite a number of coconut in order for us to be able to make the analysis we need. So we planted those for a purpose and we do need them for a purpose. We do not, we do not need them all but we do need...

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Buck for the Marshallese: Oh, I was just going to say, the meaning of your reply, is leave them for us. Don't use them because we need them.

Ray: Well, I'm just saying that we do need a certain number of breadfruit and pandanas in order to, to make better evaluations of Enjebi Island and if they are all gone then we can't do that. So we need some of them.

Senator John: I would like there to be a supplement report or additional information given than what is in the book and on this, this matter. Where in each island or atoll is it best to harvest or have food grown and what are the amounts of certain foods that would be advisable for us to feel free in eating as opposed to other amounts. Are there some guidelines like that, because that information isn't given here and it seems very important for us to know?

Ray: And that is precisely, that is precisely one of the reasons that Bill Robison needs to continue the experimentation on Enjebi. That is not exclusively applicable to Enjebi. It's learning what occurs in an island for application to other locations, as well.

Senator John: Well, thank you for your reply. I just am still kind of marveling at the fact that you have quite extensive data in this report from atoll to atoll but I really don't see any concrete recommendations that you have made regarding people's diet. And it seems like that is very important for us to know. How much breadfruit, how much pandanas?

Robison: Well, I think again I can repeat what was said earlier with the exclusion of Bikini and the northern end of Rongelap there is no need to worry, I mean you can eat breadfruit and pandanas and coconut from any of the islands in any quantity from the other atolls. The doses we predict from that are very low and like we said are no different than, than exposures that other people get throughout the world.

Marshallese: Your number 4 on this map, ...it seems like yesterday you said everywhere is fine, permissible for people to live and take their food

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from every place, any place on the map and of course now you are saying well the northern part of Rongelap would be treated differently and Bikini island itself. Well, we see other fours around and so I am confused by the information you are telling me right now. It seems like it has changed from what you said. Yesterday, it seems like it was fine anywhere, now you are saying, well, anywhere but those places and yet that doesn't correspond to what the map reflects. What does 4 here mean? Is four all right or not all right?

Robison: Well, we didn't say yesterday that it was okay to use foods from everywhere. That was not what was said. I am saying now that except for the northern part of Rongelap and Bikini, that the other atolls that were part of the survey, they're fine. I mean you can eat all the breadfruit and pandanas that you want from those places and the doses we estimate are very low. The "four" numbers you see, once again remember, Phil, that designates a range and it doesn't mean that an island that has a 4 is necessarily the exact same number. It just means that they are in a range somewhere and they can be different.

Senator John: I have further questions, later on, but I will defer now to others and I am just concerned though, too. I feel I am a bit confused and therefore I am fairly certain that people on the outer islands will be perhaps as confused as I am and, even more, with this kind of explanation that we are hearing.

Buck: There is a hand over there.

Ray: I wanted, if I may, to go back to Senator Ishmael John's, question about Enjebi and I want to leave that. Recognizing that you do have a problem because of the recent storm, and because things are not yet producing on the southern islands, we would not recommend against your supplementing the diet on the southern islands by some foods taken from Enjebi. On the basis of any radiation concern we would not recommend

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against that, or any health concern. But we would plead with you, to not destroy the 8 years of work that has gone into trying to understand what's going on there by, by taking all of the crops off Enjebi.

Senator John: May I reply to that? Well, then, I just want to remind you that the first part of this year, I believe, DOE sent their ship up, and we had a body count of our population or, you know certain of our people. And some people who had not showed contamination before, or at least a certain amount, that had risen and so we were asked, those people were asked, "Well have you been drinking coconuts from Enjebi?" "Yah!" "Have you eaten some breadfruit from Enjebi?" "Well yes." "Well then that is why your body count has risen." And so look, we have already been told that and now you are saying that we can go do that. And yet that, it is obvious that we are gonna, our body counts are going to rise, because if we go and do that.

Ray: That is absolutely correct. It will rise, you would expect that, and that is one of the reasons we have the whole body counting program, in order that we can anticipate and see before that rise becomes a matter of concern. All of us have a fluctuation in our whole body count throughout our life. This is occurring all the time. I would compare it, Senator, with your doctor who may put you on the scale and weigh you periodically. If he has put you on a diet, I am not speaking of you of course, this would not apply to you, but if your doctor should think that someone was gaining too much weight, he might put him on a diet and make some recommendations to him and then he will periodically weigh him. And if he finds that he is getting too heavy, too fat, he will make some new recommendations. The whole body counting is very much like that. We use the whole body counting to monitor what's happening in the population and the fact that we come back and yes, your number has risen, does not necessarily, does not mean that there is any expectation of illness from this, but it may mean that we would suggest that you try to change your diet some and not let that continue, not let it rise continuously.

Ray: Is there another question over here? Yes, sir.

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Marshallese from Wotho: We from Wotho are glad to be in this meeting and thank you for the report you have prepared for, not only our atoll, but other of the northern Marshalls atolls and I just am wanting to give my greetings. This is the first time for me to raise any, to speak and so I want to say that the Senator from Wotho and myself do have some questions we would like to raise.

Marshallese from Wotho: In this supplementary sheet, we notice that the number of, that is given for the yearly amount of radiation for Wotho would be 30. We, our question is, does this 30 refer to a single year or is this 30 beginning from 1978 to the present? Is that a four-year period that that 30 represents or is that a one-year period?

Ray: That represents the largest amount for the person who might have the most radiation in any one year. In the highest year.

Marshallese from Wotho: So, now, thank you for that reply and now if I understand it, then, from 1978 a person could receive 30 and then '79, 30, and '80, 30, and '81, 30, '82, 30--that would mean that a person probably then has 150. Is that, is that, am I to understand that?

Ray: Well, you are right that it is accumulating, but the 30 is the highest year. That's in the 1978 year. It is diminishing slowly, by several means. It's going down each year, so it will not be 30 the second year, it will be something slightly less than that and it is dropping off. So that over the 30-year period it adds up to only 200. If it stayed at 30 for that 30 years it would be 900 but it's dropping off.

Marshallese from Wotho: What is it, what is it that keeps decreasing?

Ray: The strength of the radiation is decreasing as a natural process. It decays much the same way as a fire dying down.

Ray: Let me continue Alice, please?

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Ray: In addition to the lessening that comes from the "fire dying down" it is also being washed out of the soil by the rains so that it is not as available. It is getting deeper into the soil and finally getting into the groundwater so that it then disappears.

Marshallese from Wotho: I would like to further ask another question, then. This I am wanting to talk about, soil and plants. Other foods. In 1946 there were, the tests began and I assume that some of these radioactive particles began coming to our atoll, Wotho. One of our staples that we really relied on in our diet at Wotho is arrowroot. And we had plenty of it, that's our staple food. So we are now told that these radioactive materials enter the soil and somehow are active, or affect the soil. Just how do they affect the soil? How do they work in the soil?

Ray: The radioactive materials do not have a harmful effect on the productivity of the soil. Is that the question?

Buck: I believe so.

Ray: They do not in any measurable way that we are aware of, affect the productivity of the soil. I will continue. And there is no evidence that the presence of the radioactive material in the soil affects the health of a growing plant, damages the plant itself.

Marshallese from Wotho: In all of the islands that appear on this map of Wotho we have not any arrowroot at all. We do not have arrowroot in our atoll. And I would like to continue. Now, I'd like to just expand on that a bit. We do have the stalk, the leaves, but no, no root. Nothing, that we can, our staple is gone. Now the plant is there but we can't eat arrowroot. Utrik and Likiep have the same conditions. All the northern, northeastern, all the northwestern atolls.

deBrum: The question is, assuming that the radiation is the cause.

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Bair: I am not aware of any information, any scientific information that would suggest that radiation has caused the problem. Plants are not very sensitive to radiation. The problem is probably one of the amount of nutrient in the soil and to answer your question you will have to contact somebody who is an expert in raising and growing plants.

Marshallese from Wotho: Well, I just want to repeat that it was 1946 that we began having bombs.

TAPE 6, SIDE 1

Ray: (note a few words lost due to changing tape)...and they all lead to the conclusion that, that plants in general are very resistant to these levels of radiation.

Robison: It would take... All the data from all the plants that have been studied indicate that it takes hundreds and hundreds of times more radiation than what we are talking about here to see an effect.

Marshallese: So, I understand your reply, but then of course we still have the obvious question, "what has caused this?" This is a condition and we want to know why it has been this way. Since the time of the bomb tests our arrowroot has not produced, and we really want to know what has caused that, then.

Ray: Well, I am sure we share that and would like to know too. We do not have any clue in all of the knowledge that we have about effects of radiation on plants. We just don't have any indication that that is the cause. We too wonder what the cause might be.

Marshallese: I wonder why it is that the people came and tested bombs in our area before knowing the effects that it would be, for our people and our land. Why didn't you conduct some experiments in other, you know, places before you did that? It seems rather presumptuous (Alice: That's

not the word), seems like you quickly began testing in our area before you knew what was going to happen. We wish that you would have had some way in knowing this before you came and did it in our area. What would have been the environmental effects.

Ray: Well, I find it, I find it hard to explain the actions of President Truman and the United States government leadership in the decisions that were taken in the 1940s and later. However, at least the history tells us that there were very serious threats to the security of the world that the United States was attempting to deal with.

Ray: It would take a long time and much study to judge whether this was the best place or the only place or the ideal place to do this work. In my opinion there is not serious question about the fact that at that time in the perception of the United States government leaders it needed to be done.. To have had a complete understanding of the environmental effects ahead of time, would have taken many years, and I believe that at that time the leadership of the United States and the rest of the free world believed that there was not that much time available. The extent and degree of risk, the extent and degree of lasting effects, I'm sure were not well enough understood then. I am also sure that the men who made the decisions thought they did not have the time to evaluate that before we, the world would have been in much worse trouble.

Ray: Any pending questions?

deBrum: The motion on the floor is that we probably have lunch, first.

Ray: Alright, I will second that.

Male Person: All in favor, probably.

AFTER LUNCH

Ray: We are ready to entertain additional questions.

Marshallese: I have a question. If I understand correctly the Department of Energy is the department that is responsible for understanding about radiological effects and energy in general, and you have in this graph on page 12 showed information regarding the duration of radioactivity of certain elements and some, it is pictured here, as being very short-lived and some are longer and you gave an example of one which is say 30 years as a half life so, my question is: Since you are the ones now that are active in studying this and understanding it, why did you make your survey so many years, like it was done in 78 and you realize though that something such as the top two elements, they are not present, they do not exist after, in that period of time and so it seems like you who understand this, delayed certainly your survey for, it is obvious that you made it after some elements were no longer even present in the soils? If this information is accurate, which we assume it is, then it seems interesting to me that the survey was made years after some of those have dissipated.

Ray: That's a most appropriate question. In fact measurements and surveys have been made since the first test at Bikini in 1946. In the locations where most of the radioactive material fell, these surveys have been made most frequently and continuously, for example, at Enewetak, at Bikini and later at Rongelap and Utrik. This survey and this report were an attempt to summarize at one time the conditions throughout, whether or not we expected to find anything significant to health. As I indicated this morning we did not have, until recent years, the ability to do as extensive a measurement as we have done in this survey.

(Buck to Ray: You mean by ability, equipment?)

(Ray to Buck: That's right equipment and technology if you can..well yeh, equipment, measuring instruments.)

Marshallese: It seems like yesterday a statement was made that would tell us that a person who lives on a given island that is contaminated, if he lived there and did not eat food from that island, that it would be

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reasonably safe and all right. I have a question about a person who is not from that island, and that is not his home but if he were to come to that island and eat food from that island, what is that scenario?

Ray: If he comes to that island to visit for a short period of time and eats food from that island, in general we can say that that should have no adverse effect anywhere in the Marshalls, a few days. And as I said to Senator Ishmael John this morning, although we think that the people of Enewetak should not take their food continuously and regularly from Enjebi, of course if they have a food shortage, there is good food there and so long as that does not become a big part of their diet, that should present no problem.

Ray: Again, except for Bikini island, the northern Rongelap islands, and to some extent Enjebi, except for those few, all the places that were surveyed, no limitation at all. You should not be concerned about visiting, eating, living in any of those places.

Buck to Marshallese: I am not sure I understand it.

Marshallese: All right, it sounds like, it seems like we have had a certain amount of radioactivity in our islands as around the world which is natural and has always been there. Now, you in your technology have developed a way of producing additional radioactivity and yet you have brought it to our islands to experiment and test, and so it is almost like could we, could you be more immune, to say, harm from it since it is your product than we because it's new to us? I think it is sort of like measles. We may have a threshold where we can and not be susceptible because we have had that all along and yet a population that had not had that would be real susceptible to harm from measles because they don't have any immunity to it. Now does that work in the case of radiation? In other words would you have been less effected, because it is your product than we, and it was not our product?

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Ray: I understand and I think I would ask Dr. Bair to comment on that.

Bair: Radiation is not like measles or any other disease. Radiation affects all people exactly the same. It doesn't make any difference whether they live here, live in the United States, live in Japan, live in Europe. Everybody is affected the same. We are not more immune or more sensitive than you people.

(Buck: I wondered if his, if the implication was the distance from that, but he says no that wasn't in his question.)

Ray: I understood it to be a question about a developed immunity. And there is no evidence, I think that any of us are aware of, that radiation causes an immunity to further radiation as would be the case with some of the chemical contaminants or as might be the case with measles or one of the diseases that, one of the communicable diseases that brings on a natural immunity. I am aware of no evidence, no suggestion, even, that radiation, that one dose of radiation confers an immunity toward future doses.

Marshallese: Page 52 Ailuk atoll. One of these islands down here in the southern part of it. He says this isn't really a question I have, I am just reporting that that island is a place where lots of birds gather and there is vegetation, and last April in a sense of mysteriously something happened, and only about a tenth of the natural vegetation is now still growing. Everything else has just died, and then as a consequence the birds also are dead and you can, the stench even of their secretions and so forth, is very pronounced. And he says we have no explanation for what has caused this and, it is, we are concerned about it and that is just relatively recently that has happened.

Robison: Which island was that, just for my own interest?

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Ray: It's right here.

Robison: The small one down here.

Buck: E N E J A. And he says there is another one there which we haven't named. Two of them in that area.

Buck: Oh, just that one.

Robison: Okay thank you. I just wondered which one he was speaking of.

Ray: I'm sure we don't have any explanation for that.

(Bair: .It's not radiation, Roger.)

Ray: We can say with considerable confidence that there doesn't seem to be any plausible radiation explanation for it.

Marshallese: I am asking regarding an island in the Rongelap atoll and I am to understand that you say that the northern part of Rongelap is hazardous?

Ray: What we have said is, that the foods that might be gathered from the northern islands of Rongelap have radiation levels considerably higher than the foods, similar foods from the southern islands. And that given a choice we would recommend against using the foods from the northern islands as an important part, as a large part of the diet.

Buck: Would you explain what kinds of foods is it that we should steer away from, that are raised in the northern part of the atoll?

(Robison to Ray: I don't think we steered away from any of them.)

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Robison: I think we can talk about it just in general terms that if, if you consume breadfruit, pandanas fruit, coconut or coconut crab, or papaya or banana, whatever might be there, if you consume those products from the northern part of Rongelap they will have a higher amount of activity than those from the southern part of Rongelap. The doses we estimate even from those products are identified in the booklet and are below the standards, for example, but if you do consume the products from that end of the atoll, up in the north, you will have more activity in your body than you will if you consume those from the southern part. So we are just saying that you are better off using the ones from the southern half most of the time. That doesn't mean that there can't be occasional use of the northern products if it is absolutely necessary.

Marshallese: I feel that the explanation just given, can be confusing to our people. To say you may eat from those islands, but it would be wiser to have most of your diet come from the south. Because just saying this, that you may eat from those islands, we take to mean you may eat there. And so, people would tend to then go and just indiscriminately take a lot from that, that the word is out that it is all right. The added clause, "but take care," or "it's better to eat more from south," almost confuses the issue. It would better for you to say it is much better for you not to eat those things. Or even to say don't eat them. Because once you say you can but take care, that's where we got a mixed message, and I think that is confusing to have that kind of an explanation offered.

Ray: Well, Senator my doctor tells me that I need not stop eating eggs for breakfast. But he tells me that I would be wise to eat no more than perhaps 3 eggs a week and it is that sort of thing that we are trying to impress here. That, if you have a choice and have an ample diet, adequate food from the southern islands from Rongelap, then in the long run you are better off to not eat foods from the northern islands. At the same time if there is a shortage of food on the southern islands, we don't want to say, "don't eat it at all," because you don't have food on the southern islands. It is a matter of how much and how often and for how long. If there is a

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better way to express that, we need help from the leaders of the community such as you, in expressing that in ways that will be understandable to the people.

Marshallese: Could we say that this would be accurate and permissible or recommended? That if you have no food if there is no possibility of having food from the southern islands, then it is all right to eat from the northern islands? Would that be, would that be good to say? That, and there ultimately is no harm in eating that food since you don't have any from the southern to use.

Ray: Well, I would surely say that is right. If you have no food on the southern islands presumably you will starve to death unless you eat something. And if there is food on the northern islands that prevents that, then certainly that would be a recommended temporary solution. All that we are suggesting is that to the extent that the circumstances permit, the bulk of the diet should come from the southern islands. But people need not be fearful if, for one circumstance or another, caught overnight in a storm in the northern islands, or a shortage of some particular food in the southern islands, that they consume some food from there. It's not an abrupt difference. It is a matter of degree.

Marshallese: I'd still like to just kind of think of examples of what might be the situation. I think I am correct in saying that the people feel that the northern islands tend to have more of abundance of let's say crabs and birds, things of this sort. So, if a people were to go and eat a chicken or a bird (I guess that would be a bird) or a crab a day up there, is that a problem then if they did that? (So I ask, "A day, one day out of a month?" And he says, "No, each day.")

Ray: Do you want to try that one, Bill?

(Robison to Ray: No, because we are in a continuous living pattern. I don't know what to say about that...)

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Ray: There is, I think not, a yes or no answer to the question. And, the portion of the diet that comes from the northern islands, as that portion increases, the radiation dose to that person increases. If all of the diet comes from the northern islands, that still is not a great catastrophe. But things can be better if none of it comes from the northern islands. So it is a matter of degree. And there are choices to make if there are benefits such as a better diet or a more delicious diet from going to the northern islands than confining to the southern islands. There is a choice that the individual must make or the community must make. Perhaps you would translate that and then come back to me.

(Buck to Ray: I have a question.)

(Ray to Buck: Okay, I wanted to continue there.)

Ray: In coming here, Senator, to present this report all of us have as you know, have flown an airplane from the mainland. And because of that flight we have been exposed to radiation much higher than we would have been, appreciably higher than we would have been had we stayed home. By being up at high altitudes we get more radiation than had we been on the ground at home. The amount of radiation that all of us received just coming here for this visit is not very different from the increase in radiation that your Rongelap person would have by your daily increase in diet from the northern islands over six weeks. Our one trip here might equate to a month or six weeks of this increase diet from Rongelap. We derive some benefit from that. It is important to us to be here so we accept that additional radiation, knowing that it is an additional risk to us, because there is something that needs to be done here or that we want to do, that we like to do. Similarly, if it is important enough to go to the northern islands and expand the diet, there is some additional risk, we believe the risk is small and the risk is described in this booklet. Nevertheless, we cannot say that there is no increased risk from eating food from the northern islands.

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(Buck: And that plane flight would be anywhere not just because it was flying in Marshallese air?)

(Ray: That's right. Any plane flight.)

Marshallese: Well, it is unfortunate that you had to receive greater radiation because of a trip here, to meet with us, on the other hand we know that you made the trip because of something that your government did in our islands and you came to make this explanation to us and meet with us and we are grateful for your concern and willingness to accept that increased radiation as a result of the trip. I see a difference in your example, though, because this is something that by choice you have done and in a sense we're not sure what our choice is because we would rather have not had our islands contaminated in this way. And yet they are by people other than ourselves, by a choice that was not ours, and so we are faced with this condition. And so I'm just concerned now about our people and this choice is forced upon us. You did it of your own free will. But with us it is a forced choice now that we have to make, or situation we have to deal with. And I think that is a bit different but we understand your explanation.

Ray: Well, we too feel that it is most unfortunate that Rongelap was contaminated. That was not by our own free will, it was as a result of an accident. What we are talking about here is I think the choices that now exist and the Senator was asking, "Is it appropriate to tell people they must not go to the northern islands or is it appropriate to say they may, freely?" Well it is somewhere in between and there are..., that's the value judgment that I wanted to address.

Robison: The practice throughout the world in radiation protection is that even though 500 mrem is an acceptable level that governments work with, if there is any practical way to stay below that level even though they say that's a level you can, you know, go up to and around, if there is any practical way to stay below that, they do it. And what we are saying here

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is that there is a practical way to reduce the exposure for the people at Rongelap by not using foods from the northern end. If you do use foods from the northern end, certainly there will be more radiation in the body and a slightly greater risk, be it small, however. But that definitely it will increase the levels in the body, but we are just saying that in the way radiation is handled worldwide, if you have a practical way to reduce it, the exposure, you will do it. And we are saying that this opportunity exists at Rongelap by simply not using the northern foods anymore than is really necessary.

Marshallese: On this paper, it states that the amount of radiation in any part of the body for Rongelap would be 2,500. Now that's a lot more than 500. Is there going to be some problem with that?

Robison: The 2,500 number shown here is the total amount over 30 years, not one year, and the comparable number for 30 years is 5000. So this is the total amount estimated for 30 years, not one. And the standard, the guideline for a 30 year exposure is 5000, and that represents the number estimate for Rongelap island.

Buck: Oh, Rongelap island?

Robison: Yes, Rongelap island.

Marshallese: It sounds like it is decreasing. You said that all of this is decreasing, so how did it reach, what 5000? 2500? How come it is 2500 if it is decreasing?

Ray: The amount per year is decreasing. But all of the years have to add up.

Robison: If it starts out, for example, let's say the first year is 450...

Buck: 30 times 400 is 12,000.

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Robison: The number that would compare to the 500 that you referred to would be this column which says 400, but that is the maximum amount, the maximum exposed individual. Most people would get much less than that and that's the number you would compare to 500 and that gets a little less every year but by the time you add up 30 years that's how you get 2500. Okay? It is getting less every year but still you have to add year one, two, three, four, five, right up to thirty. And so that's how you get to that number at the end of 30 years.

Marshallese: Seems like yesterday, I remember now something I wanted to ask about our discussion yesterday. That at Rongelap, somebody living at the northern part of the atoll with the numbers you are using in your calculations as a base, 233 population in 1980, in the next 30 years, at some point in the discussion yesterday, I recall you saying that perhaps 3 might die. Die from cancer? I remember this coming out of the discussion when we were looking at the slides and the figures on the slides, seems to me that that figure came up 3 people.

TAPE 6, SIDE 2

(Note a few words were lost when the tape was turned over)

Robison: ...additional cancer. Bair's point six to 3.

Marshallese: Looks to me like the color in this picture of Rongelap island is just one down from the color of Naen. In other words we aren't in that category but we're in this category by living on the islands, the main island of Rongelap. He says that of everybody living at Naen you get the figure 3, might 3 more might die because of all of them living there. Well, Rongelap is the next spot over as far as contamination. So what's it for us?

Ray: And it is point six. It is one-fifth of that. Less than one or point six.

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Bair: It is the number shown on the chart for Rongelap.

Marshallese: Point 6 means not, it doesn't even mean one person. It is less than one person for a 30 year period!

Ray and Bair: Right.

Marshallese: What about fish, sea life? Either ocean or lagoon at Rongelap? What about them? Is there any problem with that?

Robison: We have measured the sea life, the radionuclide concentrations in the sea life at all the lagoons and in the ocean at all the Northern Marshalls and we have found no place that we would recommend that you are not able to fish. The marine products, be it the lagoon or the ocean, have low levels of radioactivity in them. In fact we find that the radionuclide concentrations in the fish at the atolls here in the Marshalls are really about the same or less than what we see in fish in the United States, in the United Kingdom, Britain and Japan.

Marshallese: Shellfish. Like clams and crabs. What about these in the Rongelap islands?

Robison: The concentration...

Buck: He says fish obviously swim around and move. What about these things that are not as mobile?

Robison: The same thing is basically true of the clams, the big clams and the smaller variety and the lobster. They're very low level and there is...you know...

Marshallese: I just think that it would please me if you as experts in the field and the scientists who have studied all of these and are familiar with the significance, the way these things affect us, you, it seems to me

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to have the authority to really be specific and say either, "don't use these foods from the northern part," or "yes, it is all right for you to use these things." We don't have that capability, that understanding of the situation, so it is hard for us to be, consider ourselves the authority on this. But you are, and so, that word, it seems to me, needs to come from you.

Ray: Well, we certainly could make a very positive statement that if you wish to keep your radiation dose as low as possible then, do not eat any foods from the northern islands. In just the same way we could say to you, if you wish to keep your risk of lung cancer to an absolute minimum do not buy or smoke any more cigarettes. Or we could say if you do not, we could say if you do not wish to die in an airplane crash do not again ride in an airplane. It has been our choice, instead of that, to try in the best way we know how, to describe to you the amount of risk that you take in making your own choice about radiation in your environment. We recognize that this is very difficult, it is difficult for us to explain, it is difficult for you to comprehend. But, we do not want to be rule makers, we do not want to be saying you may not or cannot do these things. We hope to continue to describe to you and explain to you how these risks relate to other things that you are accustomed to, and hope then that you can make your own judgements.

Marshallese: Before your 1978 survey, we were given a statement and it was perfectly clear and that was, "you shouldn't eat crabs from the northern islands in Rongelap." Now that is a clear statement, we understand that. Now it seems like your saying, "well, sure you can, if you choose, eat one a day or something like that." Is that a, am I hearing you clearly that that has now changed? What you are saying today is different than what you told us before the '78 survey?

Ray: I think we are trying to say it in a way that provides greater understanding rather than rules. Senator Balos said earlier that it would be better and easier if we would simply say do, or do not. If it is at all

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possible we would like not to be in the position of telling people what they must or should do but rather of informing them of the degree of risk and permitting them to accept risk if that is their choice and to control their own lives rather than asking us to control them. So, perhaps the way we are saying it is different. It is very easy to say that we can avoid excess radiation exposure at Rongelap by not eating coconut crabs, at all, because there aren't many on the southern islands and they are on the northern islands. We would choose not to do that but certainly if the council, the people at Rongelap, should want to make that decision it is much more, they have a much greater right to do that than we do.

deBrum (in English): I was taken by your explanation that ... I didn't pay any attention... Let me try it the best way I can. (Oscar translated the above into Marshallese)

Marshallese: I think I detect one of the reasons these kind of questions are coming up, is that the people have their own council and also some other sources of scientific data or doctors that come to check them and sometimes that they have asked well what were you told by the DOE people and then they say, well that's inaccurate or that's certainly not so, they are misleading you or deceiving you. And so, that is why we are really puzzled. This makes for a lot of misunderstanding, so it is difficult now for us to really know what to do when we get that kind of information from different sources, so, I think that is one of the reasons why we are having these questions.

Ray: Well, if that's the case it seems to me that this is a very wholesome exchange and that we should and do encourage a discussion with those advisors, those council members, those experts. And, we have freely made available to any legitimate representatives or advisors of the people, all of the information that we have. We welcome their advice and you know in the case of the Bikini people we cooperated extensively with the counselors and advisors that they retained. And we stand, certainly, willing and ready, and these documents are available, as I said earlier this morning,

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to be distributed to them so they can challenge and they can ask about them and, if they wish, go and make their own measurements to verify them. We have done the best, we have done in the best way we know how, a job of determining the conditions, analyzing their significance to man and presenting them. We are not infallible nor do we guard these, this information and these conclusions in any way. They are open, open public documents for anyone to challenge and to give us suggestions about.

Muller: I have a question now about the thyroid disorders and I recall seeing in some medical publication a figure that indicated that out of a population of 30,000 you would expect to find 2 thyroid conditions, I don't know if this means cancerous or whatever. This being the normal incidence of thyroid among a population of 30,000, given 30,000 people. Well, the 30,000 would certainly approximate the population of the Marshalls and yet we have had 500 such incidences. So what kind of explanation do you have for that?

Ray to Bair: Bill Bair, do you have any comment to make on that, or...

Buck: Oh, he says it is actually one out of 30,000.

Ray: He's speaking of, I believe, normal incidence of thyroid abnormalities in a population (per 30,000).

Bair: I have the information here, I think I can help.

Ray: Do you want to come back to that?

Bair: Yeh.

Ray: Dr. Bair thinks that he may have some information that he can look at right now. Let me suggest that we hold that question.

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Ray: Could we go on to another and come back to Dr. Bair?

Marshallese: What I want to bring up, now, is sort of different from what we have been discussing, because that we now understand that this book was prepared with detailed information regarding the conditions for the 30-year period following the 1978 survey. And I have a feeling that people who are involved and live in that period are to be considered fortunate to have this document, now, that explains so much of what will be effective then. My concern or my question now really revolves around those that have been affected prior to that year, just what can be done for them? Is there any, I suppose compensation, is there any help, is there anything to tell them? Any information for them about their condition, because this book you say definitely is not addressed to them?

Ray: That is correct. Well, there are other publications that have come out from time to time ever since 1954 on the condition of and the consequences to those people. There are numerous publications on those subjects and the matter of their future and compensation has been a part of the negotiations between our two governments over the past many months. We are not prepared to really discuss that subject here. There are other forums where that is being discussed and we have no real authority to come and talk about it here. This visit has a different purpose.

Marshallese: I want to ask about Kwajalein and Rongrik (did he say?) and Kwajalein and Rongrik; what about the radioactivity that may be involved or incurred by the missiles that are being tested? Is there an increase (or is this, increase or decrease) increase in the radioactivity in those two places, Rongrik and Kwajalein, from the missile testing?

Ray: We are not even indirectly responsible for the missile activities at Kwajalein. Those are Department of Defense, Department of Army activities. But I am not aware of any radiation consequence of those missile launches. There are to the best of my knowledge no significant amounts of radioactive materials that are involved in those, in those missile launches.

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Marshallese: Does that mean that all missiles that are shot into our lagoon at Kwajalein have no radioactive elements in them, products?

Ray: I cannot say that. I think that is true for at least, that if there is any radioactivity, it is minimal. It might be, my watch is radioactive, there might be some radioactivity in some components but there are no atomic warheads. There are no atomic bombs in those missiles. There are no atomic explosions having to do with those. And, I am quite, I am confident that there is no significant introduction of radioactivity into the Kwajalein lagoon from those but I, again, would say that the question should be addressed to the people that are doing it and if there is some further question about that I will be glad to carry that question back to the Army and see that it gets answered.

Marshallese: Oh, I felt this was an appropriate question to address to you because I felt that anything having to do with weaponry, this kind of thing, you would be familiar with. This is something that scientists manufacture or their knowledge goes into making these, these explosives and so forth. And so, I thought that you would know about this, and as I have observed, those that have entered the lagoon, there is quite an explosion involved. I mean there are rocks and stuff that go up into the air and I thought you would be informed about this and could answer my question.

Ray: Well, I'm personally am informed but in the same way that you are, from what appears in the press and from what we read in the paper, hear on the radio. And I would not like to be considered an authority on what the Army is doing there. I will say with a high confidence, that I'm absolutely certain that the Army is not sending atomic weapons into Kwajalein lagoon. What they are sending, I don't know. I don't know the composition of it, but if they were using atomic energy bombs, we would know it and we would be involved. Since they are not doing it, we are not knowledgeable and we are not involved.

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Marshallese: Because of the discussion we had yesterday and the information that was presented, one of the elements named was plutonium. And, we would really like to know, is there any plutonium in the missiles that come into the Kwajalein lagoon? I really feel that we can now ask things that we want to know and feel comfortable, we want to build on this relationship of sharing information with each other. What we know we tell you, what you know you tell us. What we don't know we admit to that, on both sides. So I am really thankful for the opportunity to ask this of you and if you don't know the answer would you convey it where it should go, be our voice in asking? Is there any radioactive elements in the missiles that come into our lagoon that would be of harm to our fish or to the life in the lagoon at Kwajalein?

Ray: Again, I cannot answer with authority because I don't know what is in every missile that comes into the Kwajalein lagoon. I assure you that I will carry that question to the Army and arrange that it be answered as promptly as possible to the government of the Marshall Islands.

Marshallese: I want to own, ask something and I want to own up to the fact that I have no advanced degree. I am not a doctor and so all the explanations that are in the book I have something I want to ask with this understanding. In this publication, 8, 10 and 11, is all of this data given on these pages, does this come from the U.S.S. Wheeling survey?

Robison: Yes, everything presented in this booklet basically comes out of or does come out of the Wheeling survey.

Marshallese: Turtles and turtle eggs, regarding Mejit. So since this report definitely names some information regarding turtles and turtle eggs from Mejit, I don't recall seeing a single turtle or any turtle eggs being observed or gathered during the visit of the Wheeling so I am kind of wondering why there is information here attributed to that survey.

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Robison: That's a good question. We wanted to be able to put an entire diet together to estimate the dose at every atoll. Now we weren't able to collect turtles or turtle eggs at every atoll, but the turtles we have been able to analyze throughout the Marshall Islands, all are very similar and all the other doses or all the other radionuclides concentrations we see at the outer atolls, Mejit, Wotho, Ailuk, Likiep are all just about the same. And, so what we did was take the average from the all the turtles we were able to analyze and use that at an atoll if we were unable to collect them at that specific atoll. But we see no difference between the turtles we have been able to analyze wherever we get them. But we weren't able to get them every place, but what we did was take the average value from what we've seen throughout the Marshalls and then we used that at every, at an atoll if we were unable to collect them just so we would have a complete diet and we didn't leave anything out.

Marshallese: Thank you.

deBrum: Then maybe we can assume that some day when a turtle comes over on Mejit to lay eggs, the people catch that turtle and eat it, they are likely to absorb the same amount of count as stated in the book.

Robison: Right.

Marshallese: He said that there seems to be great differences between the amounts of radionuclides in the different places but he says, look here in the book I see that the one at Likiep is a little bit different, has a little different specifications than the one that you gave to Mejit, and so he says that maybe that was a male.

Robison: Maybe that, what?

Buck: A male.

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Robison: Maybe that is so. I would have to look back at my specific data to tell for sure. Which of course I don't have with me. But basically what happened is if that if we had a turtle from an area and measured it we used that number. Now, that number varies very little but at another atoll it would be just a little bit different but very close; and so what we did was we averaged all that and would apply that to an atoll where we had nothing and, therefore, they don't always look exactly alike, but they are very, very similar no matter where you find them.

Buck: I just happened to notice that down the line it seems like Mejit ranks a little higher in all of those figures than Likiep. Likiep is a little higher than Mejit.

Robison: I think just an addition on the turtle question, we have sampled enough turtles from around the area we feel we know basically what the concentration is in a turtle and it is very, very low and there is no problem. And we just don't like to keep taking turtle samples because there aren't that many. We don't collect them just to go back and measure them when we feel we know already that the concentration is very low and there is no problem with the turtle.

Ray: I'd like to clarify one thing, to make sure I heard it correctly. Did someone suggest that male turtles are laying eggs too?

(Laughter! Only Roosters!)

deBrum: Please correct that. It's an Ailuk rooster, not a turtle! Any chance, because of the radiation problem? (more laughter)

Ray: Yes, Dr. Bair is ready with the information. It was Phil's question.

Bair: In 30,000 people you would expect normally about 6 people to have thyroid cancer. I don't remember what number you said. One? It is really about 6. But it is true in the Marshallese, in the 239 Marshallese who

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were exposed to the fallout, there is a much higher incidence of thyroid cancer in those people. I think there were 7 in 1977, I don't know how many there are now.

Buck: There were 7 cases of thyroid cancer.

Bair: There were 7 cases of thyroid cancer in 239 Marshallese in 1977. I don't know how many have occurred since then.

Muller: In our records, I think we have, I feel we have heard about 460 or so cases of thyroid abnormality in our population over this period; and, so we think that our population is now something around 32,000. So, that seems to be much different than what you said, well actually Marshallese population differs in no degree from say Yap in an incidence of thyroid disorders.

Bair: My number was only thyroid cancers. That is much different than the thyroid abnormalities. There is no relationship that scientists know about now between nodules and cancers. They appear to be independent. Different populations around the world have different numbers of thyroid abnormalities but their incidence of cancer is not that different, is not different. It is fairly uniform.

Muller: No, I was speaking about thyroid operations. There have been 460 thyroid operations. In Japanese records of the time that they were in the Marshall Islands, we've checked those, and the number of incidences of thyroid disorders during that time was not near what it has been now in this recent time in our records.

Bair: That is probably because you are more concerned about thyroid abnormalities and so you are looking harder for them. And when you look harder for something you find more of them.

Muller: Well, I have not conducted any vast research in this subject so it's not because of my interest or lack of interest that these figures seem to be this way, but thank you for your reply.

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Bair: I should add that I'm not an expert either and I'm only taking it from a book that was written by experts.

Ray: We have a question back here.

Marshallese: Well, I am really amazed at the discussion we have just had because the figures as reported here one out of one incidence in 30,000 versus 6 out of 30,000 that's not anything that disturbs me too much. However, you compare that with the population of Utrik in 1979, that's just one year following the time of this survey as reported in the book here, our population was 310, more or less, and out of that population 310 there were 9 operations on the thyroid. Nine individuals had thyroid operations. Of these 9 some were at Utrik at the time of the test and the fallout but some were not. They were at Likiep or they were at Mejit and later came and moved to Utrik. Now that just seems to be astounding, and what can we say with that ratio? I know that, that information that I have is the year 1979 with a population of 310 people there were 9 thyroid operations.

Ray: Do you care to respond?

Bair: I don't, I really cannot answer any questions about that. Not all the nodules are caused by radiation. In populations that don't, have not received radiation, nodules appear. Thyroid disorders appear. I don't, I can't answer your question.

Ray: I believe that's a question we will just have to ask be held for another forum when we do have the appropriate expert to talk to.

Marshallese: I just want to further observe that on this sheet, the amount of radiation, the highest amount that a person might receive in one year is listed for Rongelap as 400, for Mejit 100. Both of those are higher than the figure given for Utrik, and yet with that low figure we have had nine operations in that one year. Now I just want to make that observation as a matter of deep concern for me and my people. And what, now, can we expect in the next 30 years, that was one year?

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Buck: That's a rhetorical question.

Ray: Again, I think that that kind of question needs to be addressed to the physicians who are familiar with the incidence of these things and what kind of occurrences they are and we just don't have that knowledge here.

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Marshall: In addition to thyroid disorders we've got, had an increase, a measurable increase in our statistics as we compare them with the time the Japanese and the early times that the Americans have been in our islands. It's not just thyroid disorders now but diabetes and cataracts and hypertension among the women. All of these have had an upsurge and so we are just wondering we really are puzzled by this and would like to have that addressed as to what has been the possible cause, what contributes to this increase which is verifiable?

Ray: I assure you that we, as you know we have recorded these questions and I have recorded some, we will certainly take these back to the appropriate people to the extent that it is appropriate for the United States government to look into these things we will. I think that it must be something that will be discussed with the health authorities of the Republic of the Marshalls, to the extent that our doctors have any information that might shed light on it, certainly that information will be available. And we will endeavor in cooperation with the government to look into these things and help find some answers.

Buck: Thank you.

Marshall: A benign thyroid condition develops from what, or a cancer, malignant thyroid develops from what. What makes the difference between these two kinds of tumors that develop in the thyroid? I would like to know.

Bair: I don't know.

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Ray: That's again a physician's question and we are not prepared or qualified to answer.

Ray: Mr. Secretary.

deBrum: It is now 3:45. Would you like to have a 5 minute break and then conclude it?

Bair: Let's conclude it now.

Ray: We can do that or we can conclude now.

deBrum: (not clear)

Ray: I think we would rather conclude it now.

deBrum: There is one maybe last question.

Ray: Yes.

Marshallese: I'm not sure if this has already been discussed in my absence because I haven't attended all of these sessions; nevertheless, I would like to just ask for my own clarification. According to the report in the book as written and presented to us, it seems to me that it is clear that from the tests conducted at Enewetak and Bikini there has been contamination to the atolls that are, were surveyed, some more than others. Is that correct?

Ray: That is correct.

Marshallese: So, for further clarification, the radioactive, the radionuclides from the tests that now are in the soil and also become then part of the plant life and even the land life, pigs and chickens and birds. They have these now in them, there has been an intake of this until present, in the soils and in the life, plant life and animal life. Is that correct?

Ray: That is correct.

Marshallese: Now in some atolls where there is higher radioactive present, the people living there will ingest or have some of that in their bodies. That will be higher than other atolls where it is smaller, like Likiep and Mejit and some of those. Nevertheless, people living there, as they live there, they will continually be absorbing or taking in these radionuclides. Is that correct?

Ray: That is correct.

Marshallese: I just wanted to ask this for my own clarification.

Ray: And, all three of the statements are correct. But I would like to emphasize as is shown in the booklet, that for most of these places those numbers are very, very small and that the radioactive dose, because of that, is comparable to radioactive, radiation dose that people experience in lots of other places, lots of other conditions in the world.

Marshallese: If there had not been tests conducted in the Marshalls, then these levels would even be lower than this. Even though you say they are low, nevertheless, they are higher than they would have been or were prior to the testing of the atomic weapons?

Ray: Yes, certainly that's true.

Marshallese: It seems to me yesterday the request was made that Wotji be surveyed; and if indeed there is going to be a survey of Wotji, I would request that Taongi further north. The people of Utrik are interested in that atoll for purposes of planting and increasing our food supply as our population increases. So it is of concern to us what the radioactivity of that atoll is and I would suggest that if there is additional surveys conducted for Wotji as requested yesterday then I would like that atoll also surveyed.

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Ray: Let me clarify. I believe that the request that was made yesterday and the offer that I made, was that we would research those things that have been done at Wotje already. but were done back in the earlier years, and if we were to produce that information and reduce it to a meaningful document for the people of Wotje, we would let them know what is done and what, on what basis we feel confident that Wotje does not need a further survey.

Marshallese: Well, if you do that for Wotje can you do that for
 ? ?

Ray: Yes, we can certainly. We will do that.

Marshallese: Second question I have. This picture, the illustration on page 22, very clearly points out that it's not just the thyroid that is affected by radionuclides but they enter the bloodstream and are then carried to every part of the body, so that my friend here from Rongelap joins me in requesting that after this don't just bring a thyroid specialist but we would appreciate a doctor that is a specialist in the other areas of the body since the whole body is affected. An eye doctor, an ear doctor, a brain doctor, a physician that would be able to give us help with other ailments that we might have since our whole body is affected, not just our thyroid.

Ray: The doctors who participate in the DOE program represent a wide range of abilities and experience. The emphasis for some years has been on thyroid because that has been the most evident result, but we have had specialists in all fields visit and some generally qualified practitioners who are capable of recognizing the need for other specialists to come in. We certainly, in the DOE medical program, certainly does not look only at thyroid. It has done work in all sorts of illnesses but concentrating on those things that by experience and knowledge are most closely related to radiation exposure. We have had some cardiologists, we have had some diabetes studies, we have had parasitologists working with parasites, pediatric specialists, even dentists helping in that program.

Marshallese: We from Rongelap and Utrik have this request and now the Senator from Enewetak also joins in requesting that those of our number who have had thyroid operations, some were not exposed to the fallout, and so consequently received no compensation yet they as a result of their operation are required to take medicine daily perhaps for the rest of their lives. Is there some way to financially help these people since they are now required as a result of their operation for this sickness that they have?

deBrum: If you cannot answer this perhaps you can take this request to the proper authorities?

Ray: I shall do that. I want to comment that the matter of treatment of illness and injury that is not radiation related is a subject of agreements between our government and the government of the Marshall Islands and the subject of continuing discussion. And I shall certainly take that subject to those discussions.

Marshallese: I have no further questions.

deBrum: On behalf of the President who is not here or the Acting President, I want to express our extreme gratitude and sincere thanks for the team's coming, presenting us with this information from the study made and your report at this time to this group. I am especially grateful for this kind of setting where we are able to sit down face to face, discuss these matters, raise questions and get answers or at least have them raised so the answers can be forthcoming, eventually in the future. We are encouraged by such a gathering and are grateful to have had this. I might just say as sort of an example or a parable that as we sit here it is almost as if a ball of fire had fallen right in the middle of the room and we are trying to find out how we can escape injury from getting too close to that fire, and in that way we want to avoid injury. And those that have been burned, we want to discover, try to find ways of giving aid in their distress and discomfort or illness or harm. That is figuratively how I

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experience our meeting these past two days. So provision has been made now for this in the agreement or the proposed 177 that the two governments are discussing and we are glad to know that they will be pursuing this matter. I was very encouraged to hear you say that you welcome the people taking these reports and sharing them, showing them to whoever they wish to seek further advice and counsel. I think that that is a healthy situation and we can all grow and benefit. And I would hope that any further research or results or information, whether pro or con, would also be brought and we would be able to further discuss, so that we would all better understand what's involved.

deBrum: I'll give everyone an opportunity to say a few words.

Marshallese: I am very grateful for having been here and for the report that you brought and explained in great detail. I feel better equipped to share as much as I have gained from it with my people. And I thank you for enabling me to do this by providing this kind of information. This is a help to me and my people and I thank you most sincerely.

deBrum: Do you want to say a few words?

Ray: Well, thank you Mr. Chief Secretary and thank all of you. We again appreciate this opportunity and your hospitality and especially the time that you have taken to come and very patiently listen to us and absorb what we have been able to pass to you on a very difficult subject. We want to continue this discussion, this exchange so long as you find it useful and we welcome your suggestions about questions that still need to be answered about things you would like to hear more from us about. We have taken a number of notes on those and I assure you that they will receive our attention. I know that I speak for my associates here when I say we have been pleased and greatly impressed. We respect greatly the efforts that you have made and the degree to which you have absorbed so much information in such a short time. Your questions and your comments will make us very much better prepared to visit your communities at a later date.

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Now since the Chief Secretary chose to use a parable, this may be difficult, Alice, but I would like to try one myself. I even do this with apologies to Elden*. I think you all should be reminded of a man I heard of who had not been to church. For many, many months he had not attended church and the minister stopped him one day and asked him, would he not this Sunday come to church because he was badly missed and he was needed. It happened to be a Sunday when the minister was greatly inspired and spoke at great length. His sermon touched on every book of the Bible and lasted for more than four hours. And as the man left the church the minister said I was so pleased that you came here. I hope that you feel that it did you good. And the man said to the pastor, "I, pastor, am reminded of something that happened in my childhood when my father went to feed the pigs and he took a whole cartload, a whole wagonload of food down to feed the pigs and only one pig showed up. My father emptied the cart and almost drowned the pig with food. Pastor, I realize I have not been to church in a long time but did you have to give me the whole load at once?" We apologize for giving you the whole load at once. We thank you very much for your hospitality and hope to see all of you again soon. And finally our deep appreciation to Alice. Thank you.

* Reverend Elden Buck, Alice's husband.

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