TRANSCRIPTION OF MEETING BETWEEN DOE REPRESENTATIVE AND GOVERNMENT OFFICIALS OF THE REPUBLIC OF THE MARSHALL ISLANDS AT MAJURO

DECEMBER 8 AND 9, 1982

The purpose of the meeting was to present to and discuss with the government officials of the Republic of the Marshall Islands, two publications: "The Meaning of Radiation for Those Atolls in the Northern Part of the Marshall Islands That Were Surveyed in 1978" and "The Northern Marshall Islands Radiological Survey: Terrestrial Food Chain and Total Doses."

Those present were:

Senator Ishmael John	Enewetak
Senator Calep Rantak	Ujae
Senator Ataji Baloo	Kwajalein
Senator Donald Matthew	Utrik
Minister Jeton Anjain	Rongelap
Minister Tom Kijiner	Likiep
Senator Tokwa Tomeing	Wotje
Senator Katip Mack	Arno
Mayor Jabwe Jorju	Rongelap
Major Necheld Leem	Ailuk
Mayor Elden Juda	Utrik
Senator Report Emmius	Mejit
Mayor Aneo Keju	Mejit
Senator Mwejor Mathusala	Wotho
Oscar deBrum	RepMar
Phil Muller	RepMar
Suzanne Cowan	RepMar

DOE:

Mr. Roger Ray
Dr. William Robison
Dr. Tommy McCraw
Mr. Harry Brown
Dr. William Bair
Mrs. Alice Buck
Mr. Reynold deBrum

The following is an unedited verbatim transcription of the English language portion of a recording made of the two-day meeting. Since it was not possible to identify with certainty all of the Marshallese speakers, they are identified in most cases as "Marshallese." From their translated comments it is frequently possible to identify the atoll they represent and for many of these it might be possible to identify the speaker. The translator, Mrs. Alice Buck, is identified in the transcript as the speaker only when she spoke for herself. Conversations and discussions among the English speaking participants that were not translated into Marshallese are given in parenthesis. A few words are left blank in the transcript because they were not recognizable to us. The addition of these and the identity

of some of the Marshallese speakers would improve the transcript, if they can be supplied to us. Because it was not always clear on the tapes where sentences and phrases began and ended, much of the punctuation was inserted arbitrarily.

The transcript does not fully reflect the friendly, yet serious atmosphere in which this meeting occurred. The frequent instances of humor and laughter are recognizable on the tapes, copies of which are being made available.

W. J. Bair
February 1983

DAY 1

TAPE 1, SIDE 1

Roger Ray: I think you all know generally why we are here. We are here to report some work that has taken almost 4 years; that is, the conduct and analysis and reporting of results of the survey that was done in 1978.

Some of you were here in July of 1978 when I talked to the same group about our plans to do the survey, and I remember that one of the most important things that I heard in that meeting was that you and your families and friends on the islands that were surveyed would very much like us to come back and report the results after we were finished.

That was a promise that I made at that time, that we would come back as soon as the report of the survey was finished.

(Can I use this for a second?)

The actual scientific report of the survey is in a collection of books that look like this and some of you have seen those.

The last of those was completed and came from the printers just a few days ago and just arrived here recently.

At the same time that that report was being printed, Dr. Bair and his colleagues and, Alice Buck working with them, prepared this booklet. I think all of you have copies of it now, which is a summary of the reports of the survey and is expressed in both languages, Marshallese and English.

We have many copies of that report and wish to make it available, that booklet, (wish to make it available) to everyone who will find it interesting and useful.

Two weeks ago I cabled the President and informed him that this report was now ready for presentation and I asked that we be permitted to come here this week to meet with those of you representing the islands that were surveyed, and any others who might be interested.

We all regret very much that President Kabua cannot be here today. He informed me that he could not be; however, he said that we would be welcome to come ahead and meet with you, and knowing that I expect to meet with him next week and he will get a personal briefing on the report.

We appreciate very much your coming in to be with us here so that we could come to one place to make this presentation. At later dates we hope to visit your home islands and at least answer questions that people may have and perhaps make a presentation if that seems worthwhile.

What we would like to suggest this afternoon is that Mrs. Buck will go through the booklet using the slides. (and) She will not read it entirely but she will summarize what is on each page, summarize each chapter of the book. (and) We will be pleased to answer questions during and after that presentation. We would suggest that the questions be questions of explanation of what she has said rather than questions of broadening outside of what is in the book. Then after you have had a chance to study it, to look it over tonight and tomorrow, we would like to suggest that tomorrow afternoon we would meet with you and entertain any questions that may have come up as a result of your reading.

Does everyone now have a copy of the (of the) colored pamphlet?

(Right there on the table in front. etc. Coming up.)

Does anyone have a question or suggestion before we proceed?

Alice Buck: We have one question here.

Ray: Yes.

Marshallese: Who was it that you had thought would be in this meeting?

Ray: We had expected to see representatives of the leadership of the atolls that were surveyed and any other members of the Nitijella, any members of the government. We were prepared to have whoever might be accommodated in whatever space would be provided. I think it was left entirely to the government to make the choice of who would be here to listen to us.

Buck: We have another question here.

Ray: Yes.

Marshallese: The title of the book as presented here on the book says this report concerns atolls in the northern part of the Marshalls. Now just which atolls are these?

Ray: They are listed, I believe, on the, well...here named on the chart on page 8 and 9. Those are all the ones that were surveyed. This report does not deal with Enewetak and Bikini. They've been separately reported in other reports.

Buck: All right another question.

Marshallese: Why did you treat Enewetak and Bikini differently from the others?

Ray: Enewetak and Bikini had been the subject of earlier surveys and there were decisions that the Enewetak people had to make in 1979, before we had this survey completed. So we prepared a booklet, a separate booklet, for Enewetak which was presented in 1979. Similarily, the people of Bikini asked us to make an earlier presentation to them when they had to make some decisions about their future. (and) So we produced a separate booklet for them. Those are mentioned in the back last few pages of... Bikini is mentioned on page 61 and Enewetak on page 59.

Ray: Here are those two books. Bikini and Enewetak.

(Background voices not clear. Bill Robinson suggested it should be mentioned that the actual work was done before then. Alice said that it might be better to say again.)

Buck: Another question.

Marshallese: The first population to be returned to their atoll, if I understand correctly, was the people of Utrik. So I am asking why information regarding their atoll wasn't prepared first. They were the first to be returned to their atoll.

Ray: Well, there was work, was survey work done at that time before the resettlement of Utrik and there has been a continuous survey effort at both Rongelap and Utrik since the 1950s. There was a great deal of information that lead to decisions and recommendations being given to the people. It was only after we had done the Bikini and Enewetak booklets and found them so useful that we felt that it was important to do this here. The information has flowed continuously but never in one concise form before for Utrik and Rongelap. I can't really explain that, except to say that the people who were making the decisions had the information. We now recognize, certainly, that it would have been better, that is why we have done this, recognizing that it would have been better had there been a more complete, more continuous communication.

Marshallese: I feel that there are other atolls that we would be considered accurately as part of the northern area of the Marshalls and I don't see them named in this map. (and) So the reason that they do not appear in this book (is this), does this mean that they have not been significantly contaminated, or what is the reason that they are not?

Ray: That is the correct answer. At the time of the, at the time these islands and atolls were selected for survey a careful study was made of what had occurred in the past and it was concluded that these were the ones

that might show some significant contamination. That if we cover these, we would (in ? found*) that there was no concern about the ones on the fringes of that pattern, that we need not be concerned outside that pattern.

Buck: Further question.

Marshallese: Has there been any survey made of other atolls than those in this book?

Ray: There have been limited surveys in other places. There has not been as comprehensive a survey as has been done, as is reported here, on I guess any other atolls but those that are listed here. There have been, (and aside to Alice, "can you find something for spot check?"), there have been brief visits, small excursions to other atolls just to be sure that there was not something that had been missed.

Ray: Many many surveys have been done starting back during the test days by the University of Washington, by Brookhaven Laboratory and by other Department of Energy Laboratories. These have all been reported in the scientific literature, they have all been reported to the Trust Territories Administration, to the Department of Interior. These three booklets represent our first attempt to try to convey this information back to you in a way that is meaningful. We, perhaps, ought to consider going back and looking at some of those other things and putting them in a meaningful form but it is a great deal of effort to summarize it. If there are specific places that people are concerned about and would like to know what information exists, that information is available and we will make it available.

Marshallese: This may be my final question. I would wonder if it would be considered appropriate, I would think it would be beneficial and I would like to request that information regarding Wotje since I am representing Wotje could be given to us. This is my request.

* There was static on the tape.

Ray: Yes certainly.

(Voice in background cannot be understood.)

[Alice Buck - Began presentation in Marshallese of material in book.]

TAPE 1, SIDE 2

Buck: A question!

Marshallese: Since this depicts the radioactive things circling the globe and actually going everywhere that seems to imply then that all of the Marshalls have been contaminated. Is that a fact?

Ray: It's a fact that the fallout from the atomic testing of all countries does circle the globe, so to that extent we can say everywhere. Everywhere in the world especially in the northern hemisphere has received some fallout.

[Alice continued her presentation.]

Buck: Yes, a question.

Marshallese: This is labeled the least amount of radioactivity, small amount of radioactivity, and so on. Which one of those numbers or categories is permissible for people to live healthfully?

Ray: Dr. Bair.

Bill Bair: None of the levels would be considered dangerous.

Marshallese: Is there any such, can you say that there would be a category at 0 were there is no radiation?

Bair: No because it was mentioned earlier that fallout from the atomic bombs went all around the earth, so the whole world is contaminated to some amount.

Buck: Another question here.

Ray: May I follow that just a bit?

Buck: Okay.

Ray: Before there was any atomic bomb, there was radiation in our environment, worldwide. The radiation, naturally occurring radiation, in the waters of the ocean, in the fish, in the plants. It has been there forever, since the earth was formed. We are also exposed daily to radiation from the sun, the cosmic rays from the sun. So there is no place that has zero radiation. What we are portraying with these numbers is that that which is caused by the bombs is not very different in quantity or intensity from that which occurs naturally. As the number gets higher it is more, it is larger in proportion to what is there naturally. But nowhere is there no radiation.

Marshallese: So, here we see on the map of Bikini the figures 4 and with that you are saying that, that 4 is a level that is safe for habitation? May we live at Bikini?

Bair: I can't answer that question whether you can live at Bikini. Bikini Island has more radiation on it than the other places that are labeled 3, labeled 2 and labeled 1.

Marshallese: It seems like you said before that all these figures including 4 were, it is possible to inhabit those places, so now that means that we are able to eat whatever we want and drink whatever we desire at Bikini because that is labeled 4?

Ray: I think that these numbers will have a great deal more meaning when we get further back in the text. I don't want to turn off a question, but there is a lot of explanation in what Alice is going to go through that will help us to, help answer your question. Perhaps a little later in the time we will come back to it but I think it would be a lot easier to comprehend and a lot easier for us to address after we develop...

Marshallese: I am still not quite sure why we need to go further into the book when we are right here at this place and we can compare Ailinginae has a 2 and Bikini has these other numbers. (and) So it seems appropriate to address this question right now.

Ray: Well, certainly we can, can pursue it now. I was just suggesting that what comes after this helps to explain those numbers.

Buck: I will tell you what I am really asking. I am questioning the accuracy of the numbers. It seems like maybe Bikini then should probably be a 6 or a 7 rather than a 4. I am just wondering that.

Bair: The number 4 means the radioactive contamination is above a certain level. The level 3 is another range, level 2 is another range and the level 1 is the lowest range. So when you have an island or an atoll that says 4 it has a range of values which may (be) extend upwards. I don't know how high because I don't have all the data. Do you understand what I am saying?

Marshallese: So the 4, does the 4 represent acceptable doses? And if that is the case does that mean it is safe?

Ray: The 4 represents an area which has radiation contamination above a certain level. We have not yet talked about what that means in terms of dose or what it means in terms of living at that place. There are other things beside the simple number of what the radiation level is on a particular island. There is the diet of people, there is the location from

which they seek their food. Each of these questions has to be looked at, each of these locations has to be looked at using some assumptions as to what people are doing and for how long and that is what the rest of the booklet will present. This simply tells you that levels of radiation are widely distributed through those regions and they vary even within an atoll. Now what that means comes next.

Marshallese: May I ask what is that level of radiation that this exceeds, if 4 is above?

(Ray: Do you want to answer that Bill? Bair: Do you want to give them the actual numbers? Ray: Yes.)

Bair: (It's) The number is more than 100 picocuries per gram in the soil. That is a measurement, that is what 4 is. That is a level of radioactive material in the soil.

Suzanne Cowan: Dr. Ray is now saying that the designation 4 has no upper limit. It is a designation above this limit. Whereas how can you say that and Dr. Bair is saying that all these designations are considered not dangerous?

Bair: If people lived on these islands that have a level of 4 on them and didn't eat any food that was grown on those islands they wouldn't get much radiation exposure. They wouldn't get much radiation. But if they eat food that is grown on those islands, they would get more radiation depending upon how much food they ate from those islands.

Ray: I think there is a misunderstanding here. Let me try and clear that up. Dr. Bair did not say that any number is not dangerous. What he said is that the numbers that were measured in this survey would not indicate a dangerous situation at any of these locations. We do have actual measurements that permit him to say that. It is not an open ended thing

all the way up to the sky. The number is a number that we know and that's what he is saying is not dangerous. For simplicity of notation here, we've said that everything above that hundred number is just a 4 because we know that it doesn't go very much higher than that.

Buck: Oscar is suggesting that we do proceed with the presentation that is to be made and, not wanting to put any damper on the questions asked, nevertheless it might be profitable to hold them until tomorrow which we have already explained will be opened to any sort of question and suggests that we go further with the explanation that is prepared in the book of these matters.

Buck: He was again saying that I would rather want to understand each page as we go along rather than we might forget what some of our questions are regarding this if we go along. Oscar tried to also explain that doubtless some of the answers to what your question is on this page will appear, the answers are given in the next pages. Rather than confusing or departing from this we are actually going into this deeper and more clearly.

[Alice Buck continued presentation in Marshallese.]

TAPE 2, SIDE 1

(Note - The beginning of Tape 2, Side 1 was accidentally recorded over. This material has been inserted in its proper sequence, at the end of Tape 2, Side 2. Part of Alice's presentation in Marshallese recorded on Side 1 was lost by this error.)

Marshallese: It was stated that there has been radioactivity in the world from the beginning. How come the people in the Marshalls were not sick in years before?

Bair: Because, because the amount of radiation naturally..., well. We don't really know whether people in the world have been made sick because of the natural radiation. There is no way of knowing whether sickness that

we see in the people in the world is due to radiation or not due to radiation. You can't answer the question. Radiation has always been here. You can't, you don't know what it would be like if we did not have radiation.

Bair: Some scientists believe that the natural radiation in the world does cause cancer and other diseases. Other scientists don't believe that this is true. It is an unsettled question.

Marshallese: I feel confused but we can go ahead.

[Alice continued presentation in Marshallese.]

Buck: A question is asked, "what are these?" "How far down do these atoms go?" "In this picture, we have a picture, he says how far does that represent?"

Bill Robison: We find the radioactive atoms distributed through the soil column down to depths as far as 60 to 120 centimeters, but more of it is at the top and it gets less and less and less as you go down. But you do see it, it really, some of the activity that's in the surface soil, slowly makes its way all the way down to the ground water, the lens water.

[Alice continued presentation in Marshallese.]

Marshallese: We are asking about the fish you mentioned now, that there is not as much in the fish as in plants or in food-bearing plants. Have you studied the bones of the fish or are you talking about the flesh of the fish?

Robison: We have studied the flesh and the bones both but most of what we talked about is the flesh because that is the part that is consumed. (and) So in the reports we have published, however, there are data on the concentration of these radionuclides in the flesh, in the bones and in other organs of the fish.

Marshallese: The marrow of the fish bones! This is a custom, we enjoy that part of the fish very much. We don't restrict our intake of the fish to the flesh but, too, we suck the bones and the content of the bones. That is why I asked this question.

[Alice continued presentation in Marshallese.]

Buck: He is wondering if we can have just a brief recess.

TAPE 2, SIDE 2

[Alice continued presentation in Marshallese.]

Marshallese: Am I clear? Did I understand correctly that the cancer that occurs in a thyroid the disease that appears in a thyroid as cancer, ...Is the thyroid cancer a result of damaged cells?

Bair: Yes.

Marshallese: I wanted to know in the case of thyroid cancer if there are two individuals one of whom it is very probable that his cells were damaged by radiation and the other person they do not believe that that was a factor. In other words radiation-induced thyroid cancer as opposed to non-radiation-induced thyroid cancer; would the operation be different for these individuals? Would you handle the one different from the other in operating?

Bair: No. You would handle them both exactly the same and you would not know whether either one of them was caused by radiation.

Marshallese: They cannot find out by looking at the cell whether it was from radiation?

Bair: No. Cancer caused by radiation is exactly the same as cancer that occurs naturally.

Cowan: Can you through bioassay determine if there is abnormally high levels of iodine-131?

Bair: You could do that, yes.

Cowan: Well, wouldn't that be a probability?

Bair: That would increase the probability that it was caused by radiation but not assure that it was caused by radiation.

Cowan: But it would give a probability?

Bair: But it would increase the probability.

(Background conversation - Alice and other voices. Alice was trying to translate the above exchange into Marshallese.)

Bair: You won't find radioactive iodine in a cancerous thyroid because the thyroid, if cancer was caused by radiation, the thyroid would have had the iodine many years ago and now it is gone. You cannot look at a thyroid cancer and measure radio-iodine in it unless the person has received it recently. (and) If that is the case it was not caused, the tumor was not caused by radiation.

Phillip Muller: I have a question. I think I heard you clearly say that iodine is the cause of the thyroid, possibly caused by high iodine. You said that life span of iodine is relatively short. Do we have any explanation as to why some of these thyroid cases have taken long before they developed? For instance they didn't happen the same year that fallout took place but relatively sometime thereafter. Do you have an explanation?

Ray: That is the point Dr. Bair was making. Maybe you had better have your question translated first.

Ray: What we do know about the cause, about iodine-131 causing thyroid cancer is that it takes quite a long time for the cancer to appear after the radiation exposure occurs. We also know that the iodine-131 has a short enough half-life that if it caused the cancer in the thyroid, by the time the cancer shows up the iodine is no longer there. So the measurement that Suzanne is suggesting that might determine how much iodine is in the thyroid at the time the cancer is there has nothing to do with how the cancer was caused. Whether it is high or low, it has nothing to do with it because it wouldn't still be there if it had caused it.

[Alice continued presentation in Marshallese.]

Marshallese: I am asking about the last sentence of the paragraph that was just read, which is on page 26. In other words we are comparing populations now, if you compare the population of the Marshalls with the population of Yap, it's not greater in the Marshalls than in Yap?

Bair: What is not greater?

Buck: The number of birth defects that occurs in a given population.

Bair: The information that I have seen in a report that appeared in 1978, I think, did not show any difference in any of the territories in the trust territories, in any of the communities of the trust territories. You couldn't distinguish one from another in terms of birth defects, cancer, or other disease.

Buck: In micronesia your saying? Yes.

Bair: It was in the five-year health plan for the trust territories.

Marshallese: I have seen a report that indicates that there has been an increase in the number of defects since the bomb tests, and I don't see how

you can make a statement like this. If you go to the hospital you see that there are many such births now. Crippled births, that is little children and infants that have birth defects.

Bair: Are you sure that there are more than occur naturally? Because in any population almost 11% of live births result in some defect. That is more than 1 out of 10. That is a very high number.

Buck: Two people say yes, we have more incidences of this than before.

Marshallese: We feel that there has been an increase. We just see that there has been more and I just really doubt that you could really say that the Yapees have the same rate of birth defects as any other group of people or that the Marshalls have no more than other people. I really can't see how you can make a statement like that. Is it actually so?

Bair: That was the data in the report that I saw. I have not seen more recent data that would suggest otherwise.

Buck: That was in 1978?

Bair: I think it was 1978.

Buck: Why don't we make such a study so that we could have these figures and see if there has been an increase or not?

Bair: I assume that health data are being collected in the Marshall Islands and in the other territories. These data could be compared anytime.

Marshallese: Would it be good to include information like that in this booklet so that people from the outer atolls could have also had that information? That kind of report has not been included in here.

Bair: We don't have the information to put in the report like that.

Bair: And also it was not the subject of this report. This report is to deal only with the amount of radiation in the atolls of the Marshall Islands now and the possible health effects in the future.

Marshallese: We are talking about the future, whenever we speak about children being born we are thinking about the future generations, those that are going to be born. So it seems like this information is pretty pertinent and that kind of data probably should have been included in this.

Bair: Well we have addressed that in this book for the future in terms of the amount of radiation that the people will be exposed to if they live on the islands. We don't feel that the radiation levels on any of the islands in the Marshall Islands where people are living now is high enough that would cause any increase or any detectable increase in birth defects in the future.

Marshallese: I appreciate your answer but I feel that there are doctors that we can summon who would refute this and would say in the coming years there will be a great, a high increase number of children born with defects.

Bair: There are no data on any population in the world that has been exposed to radiation that shows an increase in birth defects. The survivors of the bombs, of the atomic bombs that were dropped on Japan have been studied for many years and there is no evidence of any birth defects in these people. No genetic effects have been observed. The only information that scientists have about birth defects comes from animal experiments. There are no human data that allows us to predict how many birth defects will occur as a result of parents receiving radiation.

Buck: You say that the human data has been studied and has not been determined. (They are laughing about the rats or the rodents.)

TAPE 2, SIDE 2

Bair: Also the Japanese survivors received much higher, much higher doses of radiation than anybody in the Marshall Islands. This was a very, this group of people that have been studied received a lot of radiation exposure and still there were no effects.

Marshallese: The Marshallese even though they were not where the bombs were exploded did have some eruptions on their skin from the bombs even though they weren't there and we have had doctors come from Japan who have testified that they do have birth defects as a result.

Bair: There are no data that support that. They are wrong if they say that is true.

Marshallese: I would like to ask if it would be possible for us to bring some slides tomorrow and view them like we are viewing these slides?

Bair: What kind of slides?

Buck: We will see tomorrow.

Bair: You mean here?

Buck: People here or slides here? Which here are you referring to?

Bair: I am talking about...are they photographs of people who were exposed to radiation here in the Marshall Islands?

Marshallese: Yes, pictures of Marshallese.

Ray: May I interject that tomorrow we are here at your disposal, Chief Secretary. We are prepared to answer questions, we are prepared to listen. If there is something that someone wants to bring to us we will be glad to

watch it. We have tomorrow available and then we must leave. We may still be going through this brochure to this booklet tomorrow, I think, if we don't go on. If I might say to Phil, I'm sure that there are lots of worthwhile, worthy health studies and other sorts of studies that could be done. Our purpose here is to report on a specific study which is complete, to give you the results of that study. We admit that it is narrow in scope. It doesn't deal with anything but what we have said. The condition of the selected atolls of the northern Marshalls at a particular time in 1978 and then some conclusions having to do with residents in those atolls. If we can get through with that then I think we can branch out on any subject that you want, provided we've satisfied the questions that go with this report.

TAPE 3, SIDE 1

[Alice continued presentation in Marshallese.]

Marshallese: I would like to ask if there was a difference between the types of bombs that were detonated in Japan and those that were tested in the Marshalls?

Ray: Yes they were...The bombs that were dropped over Japan were detonated in the air quite some distance above the earth. Those that were detonated at Enewetak and Bikini ranged from some that were underwater to some that were at great altitude much higher than those in Japan. They were at the full range of altitudes.

Buck: I would like to ask, I think the purpose of his question was were they different kinds of bombs and your response was as to where they were denotated.

Ray: I'm sorry. I thought he asked where they... Yes, there were a wide variety of bombs at Bikini and Enewetak, all different kinds of designs. There were two different kinds of design in Japan. The radiation from all of them was the same as is described here.

Buck: I am asking about the strength. Is one stronger, more powerful bomb than the others?

Ray: Yes, there were much stronger, more powerful bombs than in the late years at Bikini and Enewetak than any that we had ever used before. The strength of the radiation from any given element was the same no matter what the bomb source was.

Cowan: Are you saying that those are fission fragments and daughter products from the fission bomb?

Ray: Yes, of course. Well, there are fission products resulting from every bomb that we have tested.

Cowan: But you are saying that the radiation produced was the same for fission or fusion explosions?

Ray: For any given radionuclide the radiation coming from that material is the same no matter what the source of that material is. Does that answer your question?

Cowan: Not exactly. I'm looking at the fragments and the daughter products not being the same.

Ray: The fragments of, let's say, cesium-137 coming from a bomb that was fired over Nagasaki, Hiroshima, Bikini or Enewetak, that cesium-137 is the same. As it decays, it decays into the same family of end products or daughter products, and they have the same energy, they radiate with the same intensity.

Cowan: The same products were created in Nagasaki and Hiroshima as was created at Bikini and Enewetak?

Ray: Yes.

Buck: Is there more radiation in a place that has more bombs tested than a place that has fewer bombs? I suppose it compares between Nagasaki and Bikini or whatever?

Ray: Yes, as a general statement that is correct, yes.

(Oscar deBrum - comments to the Marshallese not translated.)

Oscar deBrum: What time tomorrow do you want to meet?

Ray: We are at your disposal.

Male Person: 6:30 or 7:00 a.m.?

deBrum: Seriously is 9:00 all right or 8:00? If you can be here in time we can be here. I doubt if all of you will be here. How about 9:00 or 10:00, all right? Okay, fine, they will be ready with some questions, and I hope you will have enough time to answer any questions that we have.

Ray: We are at your disposal.

deBrum: Can you stay until Monday?

Cowan: These people here represent various islands and atolls and they have to go back and explain to their people what you have explained to them. With their memory only. And I am asking if we may have the privilege of making a copy of your tape recording since we were not prepared to record this conversation, so that the representatives would have the benefit of this fine presentation as made by Alice to assist them.

Ray: Most assuredly.

deBrum: More than that, Suzanne. I have asked if we can televise this and they have agreed to it so that we can show it on the television so that they can see and hear the questions.

Ray: I have just one question, Mr. Secretary: "Where's the camera?"

deBrum: We don't have it yet, but by tomorrow morning, I hope. Question and answer period, I hope, it will be here.

Ray: I am not sure, Suzanne, I don't know if you were here when I said we do plan to visit the outer islands.

Cowan: I think the preparation that these people need, to make those for their presentation. Maybe Dr. Bair can assist them in making copies of tapes. Do you guys have, you have capabilities?

deBrum: Very fine. ... we'll make them available. ...

Ray: If you can copy it here, fine. If not we can send you a copy back.

Bair: I think I would rather do that at home.

[Alice continued presentation in Marshallese.]

Marshallese: Boy, I am really confused now with that statement that says because scientists feel that the amount of radiation present in the Marshalls now is not large enough to cause any of this kind of damage. How come some places are off limits? It sounds to me like the amount of radiation is not significant or small.

Ray: Where is the sentence that he is referring to?

Buck: The last sentence on 27. "Because the amounts of radiation are small in the Marshalls today scientists do not believe..." How can you say that it is small today?

Bair: Maybe I should explain a little bit more of what we know about the effects of radiation. First, the only reason, the only way we know that radiation can cause harm to people is because we have been able to study populations like the Japanese and a couple of other populations in the world that have been exposed to high doses of radiation. In those populations we have seen some effects such as cancer.

Bair: We also know from experiments that have been done with animals that if you give them large amounts of radiation you can cause cancers, you can cause birth defects.

Bair: One other thing. As I said before we have no evidence that if people who live in the Marshall Islands and received radiation at the levels that are there now that they would have any health effects, either cancers, or genetic effects or birth defects. There is no evidence that the people would be harmed. However, since we don't know for sure we believe that it is better to be safe and not let people go on to those places because,--I like to equate radiation in a sense with cigarette smoking. We know that if people smoke a lot of cigarettes they will get lung cancer or many of them will get lung cancer. We don't know how many they have to actually smoke before they, we don't know how many are safe; how many cigarettes people can smoke before harm will occur. It is very much like radiation. We don't really know how much radiation people can receive before they might increase the risk so that they would have some harm such as cancer or birth defects. So we believe that people should minimize the amount of radiation that they receive. (To Alice: Is that too much?)

Marshallese: I feel my original question hasn't really been answered because though you say this, that the amount that is in the Marshalls is safe, yet an older lady that would come from an outer island and say why is it that I can't go to this particular island and the answer would be you should not because it might be harmful. So this seems to be contradictory.

Marshallese: So I am really, I am critical of this statement here that stated it is small in the Marshalls.

Bair: Is this the statement at the bottom of the page?

Buck: Yes.

Bair: That has to do with plants and animals.

Marshallese: Yes, you say it has to do with plants and animals and yet we are told not to eat the plants at certain places.

Bair: The plants may not be harmed because of the radioactive materials in the soil because plants are not very sensitive to radiation.

Marshallese: So, then we can't eat that though?

Bair: No. These same plants that will not be harmed because they are not sensitive to their radioactive materials that are taken from the soil still contain those radioactive materials and if people eat them those radioactive materials will enter their body and they might cause harm.

Marshallese: Why would it cause harm if you say it is a small amount? The small...

Bair: It may not cause harm but it may. (To Alice: What we would like to discuss is the risk, the probability of effects occurring but I don't know how to do that.)

Ray: Well, may I try something? The statement here with respect to plants says that the plant has not been injured. The plant is still a healthy plant. But it has taken up these materials from the soil and incorporated them in the edible part of the plant so that if you eat that fruit you now take in radioactive material. The plant still has not been harmed but it has carried the radioactive material to you. This is very much similar to ? . When the fish is not sick, the fish is fine, the poisoned fish. But when you eat him you become sick. It is the same thing. The fish is not harmed by being the carrier of this poison.

Marshallese: If the book is stating that there is a small amount of radiation in the Marshalls today how can you then say that that which enters the plant that you eat then can be a part of you?

Bair: A very small amount of radiation is not likely to cause harm but each amount more that you get increases the chances of getting some harm.

Buck: Well, so then this statement should say, "Yes, this is safe but if you keep eating and keep eating those things, then you should be concerned. It could exceed safe limits."

Bair: We don't think there is enough there to exceed... I don't want to use the word safe. Because it is not a very accurate word. (To Alice: I don't really know how to respond to that.)

Buck: I was thinking though that the book has said that you don't want to continue eating foods that have it in it.

Ray: I have got to try one more statement that might help. This statement that says the plants will only be harmed if they received an exceedingly large amount of radiation refers to what happens to the plant itself and the plant can receive an enormous amount of radiation and even to the point of being destroyed but that would not signify that if you then ate that plant you would receive the radiation. It is a different thing. There are

two different things we are talking about. Radiation that effects the plants and then goes on by and is not in the plant. There is not radioactive material in it to harm you, or radiation material, radioactive materials that are taken up in the plant which you eat. These are two different things. The statement here is the radiation levels which we have experienced in the Marshalls have never been seen to do damage to a plant.

deBrum: Exactly, Roger, this is the question that he is bringing up. It is a legitimate question.

Ray: Yes it is.

deBrum: Why is it that we are not recognizing it to be a dangerous level and yet it is restricted? Why? So that we can explain it to the people. Why can't you go there if it is safe as the book says. We find it difficult to explain it to women who want to go back to Bikini, women who want to go to certain islands, when you say, as the book, that it is safe?

Ray: The principal matter of concern for people going back to Bikini to live is what their diet will be. What they will eat? How much radioactive material will they take into their bodies?

deBrum: (not clear)

Ray: We are saying in the book that the plants would be harmed only if the radiation levels were higher. The plants themselves, not that the plants would be contaminated, but that they would be harmed. This simply says that the plant will come back. We know, we've seen that plants do grow. They flourish no matter what the levels of radiation is in the soils.

deBrum: My second question, (not clear) so that we can go on with this. Can we, can these people make a copy of this book to study and let their own scientists and analysts interpret as they see fit?

Ray: We have hundreds of copies of this. If more are needed, there will be more here.

[deBrum translated this into Marshallese.]

Ray: Your welcome to do any review.

Marshallese: We can proceed. I just have a concern with the fact that those present in the room aren't yet convinced that they understand this so it is difficult for them to try to relay it on and explain it to their population. Of course, we can proceed and go forward even though we don't understand it yet.

Ray: Those things that turn out still to be not well understood, I hope will be brought up tomorrow.

Marshallese: Do you believe that roosters can lay eggs?

Buck: (Is that it?)

Marshallese: I just want to ask this question of you, can a rooster, is it possible for a rooster to lay an egg? (Buck: and I'm not sure about the rest of it.) Oh, is it a problem for a breadfruit that usually does not have a nut, to bear a nut?

Muller: I guess what he is leading up to, is that we have those things happening.

(Laughter.)

Ray: We'd like to get some samples of these breadfruit.

Buck: Maybe we are getting worn out by this sort of thing. It is time to go...

Male Person: How much more have we got to cover?

Buck: We are ready to start Chapter 5 and Chapter 6 before the maps. We weren't going to go on to each individual map.

[Alice continued presentation in Marshallese.]

TAPE 3, SIDE 2

Marshallese: I am asking about cancer and birth defects, but primarily about cancer. How many cancers have appeared in the Rongelap population since the time of the testing of the bombs?

Bair: I don't know.

Marshallese: So, what is the meaning of 0.1?

Bair: That means that if people, that if people receiving radiation during the next 30 years, not in the past, but during the next 30 years, we would..., if they receive radiation on Rongelap for the next 30 years, we would not really expect any cancers to be caused by the radiation. But we are not saying there isn't a chance that there might be one. The risk is, I don't know how to...

Bair: One possible way; if there were 10 times as many people on Rongelap, if there were 2,000 people today and they lived and had children for the next 30 years, then there might be one person (receiving) having cancer caused by radiation. There might be.

Marshallese: If your figures here reflected the period from the time that the bombs were tested for a 30 year period, would you be able to make an estimate in figures that way?

Bair: If I knew the radiation doses, if I knew how much radiation people received, yes. But I don't know how much radiation people received.

Marshallese: Could you refer to the report of all the teams that have come and visited us and taken samples and examined us and gathered data? Could you not look at that? We have been visited.

Bair: It might be possible to estimate how many but it would be very difficult because you also have to know how much food people ate during that period of time. I have no way of knowing.

Cowan: You make assumptions based upon MLSC and the Battelle Northwest diet to make these projections. Couldn't you use the same diet as the basis to make projections based on data (unclear)?

Bair: It is not a Battelle diet it is Brookhaven diet.

Cowan: Okay, whatever diet, you had to use some basis of food intake to make these projections?

Bair: You could do that.

Marshallese from Rongelap: I think that we have had a lots of data gathered in our population at Rongelap and if you went to the labs in Seattle and looked into this, probably that could be determined.

Bair: I think Brookhaven is making a determination on the thyroid; the radiation, the amount of radiation the thyroid(s) of the people have received. I don't think their report is finished yet.

Marshallese: I'm just wondering. As we've already asked, seriously I wish that you could tell how many people might have died from cancer from the time of the testing until now rather than this figure which projects into the future.

Ray: I think the answer, an answer to that question is, yes, a study could be done. Our data and amount of information that we would have about those earlier days would not be nearly as complete as what we have now from the 1978 time. Nevertheless some estimate could be made. That estimate still would only be able to indicate the likelihood that, of those people who have died of radiation relateable diseases, some number might be attributable to the radiation.

Marshallese: I feel that this whole book is affecting or applicable to the coming generation, the young children, because in the next 30 years my age group and older will be gone. So this isn't really a report for us, it is maybe a report for them rather than us. And, also, that I detect that the results of the information in this book is reporting a time that has much less damaging effects, in fact, it almost looks rather clean in comparison to the number of years which are not included in this book. And, so from my point of view, I don't know that this is..., I would much prefer a book that gave the entire picture rather than half the picture and the better half at that. In fact I hesitate to go forward and say much about this book.

Ray: Well, I would just like to say again, the purpose of this book, that purpose was to provide a basis for informed decisions about future actions. That's the sole purpose of the survey, to determine whether there should be recommendations made for future actions that would protect people in the event that we found radiation levels that were of concern. That was the commitment that we made some time ago, for this particular purpose. This is not the whole story, you are absolutely right. (and) There are many reports published that deal with the past. Those are available and as I have said earlier, if there are specific questions I am sure that we would be willing to help with converting those, translating those, into your language so that they are understandable. That wasn't the purpose of this survey. It was to guide future actions.

TAPE 4 SIDE 1

Buck: They are addressing what the book is actually stating.

Marshallese: If I and my family live at Rongelap on one of these islands that has this largest amount of radioactivity, will myself or my family be affected, or have something happen to us, to our health, as a result of our living there in the coming 30 years? On one of those islands at Rongelap?

(Bair to Ray: The higher...?)

(Ray: Yeh, Naen, Melu, ...)

Bair: If they lived on one of the other islands they would receive radiation, an amount of radiation I think about 5 times or 6 times more than living on this island. And the risk would be...

Buck: Other atolls?

Bair: No, no. Other islands.

Robison: Yeh.

Ray: Naen as opposed to Rongelap island.

Bair: The Northern Islands of Rongelap vs Rongelap island, itself.

Buck: Did he ask about Naen?

Bair: Yes.

Buck: Did he ask about Naen or did he ask about an island with a high...? And I thought you were saying that other...

Bair: The higher one on the Rongelap which is Naen, it's in the north. The radiation dose, the amount of radiation they would get if they lived there, would be about 6 times more than if they lived on this, on Rongelap island. And the risk of having a health effect would be 6 times higher. (To Alice: How do you plan to translate that?)

(Alice to DOE Representatives: I am not sure how...)

Cowan: Does that mean that you could take 6 times that and that 3½ people would die of cancer in the next 3 years due to the radiation?

Bair: That is the upper estimate, the highest risk estimate that people would, that scientists would support.

Buck: This wouldn't be multiplied by 6. This is the high?

Bair: No, no. If they received 6 times as much radiation, than this risk number would be higher. It would be 0.6 to 3.6.

Ray: That would be for the entire population (of 233) living on and subsisting on Naen. Out of the 233...

Cowan: Can I use, ask what growth rate you used?

Bair: We assumed that the population would increase by a factor of 3.

Cowan: 3% per annum?

Bair: No, three times in 30 years, and it is based on the past increases in the Marshall Islands.

Robison: But that again, it is important to understand that, if you talk about Naen and the number 6 times greater than Rongelap, that's assuming that they live there full time and eat all their food from there.

Ray: Out of the entire population which would grow to 750 in that time, there would be statistically about 3.

Buck: Okay, I thought these figures were for the whole atoll of Rongelap?

Bair: That's just for Rongelap island.

Buck: Just for Rongelap. And, so the...Island?

Bair: That's what it says in the text.

Cowan: If people go to Naen from Rongelap?

Buck: Oh, I see. Eneaetok and Rongelap, Eneaetok and Rongelap are these figures. And now they are asking about Naen. Right. I was confused. Okay.

Bair: Really 5 times; it should be 3, 0.5 to 3 additional cancer deaths.

Marshallese: How many, what other island in Rongelap besides Naen have that same dose?

Robison: I think Naen is the highest, as I recall. And Melu is, I think, next. Let me just very quickly look here.

Buck: Alright...(background discussion.)

Buck: Oh, Melu? (background discussion.)

Buck: Jorkan? He is asking about Jorkan.

Robison: Oh, let me see. Naen is the highest, Kopale, or however you pronounce that, is next and then Eneaetok and Melu.

Ray: He was asking about Jorkan. Do you have it?

Robison: We, no we don't have it. (background discussion) We didn't calculate the dose for that.

Buck: Jorkan is down from Melu, two islands.

Robison: Yeh, the only thing. Let me look. We didn't calculate a dose for that island because that was never given to us as one of the residence islands. So I am trying to find here...if we even have... I don't even have that name. (Background discussion: No, you didn't do that one. You did Melu.) We have no data on that one. Except we have the external gamma data, which I can easily tell, it's it's like Melu, but I would have to look at that data first.

Marshallese: The northern part of Rongelap is the place that they gather a lot of their protein sources, you know, meats from animals. (Alice: You say what?) Pigs, crabs, birds. Even though they don't live there they like to go and gather these kinds of things from there.

Buck: Okay, let's have the slides that show these comparisons. And maybe that's sort of a good summary. I'm not sure we were going to pass these papers out.

[Alice continued presentation in Marshallese.]

Marshallese: Do you have a safety standard then for these? Where does the standard come with reference to these figures?

Bair: One comparison is that people in the U.S. who just get radiation from background would get about 2500 in 30 years. Which is the number right there.

Buck: For any part of the body?

Bair: Yeh, all parts of the body.

(Background discussion regarding average background dose in U.S., "Dose at Denver is higher.")

[Alice continued presentation in Marshallese.]

Buck: Is there anything higher than 0.2? This graph shows that 0.6.

Marshallese: This information is not in this book.

Ray: It is but it is not tabulated.

Buck: Oh. Yes. It is on each page.

Ray: I have copies of this tabulation if anyone would like to have a copy.

deBrum: Thank you.

Buck: They say they will save their questions for tomorrow. Further questions?

Ray: 7:00 tomorrow?

deBrum: 7:00? I don't know. No one, will be here, I don't think.

deBrum: How about 9:00?

(Background discussion - agreement on 9:00).

Male Person: 9:00 tomorrow.