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TAB

A

Mr. YATES. Were the Bikini people under Federal radiation standards?

Mr. DEAL. They were but the radiation dose from intake of food had begun to rise.

Mr. YATES. Did any go over the top?

Mr. DEAL. None of the people have gone over the top as far as the cesium levels. They are very close to the maximum allowable dose from the maximum of permissible amounts of cesium.

Mr. YATES. Are the people living in the houses along the road?

Mr. DEAL. Yes, and they are getting the radioactivity in their bodies from their diet, from eating the locally grown foods.

In retrospect, this is probably the big mistake made in the beginning of the resettlement program in that we made recommendations which turned out to be impractical in the sense that to have garden growing but then tell the people not to eat the products.

Mr. YATES. Was he told to grow his garden and eat that food? Was he told that he could do that?

Mr. DEAL. The original recommendations prohibited eating certain of the local foods.

Mr. YATES. This is right. But I think I read here the houses were built on pads of coral and that they were told not to eat the coconut crab. You say you brought in outside foods at the initial stages.

Was this to cut down on the possible intake of radiation residuals? Did you bring in outside food from the start?

Mr. DEAL. Yes, sir.

CURRENT FEEDING PROGRAM ON BIKINI ISLANDS

Mr. YATES. I guess outside food is still being brought in.

Mr. DEYOUNG. It was not until early last year, Mr. Chairman, that the tree crops and some of the other vegetable crops began to become fully productive. So up until 1977 they had been existing primarily on food products that were brought in from the outside. Some of these were surplus agricultural commodity foods plus the local marine food which had been certified to be suitable.

MONITORING OF BIKINI ISLAND

Mr. YATES. When did they get the cesium then?

Mr. DEYOUNG. As Mr. Deal indicated, when this high level of cesium was revealed, a series of analyses were carried out.

Mr. YATES. When was it revealed?

Mr. DEYOUNG. in 1976.

Mr. YATES. Then the Department—were you still the AEC in 1976?

Mr. DEAL. We were ERDA in 1976.

Mr. YATES. So you became a little more alarmed than when you were the Atomic Energy Commission. In '76 you first encountered this kind of a test. Is this an annual test that you had been making of the people?

Mr. DEAL. Yes sir.

Mr. YATES. What kind of tests, monthly, semiannually, every four months, or what?

Mr. DEAL. I can supply you a statement for the record. I will give you some information and we will supply a summary.
[The information follows:]

Chronology of Radiological Surveys—Bikini Atoll

Year and type of survey.	*Findings*
August 1964: Early radiobiological survey of Bikini and Enewetak Atolls conducted by the University of Washington for AEC. Measurements and sampling were directed toward external radiation, soils, plants, water, and fish.	Photographed and identified organisms on reefs and islands. No gross anomalies seen in plants and animals due to radioactivity. See UWFL-68.
April 1967: Survey to fill in gaps in data in order that dose estimates can be made for Bikini Atoll residents. Team led by University of Washington. External radiation measurement by the AEC Health and Safety Laboratory, HASL.	Major contributor to total exposure on Bikini and Eneu Islands is Cs-137. Levels vary considerably from island to island in the Atoll. See HASL-190.
February 1969. Survey work done concurrently with cleanup operations by University of Washington scientists for AEC, and by scientists of the Western Environmental Research Laboratory of the Environmental Protection Agency, EPA, under a memorandum of understanding with AEC.	Confirm earlier survey results for external radiation. Cs-137 and Sr-90 predominate in terrestrial organisms. Co-60 and Fe-55 in marine organisms. See NVO-269-6.
June 1970: Team led by University of Washington with participation by Staff of the Public Health Service and AEC. Collection of the first air samples. Also collected soils, plants, animals and made additional external radiation measurements.	Confirm earlier survey results. Levels of Pu in air are two orders of magnitude below FRC guides. See SWRL-111r.
May 1972: Followup survey conducted after coconuts planted on Bikini and [illegible] housing construction started on Bikini Island. Team led by University of Washington with participation by scientists from the Western Environmental Research Laboratory, EPA, and AEC. Team performed air sampling, collected soils, plants, animals, and made external radiation measurements.	Radionuclide levels slowly decreasing. Earlier estimates confirmed by these data.
April 1974: Followup survey of numerous Atolls, including Bikini, conducted jointly by staff of University of Washington and Brookhaven National Laboratory for the AEC. The survey team collected samples of soils, plants, animals, ground water, and made external radiation measurements.	See BNL 50474 and NVO-269-32[1].
[illegible]: Survey of numerous [illegible] conducted jointly by University of Washington and Brookhaven National Laboratory for the AEC. Samples of soil and food collected along with external radiation measurements.	See NVO-269-32[1] and BNL 50796 in press.

April 1975: Preliminary survey of Bikini and Eneu Islands conducted jointly by University of Washington and Brookhaven National Laboratory for ERDA. Screening survey of external radiation levels and collection of some soil and vegetation samples in preparation for a major survey later this year.	See NVO-269-32[1] and BNL 50796
June 1975: A major fine grid survey of Bikini and Eneu Island external radiation levels was conducted by Lawrence Livermore Laboratory for ERDA with participation by scientists from EPA, University of Washington, Brookhaven National Laboratory, and ERDA. Also samples of soil, plants, animals, and cistern and ground water were collected.	Exposure rates on Bikini Island highly variable. Eneu Island dose rates lower than Bikini. cistern water on both islands is acceptable for drinking. Some well water acceptable, other wells unacceptable for drinking. See UCRL-51871, 51879 Rev. 1, 51913 Pt. 1, 52176, 51879 Part 2, 51879 Part 3, 51879 Pt. 5, NVO-269-32[1] and BNL 50796
April 1976: A survey of external radiation levels on Nam Island, the 3d largest island at Bikini Atoll, conducted by Brookhaven National Laboratory for ERDA.	To be published.
September 1976: Conduct of a joint survey of 5 Atolls including Bikini by University of Washington and Brookhaven National Laboratory for ERDA. Surveyed external radiation levels and collected environmental samples.	To be published.
April 1977: Site visits by Brookhaven National Laboratory to plan installation of windmill powered air sampling stations. Bikini Atoll one of four sites for long-term air sampling. Work supported by ERDA.	Site identified, agreement obtained.
October 1977: Brookhaven National Laboratory installed wind-powered long-term air sampling station on Bikini Island. Work supported by DOE.	Data not yet available.

In vivo Counting and Urine Bioassay Sampling—Bikini Atoll

Year	Sampling/Counting[2]
1970[3]: Pooled urine collected, analyzed for Sr-90, Cs-137, and Pu-239.	
1971[3]: Pooled urine collected, analyzed for Sr-90, Cs-137, and Pu-239, 240.	
1972[3]: Pooled urine collected. Cs-137 concentration shows factor of 4 increase over 1970. Sr-90 increase is factor of 2.	
1973[3]: Cs-137 in urine higher than 1970 by factor of about 10. Sr-90 increase is factor of 4.	
April 1974[4]: First in vivo counting of Cs-137 in Bikini residents. Cs-137 urine values about same as 1973. Sr-90 levels down near 1970 values. Pu-239, 240 higher than 1971 by factor of about 5[5]	
April 1975: Pu-239, 240 higher than 1971 by factor of 10.[6]	
Fall 1976: Pu-239, 240 higher than 1971 by factor of 2.[7] Cs-137 urine values	

[1] Results from several surveys published in one report. Sr-90 and Cs-137 are dominant in the terrestrial environment. Co-60 and Fe-55 in marine environment, and Am-241 and Pu-239, 240 are important in soils. Radioactivity on Bikini Atoll has declined significantly [illegible]

[2] Sampling sec. different individuals at different times as people come and go at Bikini Island

[3] See BNL 50424, Sept 1975.

[4] These results suspect, samples may have been contaminated, error in measurement is ≥100 o/o

higher than 1970 by factor of about 20. Sr-90 higher by factor of about 5. Memo Conard to Liverman, May 11, 1977.
May 1977. Second in vivo counting of Bikini residents. Collection of large volumes urine samples results suspect. The average Cs-137 burden for 22 individuals in 1977 is 10 times the average for 8 individuals in 1974. Two individuals had body burdens of Cs-137 of 35 nCi/kg which is very near the maximum permissible burden of 43 nCi/kg. Memo Conard to Liverman, May 11, 1977.
October 1977: Large volumes urine samples collected under controlled conditions to avoid cross contamination. Results to be available in May 1978.

Mr. DEAL. We made resurveys of the Bikini environment, including soil and groundwaters in 1969, 1970 and 1972. Annual collection of urine samples for radiation analysis began in 1970, and with those people who were working for the agricultural and housing projects.

Mr. YATES. Are these only Bikinians?

Mr. DEAL. Yes, sir.

Mr. YATES. Did you have non-Bikinians working for them at that time?

Mr. DEAL. I can't answer that, sir.

Mr. DEYOUNG. It is my understanding that there were other Marshallese in the work force who were not from Bikini.

Mr. YATES. You examined them as well. Were they examined through that time?

Mr. DEYOUNG. Yes, as long as they were on the island.

Mr. YATES. Go ahead.

Mr. DEAL. We later included collections from the people who had returned to living in the houses: monitoring the Bikini residents was done by whole body counts in 1974 and 1977.

Mr. YATES. What is a whole body count?

Mr. DEAL. That is a very sophisticated counting system where you essentially sit in a chair and where you have a counter that detects radiation from the cesium that has been taken up in the body. It actually counts the body's burden of cesium.

Mr. YATES. Is that the same strontium?

Mr. DEAL. They travel together in the body. You can see that the strontium is——

Mr. YATES. These are like the heavenly twins.

Mr. DEAL. You can measure the strontium with urine samples, but we have not been able to see much of that in the urine samples available to date. They do the whole body counting sample for cesium.

We had a major resurvey of Bikini and Eneu Islands in 1975.

RESULTS OF THE 1975 RADIATION SURVEY

Mr. YATES. Until '75 you found nothing. What did your tests show?

Mr. DEAL. That is when we began to see the rise in the cesium.

Mr. YATES. Will you place in the record a statement representing the levels you found?

[The information follows:]

MEAN CESIUM-137 LEVELS OBTAINED BY WHOLE BODY COUNTING - 1974*

	MALES			FEMALES		
	No.	μCi**	nCi/kg body wt.***	No.	μCi	nCi/kg body wt.***
Bikini	8	.128	1.84 (0.43-5.11)	13	.073	1.15 (0.22-3.26)
Utirik	9	.262	4.05 (2.64-6.84)	13	.133	2.13 (0.96-3.85)
Rongelap	22	.475	7.76 (4.37-16.3)	24	.304	5.13 (2.71-13.46)
BNL med. team	4	.003	0.0352 (0.0134-.0791)			

*Reference - BNL50424, "A Twenty-Year Review of Medical Findings in a Marshallese Population Accidentally Exposed to Radioactive Fallout," Conard, September 1975.

**Microcuries

***MPC 43 nanocuries per kilogram

MEAN CESIUM-137 BODY BURDENS IN ADULT MARSHALLESE - 1977*

	MALES			FEMALES		
	No.	μCi**	nCi/Kg Body Wt***	No.	μCi	nCi/Kg Body Wt
Rongelap	34	0.296 ±0.11**** (0.113-0.680)*****	5.04 ±1.97	20	0.162 ±0.055 (0.097-0.278)	3.13 ±1.1
Utirik	27	0.119 ±.048 (0.050-0.215)	1.79 ±0.77	21	0.0781 ±0.032 (0.038-0.131)	1.29 ±0.58
Bikini	22	1.301 ±0.73 (0.568-3.232)	19.1 ±10.6	20	0.926 ±0.47 (0.534-2.234)	14.8 ±6.3
Medical Team	7	.00154 ±0.00052 (.00105-.00216)	.0195 ±0.006			

*Reference memo Conard, BNL, to Liverman, May 11, 1977
**Microcuries
***Nanocuries per kilogram of body weight
****Standard deviation
*****Range

MEAN CESIUM-137 BODY BURDENS IN MARSHALLESE CHILDREN - 1977*

	MALES			FEMALES		
	No.	μCi**	nCi/Kg Body Wt***	No.	μCi	nCi/Kg Body Wt
Rongelap	5	0.217 ±0.044**** (0.168-0.246)*****	7.65 ±1.21	5	0.265 ±0.092 (0.154-0.396)	5.97 ±2.1
Utirik	5	0.0663 ±0.018 (0.049-0.091)	2.22 ±0.66	5	0.0843 ±0.024 (0.051-0.108)	2.84 ±1.1
Bikini	3	1.04 ±0.26 (0.824-1.331)	32.3 ±7.6	3	0.861 ±0.29 (0.706-1.196)	22.3 ±15.3

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*Reference memo Conard, BNL, to Liverman, May 11, 1977
**Microcuries
***Nanocuries per kilogram of body weight
****Standard deviation
*****Range

Mr. YATES. Then in '75 all of a sudden now that you are ERDA you find the rise.

Mr. DEAL. In '75 we were asked by the Department of Interior for advice on building additional houses in the interior of Bikini Island.

It was at that time we mounted a rather large survey effort which included a lot of people going out and walking around the island with instruments. We have very large surveys done at that time with 30 or 40 people going out and making measurements of the soil, water samples, vegetation samples, and measuring the external radioactivity.

Mr. YATES. Were these tests being taken prior to 1975 as well?

Mr. DEAL. Yes. But not anywhere near the scale we did this time. We concentrated on Bikini Island. It is precisely for this reason we want to have an aerial survey because we can cover much more territory and much faster and we can see the same levels.

When you have a person walking around, it takes more time.

Mr. DUNCAN. I understood you to say that this rise in the level of measurements of strontium began in '75 and that your preliminary analysis indicates that it is coming from the food source and that that food source began to mature last year.

How can we measure the increase in '75 when you say that it is coming from the food if the food wasn't being produced until '77?

Mr. DEAL. That is a very good question.

Mr. McCRAW has done a lot of those surveys.

Mr. McCRAW. When the people first returned, there were few if any terrestrial food items grown in Bikini Island soil, and available for their use. There are some things that grow wild. There were a few coconuts and arrowroot. There was a significant planting of coconut trees during the agricultural rehabilitation effort.

Mr. DUNCAN. Those were the ones that began maturing in '76? Am I not correct? We are in '78, so last year would have been '77. But now he is saying that the planting began to mature and it was '76, so we are narrowing the gap.

Mr. DEYOUNG. It started in '76.

Mr. DUNCAN. It could be coconut or arrowroot that was being consumed prior to '76. You began to notice a rise in the levels of cesium and that those levels have risen more rapidly since the domesticated plants matured and were consumed by the inhabitants.

Mr. McCRAW. We were initially using a predictive capability for a number of items in the diet that are now growing in the atoll. All we could do at first was sample the soil and try to predict the levels in food.

Mr. YATES. Where were they coming from? You said a number of items were not being grown.

Mr. McCRAW. A number of items of the normal diet were not locally available when the people first went back. Those things have subsequently become available and we are seeing an increase in availability, an increase in uptake, and you can't see at what exact point in time things occurred.

Mr. DUNCAN. Is there a level of sophistication to measure this that has been increasing? So we might attribute the greater levels to a greater ability to measure what was there all along?

Yes, I measure it easily. You can always measure if [illegible] samples of soil and vegetation and went through a very costly

laboratory procedure. But now we can do the same thing with instruments that are stationary.

CURRENT METHODS OF MONITORING

Mr. DUNCAN. What about the measurement of the levels of cesium in the body of the Bikinians? Is that increasing in sophistication so that your measures can detect levels that were previously undetectable?

Mr. DEAL. Let me answer that a little differently. Several years ago no one would have thought you could take a whole body counter into the field. Now it is engineered to be taken out into the field.

Mr. DUNCAN. You did early in 1975. But your first whole body count began in——

Mr. MCCRAW. 74.

Mr. YATES. Is that when you first detected the increase?

Mr. MCCRAW. That is the first measurement of cesium in people. We had predicted what the levels would be.

Mr. DUNCAN. Were your measurements in accordance with the prediction?

Mr. MCCRAW. Yes. All of the surveys that we have done have tended to support the earlier findings. We have gotten a better body of data and more confidence in the radiation doses we are predicting, and we are looking at the actual items of the diet and do not have to rely on estimates of radioactivity in the foods that the people are eating.

Mr. DUNCAN. But your whole body counts in 74 were not alarming. It wasn't until you went back in 75 with your major resurvey that you saw the rise begin?

Mr. MCCRAW. In 1975 we began to predict higher doses on the basis of samples we had collected. In 1977 when the second whole body count was done the levels were a factor of ten higher than in 1974.

FEDERAL STANDARDS AND CURRENT BIKINI LEVELS

Mr. YATES. Above the Federal standards?

Mr. MCCRAW. If I might explain about the standards. There are two numbers. One is for the local population. The other is for an individual where you know the individual's exposure. We have not exceeded that individual number. We have seen levels approaching this lower number for the general population. We feel that we can use the higher number or the standard because we are actually measuring the levels of radioactivity in individuals in the population. We know the distribution. We know the highs and we know the lows.

Mr. YATES. Who is to say that the Federal standards are accurate? How do you know the Federal standards are acceptable?

Mr. DEAL. We don't.

Mr. YATES. Why do you establish standards and say if you come to the standard everything is fine, and if you go above this standard it is ... fine. How do you know the Federal standards are not carcinogenic?

Mr. DEAL. I think in the radiation protection field that we are concerned with we have another philosophy which is the lowest practicable solution to a problem and it is believed that the people who work with radiation will not receive——

Mr. DUNCAN. If we gave a whole body count to Mr. Yates right now, would your sophisticated measurements show some level of cesium in him?

Mr. MCCRAW. Yes.

Mr. DUNCAN. Do you have any way of knowing that he will not get cancer?

Mr. MCCRAW. No.

Mr. DUNCAN. That is all I have. I have to go to another committee. I just wanted to worry you.

Mr. YATES. Wait one half minute for my question.

Getting back to my comment about the Federal standards, my son was treated for a tonsil disease in 1944 by then applicable medical standards. He was given radiation in the treatment of his tonsils. Everyone thought it was great. It was a common medical practice. Thousands of young people were having their tonsils removed or shriveled as a result of this treatment. He, like all the others of that age group, are now threatened with cancer because of having been irradiated 25 years ago. So now these people—I assume the radiation he received may have been comparable to the ingestion of cesium or strontium.

The thought occurs to me, and I talked to the cancer specialists at NCI in connection with some of the herbicides and additions to food, and they say amounts really don't mean very much at any particular time. The question is what will be the effect 25 years from now as a different kind of stimulant or carcinogenic material is brought to bear on the body.

So getting back to the question of Federal standards, five years from now you might decide in the new Department of Energy that the levels you established are much too high and that you should establish lower standards because you have, as Mr. Duncan pointed out, more sophisticated equipment.

Mr. MCCRAW. It is not a problem of being able to measure the dose level. It is knowing the effect.

Mr. YATES. You might go now.

Mr. DUNCAN. It is a question of exercising our best judgment. I would suggest that five years from now you might even be able to sustain even lower levels.

Mr. MCCRAW. We are looking at 30 year standards, to keep the dose down for a long period of time. We are trying to keep the dose in a year below the annual standards, and all the 30 year doses below the 30 year standard.

SAFETY OF BIKINIANS UNDER PRESENT CONDITIONS

Mr. YATES. That brings us to the question at hand. What are you going to do? You have the level of cesium and strontium in the Bikinians rising over the years. They are still on their island.

Have you told them to get off? For your own good, you ought to move!

Mr. DEAL. Mr. Chairman, I don't know that anyone thinks that this is a life threatening situation at this time.

Mr. YATES. Really?

Mr. DEAL. It is the kind of thing that if you let it continue over a long period of time then it would begin to be of hazard to their health.

Mr. YATES. What happened to Mr. Pincus' article on March 19th where he says—the article is titled, "U.S. Erred on the Safety of Return to Bikini Island."

Nine years ago the U.S. Government told the Bikini Islanders it was safe to return to their atoll, once the site of nuclear weapons tests in the Pacific. Some of the islanders went home. But now the government has found that it was wrong. According to tests last year the groundwater in Bikini is still too radioactive for human consumption. So are the coconuts and fruits and vegetables grown in the still contaminated soil. So the Interior Department has very quietly asked Congress for $15 million to move the islanders to another location.

Why are you asking for more money if it is safe? Is it safe? Safe is a relative term, isn't it?

Mr. DEAL. Yes, it is. If it was practicable for the people to only eat outside food and maybe have to drink outside water, then we think that goes within the Federal standards, and that is the only guideline we have to go with.

Since that is not a practical solution and we do see a rise in the cesium in the whole body counting, we believe that they should not be allowed to eat the food on the island, and it is probably not a practical situation. Any additional resettlement should be on Eneu Island where they can have their schools and other facilities. That is the direction they should move and not try to do that on Bikini Island.

Mr. YATES. Should they stay there is the question. Who is exercising the judgment on whether they should stay there? Haven't the levels been increasing? Our friend has said they are almost up to the top of the Federal standards. If they stay there, won't they go over the top?

Mr. DEAL. The whole question is, if they were to not eat the locally grown foods on Bikini Island, would the radiation dose from cesium go down?

Mr. YATES. What will you do, bring in box lunches?

Mr. DEAL. That is the impractical part of the solution.

CURRENT FEEDING PROGRAM ON BIKINI

Mr. WINKEL. If I might speak to this part of the discussion, because it brings in the present time period. What is being discussed illustrates, as you have pointed out, one of the difficulties of administration. Decisions must be based on available information. Our decisions have to be based on the information which you have been given, which I also have been given, by representatives of the Department of Energy that local conditions would be safe if ample outside food supplies were provided for the people on the island. In addition, we provided equipment for fishing in the lagoon. The outside food is sent in on a regular basis. These food supplies, while not attractive in all respects from the point of view of the normal diet, because some USDA preserved foods are included, provide a food standard which is in terms of nutrition far above the average as far as diet in the Trust Territory is concerned.

Mr. YATES. What does that mean? You deliver K rations to them? What kind of food are you talking about?

Mr. WINKEL. Dried foods, fresh fruits and vegetables from Ponape, as varied a diet as far as protein, starch, carbohydrates is concerned. It is prepared by nutritionists.

Mr. DEAL. I don't know why they don't count the children. It may be a question of sitting still.

Mr. YATES. Why is that?

Mr. DE YOUNG. I am informed by the medical authorities at Brookhaven, that the children under 5 are too small to be subjected to the whole body counts.

Mr. YATES. Why?

Mr. DE YOUNG. I don't know whether it is the size of the child or whether the measurement itself might have some effect on the child, but the whole body count is not given to children under 5 years.

Mr. YATES. Is there an application of some kind of radiation in the test itself?

Mr. DEAL. No, sir.

Mr. YATES. Then why don't they give it to the children?

Mr. DE YOUNG. Dr. Weyzen from D.O.E. is here.

Mr. DEAL. This is Dr. Weyzen from our medical group.

Dr. WEYZEN. There are two problems. One involves lying still for about 20 minutes. I think that is a problem with [illegible]. The more serious problem is the calibration of the instrument. It is [illegible] calibrated for small persons. You get an erroneous reading.

Mr. YATES. For all we know, the children may have been contaminated too?

Mr. DEAL. Yes, sir. If they have been drinking the coconut milk.

CAUSES OF RADIATION EFFECTS ON BIKINI ISLAND

Mr. DUNCAN. What account for the rather extreme variations, from 0.270 which is within your limits to 1.180?

Mr. DEAL. I am at a loss to answer that, Mr. Duncan, unless the possibility that some of them didn't eat as many coconuts or drink as much coconut milk. There could be some variations of some kind in their metabolism. I really don't know.

Mr. YATES. Does anybody know?

Mr. MCCRAW. Yes, I know. Basically two things account for the variation. One is just how much of the various locally grown foods various individuals are eating. The other is that some of the people have been living on the island longer [illegible] evacuation did not return on leave to live on the island. [illegible] a few at a time over a period of several years.

Mr. YATES. Starting when?

Mr. MCCRAW. About 1972. I believe the earliest ones came in about 1972, so some people have been there 6 years, some 5 years, some have been there 1 year or less. The body burdens of cesium [illegible] as a function of time, so the individuals in the population that have been there the longest and have been eating the largest quantities, basically of cesium, have the highest burdens and are receiving the highest radiation exposure.

Mr. YATES. I have the impression that you told the committee that in 1977 you suggested to the people on the island they ought not to eat the food there, but that you would provide the food from outside sources. If that is true, why did the count nevertheless go up in 1978?

Mr. DEAL. We understand that they have been eating coconuts. I wasn't there so I am telling you what survey team members reported

to us. They said that the people have been eating some coconuts. They had a drought, and a shortage of fresh water, and they were drinking more of the coconut milk than they might ordinarily.

OUTSIDE FEEDING PROGRAM FOR BIKINI RESIDENTS

Mr. YATES. Did they eat the coconuts and did they drink the milk because you weren't providing them with adequate food and water?

Mr. DEAL. I will have to defer to our friends in Interior on what was provided.

Mr. YATES. Will somebody answer that? Who are his friends in Interior?

Mr. DEAL. I am not sure.

Mr. YATES. Apparently you don't have any friends.

Mr. DEAL. I was afraid of that.

Mr. YATES. Somebody ought to answer that question.

Were you on duty then, Mr. Winkel? When did you take office?

Mr. WINKEL. I took office in June of 1977.

Mr. YATES. Who did you have in charge of this operation?

Mr. WINKEL. I was in charge of the operation, and under me the District Administrator was in charge of the operation. The feeding program was initiated in October and November of 1977, and ample food supplies to provide a balanced diet were delivered, have been delivered. Nutritionists accompanying these supplies and staying with the people for a period of time to help them and assist them in the utilization of the food and so forth. We have no reason to believe the food was not consumed, inasmuch as there is no evidence of unconsumed quantities in any size at all.

Mr. YATES. What kind of food did you deliver to them? Did you also deliver water to them?

Mr. WINKEL. U.S. Department of Agriculture foods, and fresh foods from Ponape, and water was delivered. I do not know myself in what quantities.

Perhaps the District Administrator could respond to that, because he has accompanied one of the shipments in the first instance.

Mr. YATES. Let's hear from him.

What we are trying to find out is why they went back to the coconuts and the milk if they were warned against eating the coconuts and the milk.

Mr. O. DEBRUM. I am the Deputy Administrator of the Marshall Islands.

Coconut is something that the people can see. They will drink the milk. They do that even when we visit the island periodically. They offer us coconuts to drink, so as long as they have coconuts in their surroundings, I do believe that they will drink it.

Mr. YATES. Even in the face of warnings not to drink it?

Mr. O. DEBRUM. Yes, sir.

Mr. YATES. Then they continue to eat the coconut and drink the milk and eat the food that the government gives them.

Mr. O. DEBRUM. The last time I was there they were still eating the coconuts. They have been told not to eat them. To stop them from eating that, sir, we have to remove the people from the islands or cut down the total number of trees.

Mr. YATES. That is the only way you can do it.

DESIRE OF BIKINIANS TO REMAIN ON BIKINI ATOLL

Mr. YATES. Your letter indicates that the Bikinians want to stay on the atoll. Is that impossible?

Mrs. VAN CLEVE. In our judgment, it would be improper for them to remain because of the medical risks involved, and the Department of Energy agrees with that conclusion.

Accordingly, we mean to persist in our plans to relocate them, this in the interests of their physical safety. We recognize, of course, their preference to remain. That is why we have had this problem for some 30 years and if will continue for some decades hence. We are simply trying to meet it in the most reasonable way we know, recognizing the physical threats that exist if they remain on Bikini Island.

CAUSES OF RADIOACTIVITY ON BIKINI ATOLL

Mr. YATES. Let's look at it a minute before we go to the High Commissioner's statement.

The reason they cannot remain there is because of the radioactivity of the coconuts and water. It was the food, the intake, rather than the external causes that was the problem; is that correct?

Mrs. VAN CLEVE. I believe it is a combination of both.

Mr. YATES. That wasn't Mr. Deal's testimony the last time. As I remember his testimony the last time, it was internal causes rather than external causes; is that right, Mr. Deal?

Mr. DEAL. I think maybe both are right. The external radiation has to be considered. The internal is so high that it overshadows the external.

Mr. YATES. How potent is the external; and suppose you did not have the internal radiation? Would it be feasible for them to remain?

Mr. DEAL. The external radiation is about like Denver, Colo.

Mr. YATES. It would be as dangerous as Denver, Colo., is to those who live in Denver?

Mr. DEAL. Yes, sir.

Mr. YATES. They are not evacuating the city of Denver, are they?

Mr. DEAL. I hope not.

Mr. YATES. So, therefore, the amount of external radiation in the city of Denver is not considered sufficient for that city to be evacuated. I assume, therefore, that if that is the same condition on Bikini, the basic cause for your suggestion or your recommendation that Bikinians be evacuated is the ingestion of the food and the water; correct?

Mr. DEAL. Yes, sir.

Mr. YATES. Now if the Bikinians wanted to stay there, stay on their atoll, if they did not consume the water and the food that was there, I would deduce from what you say that it would be as dangerous for them to live on Kili or Jaluit or any one of the other islands as it [illegible] Bikini, right?

Mr. DEAL. Yes, sir, the other islands are quite——

Mr. YATES. That gets us to the basic question then: Can you feed them and give them water from other sources that would permit them to stay on Bikini so that they would not be taking in the radiated food and water?

Mr. DEAL. If you ask my opinion, Mr. Chairman, I have personally concluded that it is probably impractical to have people living in

an area where they are able to farm it and to take the water from the area. I think that is a practical situation.

CONTAMINATION OF FOOD SOURCES

Mr. YATES. Suppose you were to plant other coconut trees. How long does it take coconut trees to come?

Let's ask the next question. We talk as though coconuts were the only food there. Isn't there other food?

Mrs. VAN CLEVE. There is, indeed.

Mr. YATES. What other foods do they eat?

Mrs. VAN CLEVE. Breadfruit, papaya, sweet potatoes.

Mr. YATES. Are all of these contaminated?

Mrs. VAN CLEVE. All of these have turned out to be contaminated when grown in Bikini.

Mr. YATES. That is because of the soil being contaminated?

Mrs. VAN CLEVE. That is correct.

Mr. YATES. And the contamination in the soil is transferred to the food, and there is no way they can grow food without it being contaminated; is this correct?

Mr. DEAL. That is correct.

Mr. YATES. How much of a chore is it to bring food in from the outside? Suppose it were a barren atoll; they didn't have the opportunity to grow things.

Mrs. VAN CLEVE. I think it is entirely feasible to bring food in from the outside. What we believe, however, also to be true is that it is not feasible to expect the Islanders to live on an island and not eat the things that are growing there and not drink the water that is there. We could feed them entirely from outside sources, but we could not bar them effectively from eating local produce.

CONTAMINATION OF GROUND WATER

Mr. YATES. How do they get their water now? What is the water that is contaminated? Is it from wells?

Mrs. VAN CLEVE. It is a groundwater supply as I understand it, yes.

Mr. DEAL. My understanding is that there are some cisterns too, some runoff water from rain, but I think it is the wells too. They have to use the wells under certain conditions. There isn't enough cistern water.

Mr. YATES. There is not enough cistern water. The cistern water is not contaminated, is it?

Mr. DEAL. Not to any extent to cause them this kind of problem, sir.

Mr. YATES. And the well water is contaminated?

Mr. DEAL. Yes, sir, it is.

Mr. YATES. Is there any way of decontaminating the well water? Can you boil the contaminants out?

Mr. DEAL. No, sir. It would take a very sophisticated system of resins used in chemical processing to remove the radioactivity.

Mr. YATES. How difficult and how expensive is it?

Mr. DEAL. I really don't know. We have never looked at that problem, that I know of, except back during the fallout days there was a question about decontaminating milk, and there was some looking at

LOCAL FOODS BANNED IN 1974

Mr. YATES. We are now up to 1976. Let's go back to the interrogation on page 1171:

"Mr. YATES. Were you still the AEC in 1976?

"Mr. DEAL. We were ERDA in 1976.

"Mr. YATES. So you became a little more alarmed than when you were the Atomic Energy Commission. In 1976 you first encountered this kind of a test. Is this an annual test that you had been making of the people?"

Of course, in retrospect now my question is not correct, because you knew about it in 1974. You knew about the water certainly in 1974. In 1976 the coconuts were first becoming ripe. Mr. deBrum, together with the Bikinians, was eating the coconuts. But you were not drinking the water?

Mr. DEBRUM. Not the well water.

Mr. YATES. Were you eating the pandanus in 1976?

Mr. DEBRUM. Some people ate them.

Mr. YATES. They ate the pandanus. What else was growing there?

Mr. DEBRUM. Papaya was growing on the island.

Mr. YATES. Papaya. Anything else?

Mr. DEBRUM. Pumpkins.

Mr. YATES. Pumpkins?

Mr. DEBRUM. Yes.

Mr. YATES. And people were eating all of these things, all the vegetables?

Mr. DEBRUM. We had indication that some of them admitted they ate them, sir.

Mr. YATES. They ate them?

Mr. DEBRUM. Yes.

Mr. YATES. And were you told you were not to eat them?

Mr. DEBRUM. They were told that it was questionable, sir, and not to eat them.

INITIATION OF TEPI FEEDING PROGRAM

Mr. YATES. And all during the period starting in 1972, every month a ship came to Bikini with food?

Mr. DEBRUM. Yes.

Mr. YATES. And water?

Mr. DEBRUM. No, no water.

Mr. YATES. Just food?

Mr. DEBRUM. Yes.

Mr. YATES. So they were drinking the cistern water?

Mr. DEBRUM. Yes.

Mr. YATES. And you were supplying them with food. Were you supplying them with enough food?

Mr. DEBRUM. At times we tried to supply them with enough. There were times when we could not get there in time, sir.

Mr. YATES. So in the meantime they had to eat coconuts?

Mr. DEBRUM. Sometimes they were eating coconuts, yes. They indicated that to us.

Mr. YATES. They did?

Mr. DEBRUM. Yes.

Mr. YATES. Why could you not get there in time?

Mr. DeBrum. We wanted to get there in time. At times we had serious transportation problems and were down to one ship for trips to the outer islands. Sometimes, the odds were against us, but we tried to do the best we could.

Mr. Yates. What do you mean, the odds were against you?

Mr. DeBrum. We were down to one ship for all the outer islands at times.

Mr. Yates. And one ship would not service the island or the people?

Mr. DeBrum. It takes three field trip ships to service, to make a complete circuit of the Marshall Island group, once a month.

Mr. Yates. How many ships do you need for the food for the people who were on Bikini? Was one ship adequate for a month's supply of food?

Mr. DeBrum. If we have one ship committed only to Bikini, yes, one ship will do it. The ship that is committed to service Bikini also services other islands in the Marshall Islands.

Mr. Yates. You mean provide food for the other islands?

Mr. DeBrum. It provides services, it brings in copra and takes in trade goods so the people can buy it.

FREQUENCY OF SERVICE TO BIKINI ISLAND

Mr. Yates. Maybe we had better find out about where y - work throughout the islands.

How long would your lapses be? Presumably your schedule was one ship a month with food for Bikini.

Mr. DeBrum. Yes.

Mr. Yates. And how often were there lapses in this?

Mr. DeBrum. Not very much. There were times, as I recall, when we could not provide a ship until it was a month and a half late, sir.

Mr. Yates. A month and a half late; you mean two weeks after the schedule.

Mr. DeBrum. Two weeks after.

TYPE OF FOODS PROVIDED

Mr. Yates. After the schedule date. And what kind of food? You said you provided staples? What do you mean by staples?

Mr. DeBrum. Staples in Marshallese terms is rice, flour, canned meats, milk.

Mr. Yates. No coconuts?

Mr. DeBrum. No coconuts.

Mr. Yates. I mean from the other islands.

Mr. DeBrum. We never shipped any coconuts from the other islands.

Mr. Yates. Why would you not? If coconuts were such a delicacy for the Bikinians, why would you not provide coconuts for them, too?

Mr. DeBrum. It was not a part of our feeding program, sir.

Mr. Yates. If you were a Bikinian you would have liked coconuts, would you not, from other islands?

Mr. DeBrum. I would be climbing a tree and getting it myself.

Mr. Yates. You would not worry about radiation.

Mr. McKay. How do you get coconuts in the program? What kind of a bureaucratic round-about do you have to go through to get them on the program?

Mr. DeBrum. I guess we just include it, make sure we have enough money to go around.

Mr. McKay. Would you have authority to approve it?

Mr. DeBrum. No, sir. It would have to be approved by the High Commissioner.

Mr. McKay. Could he approve it alone or would he have to get approval up here?

Mr. DeBrum. I think he has authority to approve it, the High Commissioner.

Mrs. Van Cleve. Yes.

Mr. Yates. Mr. DeBrum, you said if coconuts were not supplied to you as a Bikinian, you would be climbing the trees to get them?

Mr. DeBrum. Yes, if they were available on the island, yes.

Mr. Yates. And they are available on the island, are they not?

Mr. DeBrum. Yes.

Mr. Yates. So if you do not give them the coconuts they are going to climb the trees to get the coconuts, even if they are contaminated?

Mr. DeBrum. They have been doing that, sir.

NATURE AND THE TYPE OF ANALYSIS BY DOE

Mr. Yates. Let's go back to the interrogation.

"So you became a little more alarmed than when you were the Atomic Energy Commission. In '76 you first encountered this kind of a test. Is this an annual test that you had been making of the people?

"Mr. Deal. Yes, sir.

"Mr. Yates. What kind of tests, monthly, semiannually, every four months, or what?

"Mr. Deal. I can supply you a statement for the record. I will give you such information."

Then there is placed in the record on pages 1172 and 1173 a pretty good statement of tests that were made and a very bad estimate of the results of the tests. We find in 1964 the findings, "photographed and identified organisms on reefs and islands. No gross anomalies seen in plants and animals due to radioactivity."

1976 shows "exposure levels to the Bikinians varies considerably from island to island on the atoll."

February 1967, "confirmed earlier survey results for external radiation."

That does not tell us anything. "Cs-137 and strontium 90 predominate in terrestrial organisms. Co-60 and Fe-55 in marine organisms."

What does that mean, Dr. Deal?

Mr. Deal. It means that in the fish that they were catching they found cobalt-60 and Fe-55.

Mr. Yates. In large amounts?

Mr. Deal. I do not know, sir.

Mr. Yates. This result does not show that then?

Mr. Deal. No. We did not try to give you a complete copy of the reports. We just tried to give you the highlights of the surveys at the time, and probably, as you say, did a pretty poor job on that.

Mr. YATES. Yes.
Mr. McGRAW. And the value is 3.
Mr. YATES. Okay.
Mr. McGRAW. For Bikini 22 people in the sample. The value is 1.3, quite a bit higher than Rongelap, but still a factor of like a third of the standard that we would evaluate with. This is of course 1977 numbers.
As I recall the 1974 data, the value for Bikini was like .1. On the previous page the value for Bikini was .125, so between 1974 and 1977 the values went up by a factor of 10.

DATES OF WARNINGS TO PEOPLE OF BIKINI

Mr. YATES. If all this is true, sir, why four years ago in 1974 were you advising Mr. DeBrum to tell the Bikinians not to drink the well water and why were you then—you were bringing food in four years ago because there is no food on Bikini?
Mr. DEBRUM. That is right, sir.
Mr. YATES. Contaminated or noncontaminated, right?
Mr. DEBRUM. That is correct, sir.
Mr. YATES. Then the food came in two years ago, right? When did the coconut trees start maturing?
Mr. DEBRUM. About two years ago.
Mr. YATES. Were you allowing them to eat the food that was growing on Bikini two years ago, Mr. McGraw?
Mr. McGRAW. Were we allowing them two years ago?
Mr. YATES. Yes.
Mr. McGRAW. When was the recommendation made? Did you say four years ago?
Mr. DEBRUM. Yes, approximately about four years ago.
Mr. YATES. You have coconuts growing on Bikini two years ago. You have pandanus and papayas and breadfruit growing two years ago. Four years ago you told them not to drink the water, there was no food. Two years ago had you told them not to eat the food. Were you told not to eat the food two years ago?
Mr. DEBRUM. That was the time, four years ago, Mr. Chairman, that people were told that they were examining their food and they had suspected——
Mr. YATES. And they were told not to eat it?
Mr. DEBRUM. They were discouraged from eating.
Mr. YATES. Were they told not to eat the food all through this period? They were told not to drink from the wells all during this period?
Mr. DEBRUM. Yes.
Mr. YATES. Were they told not to eat the food all during this period too?
Mr. DEBRUM. Until further analysis convinced them otherwise.
Mr. YATES. The analysis never convinced them?
Mr. DEBRUM. Never convinced them.
Mr. YATES. So they were told all during this period not to eat the food?
Mr. DEBRUM. Yes.

ADEQUACY OF FOOD SUPPLIED BY TTPI ADMINISTRATION

Mr. YATES. And in the meantime you were bringing them food?
Mr. DEBRUM. Yes, sir.
Mr. YATES. Every month except where you lapsed?
Mr. DEBRUM. Yes, sir.
Mr. YATES. And there was adequate food for all of them?
Mr. DEBRUM. Yes.
Mr. YATES. You are sure of that?
Mr. DEBRUM. To the best of my knowledge sir.
Mr. YATES. Is that true, Mr. Weisgall?
Mr. WEISGALL. That is not quite the understanding of the Bikinians. As Mr. Leviticus has explained to me, the people living on Bikini would eat the food growing on the island even though they had been advised that it was questionable, when there simply was not enough. The boats were not coming on as regular basis as was hoped for, and according to Mr. Leviticus, when a family would run out of food it would eat food growing on Bikini, be it coconuts, pandanus, or breadfruit.

REQUEST FOR MORE MONITORING OF BIKINI

Mr. YATES. Let's go back to Mr. Juda's statement.
Mr. NOTE. The second request we convey to you today, Mr. Chairman, is that your subcommittee closely monitor the upcoming radiological and foodstuff tests to be conducted at Bikini Atoll. The people living on Bikini Island desperately wish to remain on Bikini Atoll, and they are hopeful that tests on Eneu Island will show it to be safe. They understand that the recent test results are preliminary, and they hope that resettlement on Eneu will prove to be possible.

Mr. Chairman, we cannot describe the sorrow felt by our people as they learned with bitter disappointment, that they must once again leave Bikini. Despite the contradictory statements of the U.S. Government over the last ten years, the people of Bikini have begun to understand the situation they face. They have told us that if the upcoming tests show that our people will not be able to live on Bikini or Eneu for the next 40 or 50 years, the people living in Bikini are prepared to relocate to Kili and Jaluit.

UPGRADING CONDITIONS ON KILI ISLAND

A move to Kili, however, and the establishment of Kili as a permanent home for the next two generations of Bikinians cannot come without help from the U.S. Government to develop Kili as a functional, livable community.

For almost 30 years we have lived on Kili, thinking each year that [illegible] to Bikini the next year. As we face the possibility of 50 more years on Kili, it is clear that we must think and plan in longer terms.

As you know, Kili is an island with no reef and no lagoon, and access to the island is very difficult for most of the year. Faced with these conditions, our people have not processed copra in large quantities because boats visit this island rarely. Months frequently go by without a visit from passing ships, and our only communication with the rest of the world is by radio.