LAWRENCE L ERMORE LABORATORY

Marshallese file

December 7, 1977

Dr. William W. Burr, Jr.
Department of Biomedical and
Environmental Research
U. S. Department of Energy
Washington, D. C. 20545

Dear Bill:

This letter provides some additional information pertinent to the TWX I recently sent out informing you of the coliform levels in the Bikini cistern waters.

During our recent Bikini trip, Charles Fraley, working for Bob Buddemeier, analyzed our groundwater samples for coliform content by the membrane filter technique. A sufficient number of blanks were run so I am confident the data is good. Two days before departing Bikini, we used the remaining sterilized containers to determine coliform in the water from 2 cisterns on Bikini Island. We were very surprised to find concentrations in the water, at the school and building 8 cisterns, which exceeded 25 colonies/100 ml (see tables attached for all results). In addition, one of the two existing cisterns on Enyu was sampled and found to be highly contaminated as was the groundwater at the old Bikini well (HFH-7). The groundwater on Enyu shows anywhere from no contamination to a probable small number of colonies.

I have attached copies of pertinent paragraphs from the Water Quality Standards regarding coliform levels in drinking water. A quick comparison of the table of data and the standards shows that the maximum acceptable microbiological levels are greatly exceeded at Bikini.

I can only suggest a few possibilities to account for the contamination. The cisterns were constructed several years ago and are covered with a cement slab. There are large separations between the caps and the cisterns and all of the cisterns have drain openings. Rats could easily enter the cistern through these openings. It is possible that one or more rats have died in the cisterns while seeking water during dry seasons. Bird, rat or pig droppings which find their way to the roofs (I may be stretching it a bit to consider pig droppings) could wash into the cisterns with the water during rain storms. Whatever the reason, contamination is evident and the

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trust territory health officials should be informed of these preliminary results. More important, some purification system, easy to use, should be considered for the water systems. Something should be done about the existing cisterns and open wells and some thought might be given to the design of future cisterns planned for the residential housing on Enyu.

I asked the district representative at Bikini if many of the people suffered from dysentery. He told me that many people did and I recommended that he inform the population to boil the drinking water before use until a more rigorous inspection of the water supply could be made.

Unfortunately we were both out of time and suitable sterilized containers to conduct more sampling.

Roger Ray indicated he would inform Oscar DeBrum of our results and recommend to the health officials that a more detailed investigation of the microbiological contamination of the water supplies should be conducted in the immediate future.

Yours truly,

Victor E. Noshkin
Environmental Sciences Division

VCN:eh
Enclosure
cc: Dr. B. Buddemeier, University of Hawaii
Dr. H. McCammon, DBER, DOE
Mr. C. Fraley, University of Hawaii
Mr. Roger Ray, NVOO

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TABLE

COLIFORM CONTENT IN WATER SAMPLE
(colonies/100 ml water)

BIKINI ISLAND	
School Cistern	Sample 2 and 3 (duplicates) #2 - 65-70 definite colonies/100 ml #3 - approximately 50 definite colonies/100 ml
Building 8 Cistern	70-80 definite colonies/100 ml clean background plate - 0 colonies
HFH-7 (old well site previously used to supplement cistern water supply during dry season)	3 samples showed greater than 100 definite colonies/100 ml
HFH-1 (emplaced in 1975)	2 samples - no definite indication of colonies
ENEU ISLAND	
Mess Hall South Cistern	3 samples - 45-50 colonies/100 ml in each
FWR 4 (existing ground water well supplying village area when used 2-3 families now use this supply)	Sample 1 - 12-14 definite colonies (contamination expected) #2 - 5-6 probable but identification difficult #3 - no definite indication of colonies
FWR 5 (emplaced in 1977)	no large colonies but 3 plates covered with 25-30 tiny dark, red droplets (identification unknown)
FWR 6 (emplaced in 1977)	1-2 probable colonies/100 ml

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responding concentration of fluoride shall not be exceeded:

Temperature (in F°)	(C°)	Level (mg/l)
53.0 to 53.7	10.0 to 12.0	2.4
53.8 to 58.3	12.1 to 14.6	2.2
58.4 to 63.8	14.7 to 17.6	2.0
63.9 to 70.6	17.7 to 21.4	1.8
70.7 to 79.2	21.5 to 26.2	1.6
79.3 to 90.5	26.3 to 32.5	1.4

The requirements of this paragraph (b) do not apply to public water supplies serving only educational institutions.

§ 141.12 Maximum contaminant levels for organic chemicals.

The maximum contaminant level for the total concentration of organic chemicals, as determined by the carbon chloroform extract method set forth in § 141.24(b), is 0.7 mg/l.

§ 141.13 Maximum contaminant levels for pesticides.

The following are the maximum contaminant levels for pesticides:

(a) Chlorinated Hydrocarbons:

	Level mg/l
Chlordane (cis and trans) (1,2,4,5,-6,7,8,8 - Octachloro - 3a,4,5,7a-tetrahydro-4,7-methanoindan)	0.003
Endrin (1,2,3,4,10,10 - Hexachloro-6,7 - epoxy - 1,4,4a,5,6,7,8,8a-octahydro-1,4-endo, endo-5,8-dimethano naphthalene)	0.0002
Heptachlor (1,4,5,6,7,8,8-Heptachloro-3a,4,7,7a-tetrahydro 4,7-methanoindene)	0.0001
Heptochlor Epoxide (1,4,5,6,7,8,8-Heptachloro - 2,3-epoxy-3a,4,7,7a-tetrahydro-4,7-methanoindan)	0.0001
Lindane (1,2,3,4,5,6-Hexachlorocyclohexane, gamma isomer)	0.004
Methoxychlor (1,1,1-Trichloro-2,2-bis [p-methoxyphenyl] ethane)	0.1
Toxaphene ($C_{10}H_{10}Cl_8$—Technical chlorinated camphene, 67–69% chlorine)	0.005

(b) Chlorophenoxys:

2,4-D (2,4-Dichlorophenoxyacetic acid)	0.1
2,4,5-TP Silvex (2,4,5-Trichlorophenoxypropionic acid)	0.01

§ 141.14 Maximum contaminant level of turbidity.

The maximum contaminant level of turbidity in the drinking water at a representative entry point(s) to the distribution system is one turbidity unit (TU), as determined pursuant to § 141.22, except that five or fewer turbidity units may be allowed if the supplier of water can demonstrate to the State that the higher turbidity does not:

(a) Interfere with disinfection;

(b) Prevent maintenance of an effective disinfectant agent throughout the distribution system; and

(c) Interfere with microbiological determinations.

§ 141.15 Maximum microbiological contaminant levels.

(a) The supplier of water may employ one of two methods to determine compliance with the coliform maximum contaminant levels.

(1) When the supplier of water employs the membrane filter technique pursuant to § 141.21(a) the coliform densities shall not exceed one per 100 milliliters as the arithmetic mean of all samples examined per month; and either

(i) Four per 100 milliliters in more than one standard sample when less than 20 are examined per month; or

(ii) Four per 100 milliliters in more than five percent of the standard samples when 20 or more are examined per month.

(2) (i) When the supplier of water employs the fermentation tube method and 10 milliliter standard portions pursuant to § 141.21, coliforms shall not be present in more than 10 percent of the portions in any month; and either

(A) Three or more portions in one sample when less than 20 samples are examined per month; or

(B) Three or more portions in more than five percent of the samples if 20 or more samples are examined per month.

(ii) When the supplier of water employs the fermentation tube method and 100 milliliter standard portions pursuant to § 141.21(a) coliforms shall not be present in more than 60 percent of the portions in any month; and either

(A) Five or more portions in more than one sample when less than five samples are examined; or

(B) Five or more portions in more than 20 percent of the samples when five samples or more are examined.

(b) The supplier of water shall provide water in which there shall be no greater than 500 organisms per one milliliter as determined by the standard bacterial plate count provided in § 141.21(f).

§ 141.16 Substitution of residual chlorine measurement for total coliform measurement.

(a) The supplier of water may, with the approval of the State, substitute the use of chlorine residual monitoring for not more than 75 percent of the samples required to be taken by § 141.21(b), provided that the supplier of water takes chlorine residual samples at points which are representative of the conditions within the distribution system at the frequency of at least four for each substituted microbiological sample. There shall be at least daily determinations of chlorine residual. Measurements shall be made in accordance with "Standard Methods," 13th Ed., pp 129–132. When the supplier of water exercises the option provided in this paragraph (a), he shall maintain no less than 0.2 mg/l free chlorine in the public water distribution system.

(b) For public water systems serving 4900 or fewer persons, the supplier may, with the approval of the State, make a total substitution of chlorine residual measurement for the samples required to be taken by § 141.21(b): *Provided*, That the supplier of water takes chlorine residual samples at points which are representative of the conditions within the distribution system at the rate of one per day for each microbiological sample required to be taken per month under § 141.21. When the supplier of water exercises the option provided by this paragraph (b) he shall maintain no less than 0.3 mg/l free chlorine in the public water distribution system. Measurements shall be made in accordance with "Standard Methods," 13th Ed., pp 129–132.

§ 141.21 Microbiological contaminant sampling and analytical requirements.

(a) The supplier of water shall make coliform density measurements, for the purpose of determining compliance with § 141.15, in accordance with the analytical recommendations set forth in "Standard Methods for the Examination of Water and Wastewater," American Public Health Association, 13th Edition, pp 662–688, except that only a 100 milliliter sample size shall be employed in the membrane filter technique. The samples shall be taken at points which are representative of the conditions within the distribution system.

(b) The supplier of water shall take coliform density samples at regular intervals throughout the month, and in number proportionate to the population served by the public water system. In no event shall the frequency be less than as set forth below:

Population served:	Minimum number of samples per month
25 to 2,500	2
2,501 to 3,300	3
3,301 to 4,100	4
4,101 to 4,900	5
4,901 to 5,800	6
5,801 to 6,700	7
6,701 to 7,600	8
7,601 to 8,500	9
8,501 to 9,400	10
9,401 to 10,300	11
10,301 to 11,100	12
11,101 to 12,000	13
12,001 to 12,900	14
12,901 to 13,700	15
13,701 to 14,600	16
14,601 to 15,500	17
15,501 to 16,300	18
16,301 to 17,200	19
17,201 to 18,100	20
18,101 to 18,900	21
18,901 to 19,800	22
19,801 to 20,700	23
20,701 to 21,500	24
21,501 to 22,300	25
22,301 to 23,200	26
23,201 to 24,000	27
24,001 to 24,900	28
24,901 to 25,000	29
25,001 to 28,000	30
28,001 to 33,000	35
33,001 to 37,000	40
37,001 to 41,000	45
41,001 to 46,000	50
46,001 to 50,000	55
50,001 to 54,000	60
54,001 to 59,000	65
59,001 to 64,000	70
64,001 to 70,000	75
70,001 to 76,000	80
76,001 to 83,000	85
83,001 to 90,000	90
90,001 to 96,000	95
96,001 to 111,000	100
111,001 to 130,000	110
130,001 to 160,000	120
160,001 to 190,000	130
190,001 to 220,000	140
220,001 to 250,000	150
250,001 to 290,000	160
290,001 to 320,000	170

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Population served:	Minimum number of samples per month
320,001 to 360,000	180
360,001 to 410,000	190
410,001 to 450,000	200
450,001 to 500,000	210
500,001 to 550,000	220
550,001 to 600,000	230
600,001 to 660,000	240
660,001 to 720,000	250
720,001 to 780,000	260
780,000 to 840,000	270
840,001 to 910,000	280
910,001 to 970,000	290
970,001 to 1,050,000	300
1,050,001 to 1,140,000	310
1,140,001 to 1,230,000	320
1,230,001 to 1,320,000	330
1,320,001 to 1,420,000	340
1,420,001 to 1,520,000	350
1,520,001 to 1,630,000	360
1,630,001 to 1,730,000	370
1,730,001 to 1,850,000	380
1,850,001 to 1,970,000	390
1,970,001 to 2,060,000	400
2,060,001 to 2,270,000	410
2,270,001 to 2,510,000	420
2,510,001 to 2,750,000	430
2,750,001 to 3,020,000	440
3,020,001 to 3,320,000	450
3,320,001 to 3,620,000	460
3,620,001 to 3,960,000	470
3,960,001 to 4,310,000	480
4,310,001 to 4,690,000	490
≥4,690,000	500

(c)(1) When the coliform colonies in a single standard sample exceed four per 100 milliliters (§ 141.15(a)(1)), daily samples shall be collected and examined from the same sampling point until the results obtained from at least two consecutive samples show less than one coliform per 100 milliliters.

(2) When organisms of the collform group occur in three or more 10 ml portions of a single standard sample (§ 141.15(a)(2)(i)), daily samples shall be collected and examined from the same sampling point until the results obtained from at least two consecutive samples show no positive tubes.

(3) When organisms of the coliform group occur in all five of the 100 ml portions of a single standard sample (§ 141.15(a)(2)(ii)), daily samples shall be collected and examined from the same sampling point until the results obtained from at least two consecutive samples show no positive tubes.

(4) The location at which the check sample was taken pursuant to paragraphs (c)(1), (2) or (3) of this section must not be eliminated from future sampling because of a history of questionable water quality. Check samples shall not be included in calculating the total number of samples taken each month to determine compliance with § 141.15.

(d) When a particular sampling point has been confirmed, by the first check sample examined as directed in paragraphs (c)(1), (2), or (3) of this section, to be in non-compliance with the maximum contaminant levels set forth in § 141.15, the supplier of water shall notify the State as prescribed in § 141.31.

(e) When the maximum contaminant levels set forth in paragraphs (a)(1) or (2) of § 141.15 are exceeded as confirmed by check samples taken pursuant to paragraphs (c)(1), (2), or (3) of this section, the supplier of water shall report as directed in § 141.32(a).

(f) When a particular sampling point has been shown to be in non-compliance with the requirements of § 141.16, water from that location shall be retested within one hour. If the non-compliance is confirmed, the State shall be notified as prescribed in § 141.31. Also, if the non-compliance is confirmed, a sample for coliform analysis must be immediately collected from that sampling point and the results of such analysis reported to the State.

(g) Standard bacteria plate count samples shall be analyzed in accordance with the recommendation set forth in "Standard Methods for the Examination of Water and Wastewater," American Public Health Association, 13th Edition, pp 660–662. Samples taken for the purpose of plate count analysis shall be collected at points which are representative of conditions within the distribution system at a frequency at least equal to 10 percent of the frequency for coliform analysis as directed in paragraph (b) of this section with the exception that at least one sample shall be collected and analyzed monthly.

§ 141.22 Turbidity sampling and analytical requirements.

(a) Samples shall be taken at a representative entry point(s) to the water distribution system at least once per day (at least once per month for supplies using water obtained from underground sources) for the purpose of making turbidity measurements to determine compliance with § 141.14. The measurement shall be made in accordance with the recommendations set forth in "Standard Methods for the Examination of Water and Wastewater," American Public Health Association, 13th Edition, pp. 350–353 (Nephelometric Method).

(b) In the event that such measurement indicates that the maximum allowable limit has been exceeded, the sampling and measurement shall be repeated within one hour. The results of the two measurements shall be averaged, and if the average confirms that the maximum allowable limit has been exceeded, this average shall be reported as directed in § 141.31. If the monthly average of all samples exceeds the maximum allowable limit, this fact shall be reported as directed in § 141.32(a).

(c) The requirements of this § 141.22 shall not apply to public water systems other than community water systems which use water obtained from underground sources.

§ 141.23 Inorganic chemical sampling and analytical requirements.

(a)(1) To establish an initial record of water quality, an analysis of substances for the purpose of determining compliance with § 141.111 shall be completed for all community water systems utilizing surface water sources within one year following the effective date of this subpart. This analysis shall be repeated at yearly intervals.

(2) An analysis for communtly water systems utilizing ground water sources shall be completed within two years following the effective date of this subpart. This analysis shall be repeated at three-year intervals.

(3) Analyses for public water systems other than community water systems, whether supplied by surface or ground water sources, shall be completed within six years following the effective date of this subpart. These analyses shall be repeated at five-year intervals.

(b) If the supplier of water determines or has been informed by the State that the level of any contaminant is 75 percent or more of the maximum contaminant level, he shall analyze for the presence and quantity of that contaminant at least once per month following the initial analysis or information. If, after conducting monthly testing for a period of at least one year, the supplier of water demonstrates to the satisfaction of the State that the level of such contaminant is stable and due to a natural condition of the water source, he may reduce the frequency of analysis for that contaminant consistent with the requirements of paragraph (a) of this section.

(c) If the supplier of water determines or has been informed by the State that the level of any contaminant listed in § 141.11 exceeds the maximum contaminant level for the substance, he shall confirm such determination or information by repeating the analysis within 24 hours following the initial analysis or information, and then at least at weekly intervals during the period of time the maximum contaminant level for that substance has been exceeded, or until a monitoring schedule as a condition to a variance, exemption or enforcement action shall become effective. The results of such repetitive testing shall be averaged and reported as prescribed in paragraph (d) of this section.

(d) To judge the compliance of a public water system with the maximum contaminant levels listed in § 141.11, averages of data shall be used and shall be rounded to the same number of significant figures as the maximum contaminant level for the substance in question. Each average shall be calculated on a past 12-month moving average basis if less than twelve samples per year are analyzed, and on a past three month moving average basis if twelve or more samples per year are analyzed. In cases where the maximum contaminant level has been exceeded in any one sample, the average concentration shall be calculated on a one-month moving average basis and reported pursuant to § 141.31. If the mean of the samples comprising the one month moving average exceeds the maximum contaminant level, the supplier of water shall give public notice pursuant to § 141.32(a).

(e) The provisions of paragraphs (c) and (d) of this section notwithstanding, compliance with the maximum contaminant level for nitrate shall be determined on the basis of individual analyses rather than by averages. When a level exceeding the maximum contaminant level for nitrate is found, the analyses shall be repeated within 24 hours, and if the mean of the two analyses exceeds the

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Preliminary Report on Radionuclide Levels in Samples from Eneu Island and the Eneu Test Plot, Bikini Atoll

May 1, 1978

The abstracted programs and preliminary results described below were initiated and are continuing with support from the Division of Biomedical and Environmental Research, Department of Energy.

The Eneu test plot was established in August-September of 1977. The subsistence crops planted at this time were: Pandanus, breadfruit, papaya, banana, sweet potato, squash and watermelon. In addition to these subsistence crops, coconuts are now plentiful on the trees planted on Eneu in 1972.

In August and November of 1977, coconuts were collected for analysis from a number of trees along with associated soil samples. The preliminary results for ^{137}Cs concentrations in these samples are attached. Data for ^{90}Sr, $^{239+240}Pu$ and ^{241}Am concentrations will not be available before mid-summer 1978.

In November of 1977, the squash and watermelon planted during August in the test garden were available for sampling. The collections have been processed and are presently being analyzed for specific radionuclides. ^{137}Cs concentration data should be available for these samples this summer and the ^{90}Sr, $^{239+240}Am$ concentration data will hopefully be available this fall.

The breadfruit and Pandanus fruit were planted as root stock and will not produce fruit for several years. When the test garden was started in

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August 1977, however, three breadfruit trees (10-15 feet in height) were transplanted to Eneu from Bikini Islands. If these trees survive, breadfruit will be available to sample soon. We will confirm this possibility during our May 1978 trip to Bikini Atoll.

The concentration of ^{137}Cs in Eneu coconut (data attached) is higher than predicted using the limited data bank from Enewetak and is higher than the concentrations used in the dose assessment of Bikini Atoll (Dose Assessment at Bikini Atoll, W. L. Robison, W. A. Phillips and C.S. Colsher - UCRL 51879 Part 5, 1977). These recent data are preliminary and additional results from both Bikini and Eneu Islands will be available in the near future. We will then reassess the concentration data, the concentration ratio data and the resulting dose predictions for Eneu Island.

The results of our radiochemical analyses of ground and cistern water from Bikini and Eneu Islands collected in 1975 have been published (Noshkin, Robison, Wong and Eagle, "Evaluation of the Radiological Quality of the Water on Bikini and Eneu Islands in 1975" UCRL 51879 Part 4). The water from the wells and cisterns at Bikini and Eneu Islands has been resampled for analyses twice during 1977. Our available radionuclide concentration data for Eneu ground and cistern water is shown in the attached table. In addition to continuing our assessment of radionuclide concentrations in the water, during November 1977, coliform bacteria counts were measured in the water from several cisterns and groundwater sites. The results of this latter analyses and recommendations were submitted to Dr. William Burr of DBER in December 1977 (see letter attached).

Two new groundwater well sites, FWR 5 and FWR 6, were established on Eneu Island during January 1977. The groundwater at these locations has low salinities and is of acceptable chemical quality but ^{90}Sr concentrations at FWR 5 exceeds the recommended EPA guideline of 8 pCi/l. FWR 4 is the main skimming well supplying groundwater for use on Eneu at the present time. The groundwater from this well is chemically acceptable for household and drinking purposes. The concentrations of ^{137}Cs, ^{90}Sr and $^{239+240}Pu$ in the water, however, have been variable since 1975 and during January 1977, the ^{90}Sr concentration was found to exceed the recommended EPA guideline of 8 pCi/l. The radionuclide concentrations in the groundwater at FWR 4 do not appear to change systematically. ^{137}Cs concentrations decreased between 6/75 and 1/77, while ^{90}Sr and $^{239+240}Pu$ concentrations increased. Between 1/77 and 11/77, both ^{137}Cs and $^{239+240}Pu$ essentially doubled in concentration. We are attempting to correlate these changes in concentration with fresh water recharge from rainfall, groundwater residence times and other hydrological features.

The two cisterns attached to the old mess hall are presently the only aboveground storage facilities for rainwater on Eneu Island. The water in the cisterns is, of course, chemically acceptable for drinking and contains levels of ^{137}Cs and ^{90}Sr lower than cisterns water samples collected from Bikini Island. The ^{90}Sr concentration in the Eneu cistern water is similar to the average levels reported for New York tap water (0.30 pCi/l) during 1977 (Environmental Measurements Laboratory Report, EML-339, April 1978).

Consumption of the cistern water would result in lower 10, 30, 50 and 70 year integral doses than those computed for the consumption of Bikini cistern water in UCRL-51879, Part 5. The average concentrations in the water at FWR 4 will result in a slightly lower dose from ^{137}Cs and $^{239+240}Pu$ and a higher ^{90}Sr dose than computed for consumption of Bikini Island cistern water in UCRL-51879 Part 5.

A number of the reef fish, mullet, were collected for radionuclide analysis from six different islands of Bikini Atoll, including Eneu, during 1977. Concentrations of specific radionuclides have been determined in the fish flesh, bones, skin, viscera, reproductive organs, gills and stomach contents. The radionuclide concentrations are used to compute the radiological exposure to individuals from ingestion of marine foods. Mullet from Bikini have higher ^{137}Cs levels associated with muscle tissue than average values found for Enewetak Atoll fish. The mean ^{60}Co levels in muscle tissue of fish from both Atolls is similar and the highest concentrations are associated with reproductive organs. Plutonium concentrations in mullet from Bikini differ from those at Enewetak but the average concentration factor for plutonium in fish muscle is similar at both Atolls. The concentrations of specific radionuclides in mullet tissue vary greatly from island to island within the Atoll and the radionuclide concentrations in the fish caught off Eneu fall between the lowest and highest values detected in mullet at Bikini Atoll. Updated doses from consumption of marine foods at Bikini is in progress.

V. E. Noshkin for
W. L. Robison
William L. Robison
Environmental Sciences Division

Victor E. Noshkin
Environmental Sciences Division

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Preliminary Data from the Eneu Island

Coconut Tree NO.	Mean ^{137}Cs Coconut Meat Concentration pCi/g Dry Weight	Concentration Ratio Coconut Meat pCi/g Coco Meat/pCi/g Soil	Concentration Ratio Coco Milk pCi/g Coco Milk/pCi/g Soil)
1	86	21	8.8
2	22	--	7.1
5	40	6.2	1.1
6	41	12	4.8
9 (Ripe)	32	7.2	3.5
9 (Green)	36	8.2	4.9
10	97	14	5.1
11	23	3.4	1.2
12	12	29	10
13	32	8.7	2.7
14	49	20	6.2
15	51	6.0	2.5
16	45	4.1	1.3

Mean ^{137}Cs Coco Meat Concentration = 44 pCi/g dry wt. or 22 pCi/g wet wt.

Mean ^{137}Cs Concentration Ratio Coco Meat = 11.5 $\left(\frac{\text{pCi/g dry Coco Meat}}{\text{pCi/g dry Soil}}\right)$

Mean ^{137}Cs Concentration Ratio Coco Meat = 5.8 $\left(\frac{\text{pCi/g wet Coco Meat}}{\text{pCi/g dry Soil}}\right)$

Mean ^{137}Cs Concentration Ratio Coco Milk = 4.6 $\left(\frac{\text{pCi/g wet weight Milk}}{\text{pCi/g dry Soil}}\right)$

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Eneu Groundwater

Radionuclide Concentrations

Well (6/75)	Soluble (pCi/ℓ)			Particulate (pCi/ℓ)		
	^{137}Cs	^{90}Sr	$^{239+240}Pu$	^{137}Cs	^{90}Sr	$^{239+240}Pu$
FWR 1	35	71	.0035	1.17	0.81	.0095
2	69	66	.023	0.95		.0084
3	32	1.3	.0007	0.59	0.03	.0014
4	1.1	3.4	.00085	0.57	0.11	.00067
Well (1/77)						
FWR 1	9.7	8.9	.018			
2	10.6	3.9	.0023			
3	16.1	4.2	.0019			
4	0.4	9.5	.0013			
5	13	33	.0062			
6	2.3	3.4	.0040			
Well (11/77)						
FWR 1	37.0		.0011	0.56		.0018
2	19.8		.0023	0.17		.0014
4	0.81		.0029	0.09		.0009
5	18.2		.0013	0.42		.0168
6	45.2		.0036	0.65		.0004

Eneu Cistern (attached to old mess hall)

1/77			
N. Cistern	lost	0.49	.0025
S. Cistern	lost	0.23	.0009
11/77			
S. Cistern	0.21		.0165

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