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ATOMIC ENERGY COMMISSION

RETURN OF RONGELAPESE TO THEIR HOME ISLAND

Report to the General Manager by the Director of Biology and Medicine

THE PROBLEM

1. To determine if it is advisable to return the Rongelapese to their home island in the Marshalls.

SUMMARY

2. After the relatively heavy fallout on the Marshall Islands March 1, 1954, 82 inhabitants were evacuated first to Kwajalein and then to the Island of Ejit on Majuro Atoll where they are now living. There have been public statements, concurred in by the Atomic Energy Commission, Department of Interior and the Department of State to the effect that these people will be returned to their home island of Rongelap as soon as it is possible from health considerations. Such a statement was submitted to the 17th Session of the U. N. Trusteeship Council, Subcommittee of Petitions, March 27, 1956 by Mr. D. Vernon McKay, Special Representative of the Administering Authorities for the Trust Territory of the Pacific Islands.

3. Since the Rongelapese are now subsidized by the United States Government with little need for opportunity to actively engage in normal livelihood, there is the risk of an onset of indolence, to the detriment of the best interest of the Rongelapese.

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4. Several radiological surveys of the Marshall Islands, especially Rongelap Atoll, have been made during the past two and one-half years. The latest survey (July 23-26, 1956) indicates a presence of a residual contamination on the island of Rongelap, but at a level that is acceptable from a health point of view, both for the potential external gamma radiation exposure and the strontium-90 content in the food supply, with the possible exception of land crabs.

5. Therefore, it is recommended that the position of the Atomic Energy Commission should be that the Rongelapese could be returned to their home as soon as rehabilitation procedures on the island of Rongelap are completed, with the edible land crabs not be eaten at this time.

STAFF COORDINATION

6. The Divisions of Military Application, Information Services, Finance, Isotopes, Office of Special Projects, and Office of the General Counsel concur in the recommendation of this paper.

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RECOMMENDATION

7. The General Manager recommends that the Atomic Energy Commission:

a. Approve the position of the Atomic Energy Commission that the Rongelapese could be returned to their home island as soon as rehabilitation procedures have been completed on the island as described in Appendix "B".

b. Note that Appendix "D" is a draft announcement which will be proposed to the Department of Interior for issuance when the Department determines that the natives can return.

c. Note that the Joint Committee on Atomic Energy, the G.C, and the MLC will be advised of this action by letter such as Appendix "C".

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APPENDIX "A"

BACKGROUND AND DISCUSSION

BACKGROUND

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1. On March 1, 1954, a relatively heavy fallout occurred on some of the Marshall Islands as a result of a nuclear weapons test at the Eniwetok Proving Ground. Between the 36th and 50th hour after detonation 82 inhabitants were evacuated to Kwajalein where they were under the surveillance of a team of medical experts from the United States. On June 9, 1954, they were moved to the Island of Ejit (Majuro Atoll) where they are now living.

2. There have been public statements, concurred in by the Atomic Energy Commission, Department of Interior and the Department of State to the effect that these people will be returned to their home Island of Rongelap as soon as it is possible from health considerations. Such a statement was submitted to the 17th Session of the U. N. Trusteeship Council, Subcommittee of Petitions, March 27, 1956 by Mr. D. Vernon McKay, Special Representative of the Administering Authorities for the Trust Territory of the Pacific Islands.

3. Several radiological surveys have been made of the Marshall Islands, especially Rongelap Atoll, since March 1, 1954. The results of these surveys are contained in the several reports by the cognizant laboratories and are being summarized in one report by the Division of Biology and Medicine (in preparation).

4. The Rongelapese have received complete medical investigations at six months, one year and two year post-detonation, by a team headed by Dr. Robert Conard of Brookhaven National Laboratory, as well as several routine examinations.

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RESTRICTED DATA

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DISCUSSION

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A. Status of Rongelapese Health

5. Pertinent to any discussion of the return of the Rongelapese to their home island is the body insult suffered from the fallout on March 1, 1954. One group of 64 people received about 175 roentgens whole body gamma radiation, and a second group of 18 received 69 roentgens. The most highly exposed group might have received an additional 100 - 150 reps to the thyroid from internally deposited isotopes of iodine. The deposition of bone seeking isotopes was very small and at two years the body burden of strontium-90, as estimated by urinalysis was little greater than for controls in the United States. Of the 82 individuals exposed, 45 experienced superficial skin lesions and 19 deep lesions while 30 showed some degree of epilation.

6. The present condition of the Rongelap people is best described by the results of the two year medical examination:*

> The medical survey of the Rongelap people two years after exposure to fallout radiation shows that the people appear to have been in generally good state of health and nutrition and are making satisfactory recovery from their radiation exposure. Serious illness has occurred in two individuals but neither these illnesses nor clinical findings in other individuals can be attributed to radiation effects. One death in May 1956, that of a 46-year-old Rongelap man, was due to hypertensive heart disease. Previous examinations had shown that the disease was undoubtedly present at the time of exposure to fallout radiation.
>
> There is evidence of continued improvement of hemopoiesis. The mean lymphocyte count is slightly increased over the one-year levels, but is still slightly below the mean control count. The mean platelet level is about the same as found at one year after exposure and is still slightly below the control level. The mean neutrophile count at one year after exposure had reached the control level. The delay in complete recovery of lymphocytes and platelets is similar to that reported in the two-year follow-up studies of the Japanese casualties of the atomic bombings. Evidence from the Marshallese experience indicates that the lowered levels of these blood elements have not lowered the resistance of the people to disease, and the present levels are not considered to represent a serious condition.

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* Medical Survey of Marshallese Two Years After Exposure to Fallout Radiation. Conard, R. A. et al. Brookhaven National Laboratory, March, 1956.

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Residual changes in the skin from the beta irradiation continue to show improvement. Pigment aberrations are still evident in 13 cases and in four of these there is also scarring with some adherence of the skin to the subcutaneous tissue. However, there is no great evidence of tissue breakdown or malignant change in any of these lesions, and surgical repair is not considered necessary at this time. Histological examination of skin biopsies at sites of radiation lesions shows residual effects of radiation damage, but no evidence of pre-malignant or malignant changes.

"Ophthalmological survey reveals that there are no radiation-induced lens opacities, and the incidence of ocular lesions is similar in exposed and control populations.

"The radiochemical analysis of the urine of the Rongelap people shows measurable activity, which is largely due to cerium-144-praseodymium-144 with only slight activity due to strontium-90. The body burden of these isotopes is estimated to be well below the permissible levels. Examination of bone specimens in the case of the one man who died shows no radiation that can be definitely associated with fallout deposition in the bone. Studies of radiographs of the bones of the exposed children show no evidence of any bone defects from possible deposits of radioactivity.

3. External Gamma Dose Rates on Rongelap Island.

7. The external gamma dose rates at three feet above the ground on the Island of Rongelap are shown in Graph One. It might be expected that this curve will flatten out with time due to dominance of the 33 year half-life cesium-137. The latest survey of Rongelap Island at the end of July 1956 showed a range of values from 0.2 - 0.5 milliroentgens per hour, with an average of 0.4 mr/hr. Graph one suggests an anticipated dose rate at the time of the survey to be about 0.1 mr/hr. The higher value found is undoubtedly due to the small additional fallout that occurred during Operation Redwing. Since this is relatively fresh radioactive material,

the decay will be more rapid so that the dose rates on Rongelap Island at the time of repatriation should be less than 50 milliroentgens/week.

The maximum permissible external gamma exposure to adult workers recommended by the National Committee on Radiation Protection is 0.3 roentgens/week with an added restriction (now pending approval by the NCRP), that the maximum permissible accumulated dose at any age, N, equals 5 times (N-18), provided no annual increment exceeds 15 rem (This applies to all critical organs except the skin, for which the value is double). The maximum permissible exposure for the population as a whole from all sources of radiation, including medical and other man-made sources, and background should not exceed 14 million rem per million of population over the period from conception up to age 30. It is difficult to extrapolate precisely far into the future, but the data suggest that the gamma doses on Rongelap Island would not greatly exceed (if at all) 0.3 roentgens for the first year of repatriation, with lesser doses in subsequent years.

3. The gamma dose rates on other islands of Rongelap Atoll have not been followed as closely as on Rongelap but the data suggest the cumulative dose rates now are the same as measured in the first part of March 1954, i.e. the highest activity on any island is about a factor of 10 higher than Rongelap.

9. The Rongelapese go on fishing expeditions to other islands including those showing both higher and lower activity. However, these Rongelapese spend an appreciable part of their time in boats over water where the external gamma activity is near background values. Thus, the yearly average for these probably would not differ greatly from those on Rongelap Island.

C. Food Supply

1. The basic data on the normal food supply of the Rongelapese

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are contained in Table One. There are wide variances in the data so that estimated average values are used. This is not an unreasonable approach since it would be expected that the food actually consumed would be about as variable as the individual samples collected for analyses.

11. The isotope of principal concern in the food chain is strontium-90. For an adult worker the maintained maximum permissible body burden is 1000 Sunshine Units (1000 micromicrocuries of Sr^{90} per gram of calcium). Values for maximum permissible exposures to the general population are 1/10 that for adult workers, or 100 Sunshine Units, maintained level in the body. The National Academy of Sciences report stated "--- there seems no reason to hesitate to allow a universal human strontium--- burden of 1/10 of the permissible---" for adult workers. This corresponds to the 100 Sunshine Units.

12. Table One indicates that the average concentration of strontium-90 in the total food supply might be less than 300 Sunshine Units. (The data on land crabs shown in Table One are from the Island of Kabelle which is more heavily contaminated than the Island of Rongelap). However, if crabs were eliminated from the diet, the intake might average about 107 Sunshine Units. Further, elimination or restriction of the consumption of pandanus would reduce the strontium-90 intake to well under 100 Sunshine Units.

13. There is some doubt concerning the correct strontium-90 activity in the land crabs since they are higher than for previous surveys which is contrary to all other data. Additional surveys should clarify this point. In any event these land crabs are from the island

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of Kabelle (there were no collections of land crabs made on Rongelap Island during the last survey). The general contamination on Rongelap is about one-fifth that of Kabelle. The difference in strontium-90 content may not be as great as this, but since there are land crabs it would be expected those on Rongelap Island to be lower than on Kabelle Island.

D. Estimated Future Body Burden of Strontium-90

16. Although precise values have not been established, there [illegible]

17. Although there is obviously a certain degree of uncertainty, the above data and estimates indicate that if land crabs are eliminated from their diet, the estimated future body burden of the Rongelapese would be substantially less than 100 uuc of Sr^{90} per gram of calcium. Limiting the intake of pandanus would further reduce the estimated Sr^{90} intake. By means of the continuing medical examinations described below it would be possible to note any tendency of untoward accumulation of strontium-90 with time, and appropriate action could be taken [illegible] were [illegible].

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E. Medical Surveillance

18. If the Rongelapese were returned to their home island, a program would be inaugurated of continuing medical inspections. The Rongelapese would be examined once a month and complete medical examination performed once a year by an American doctor. A radio would be provided on Rongelap for communication with the Trust Territories Office on Ebeye (Kwajalein Atoll) where a plane would be available at all times for any emergency. A fully equipped dispensary would be provided on Rongelap and an experienced health aide (a Marshallese) would be present at all times. Before their return the Marshallese would be given a complete medical examination, and immunized against Smallpox, Typhoid and Tetanus.

F. [illegible]

[illegible] Plans are currently being developed for a continuing and long range program for [illegible] and around the Marshall Islands.

G. [illegible]

20. Of considerable interest are the results obtained from animals (swine, chickens, ducks, rats) living on the island of Rongelap at the time of the fallout on March 1, 1954. These were collected and sacrificed serially in time. The last group of animals was collected and sacrificed about two years after the initial fallout. Like all of the other previous examinations there were no gross nor pathological changes in the animals that could be definitely ascribed to radiation. The estimated external gamma dose was near 900 roentgens for the two years.

21. Of equal interest is the body burden of strontium-90 in these animals. The analyses have not been completed but [illegible]

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is indicative of the data. These animals have continued to live (with their normal eating habits) in the environment during the time when the fission product intake by way of direct contamination was optimum and the strontium-90 was highest in the soil-plant-animal cycle. Also, due to their relatively short life span, it would be expected that their body burdens had approached equilibrium values. These data support the conclusion above that the estimated future body burdens of the Bongelapese (under the condition stated) could be substantially less than .OC unc of Sr-90 per gram of calcium.

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ATTACHMENT B

REHABILITATION PLANS

1. The Division of Military Application has had plans prepared for the reconstruction and rehabilitation of homes and facilities on Rongelap. These plans have been incorporated into a comprehensive program for the return of the Rongelap people to their home atoll which will be implemented if the decision is made to return them at this time. The High Commissioner of the Trust Territories of the Pacific Islands, the Commander in Chief U. S. Pacific Fleet, (to whom the Chief of Naval Operations and the Commander in Chief Pacific delegated responsibility for this action), the Commander JTF SEVEN and the Division of Military Application have approved this program. The cost of the program is estimated at approximately $1,900,000. Of this amount the Department of Defense is contributing [illegible] to support the operation for the first year of the program and for subsistence support of the Rongelap people for the year after their return to Rongelap. The remaining $600,000 for reconstruction of the village at Rongelap and rehabilitation of facilities there, and emergency radio equipment, will be provided by AEC.

2. In 1954 CINCPAC requested that he be assigned primary responsibility for the rehabilitation of the Rongelap people with AEC assistance. Although it was never made clear what the extent of this assistance was to be, the viewpoint within AEC was that we might furnish a portion of the necessary funds, resafe and health support, and reconstruction assistance. However, it was originally thought that the reconstruction effort involved would be minor,

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and [illegible] budgets included [illegible] for this purpose in their FY [illegible] budgets. Because of this budgeting by [illegible], AEC has not included funds for this work in its budget. However, with the passage of time the buildings on Rongelap have deteriorated to the point where they can no longer be repaired and the entire village must be reconstructed. The cost of this reconstruction and other rehabilitation measures is $280,000. In an effort to resolve this problem and in consonance with CINCPAC'S statement, we requested CNO (the Executive Agent of the Joint Chiefs of Staff) to provide funds for the [illegible] of Rongelap. The CNO reply (copy of which is attached) states [illegible] the Rongelapese [illegible] considered [illegible]. In [illegible] AEC [illegible] the responsi- [illegible] reconstruction and other rehabilitation measures of Rongelap, [illegible] AEC operating

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Graph One

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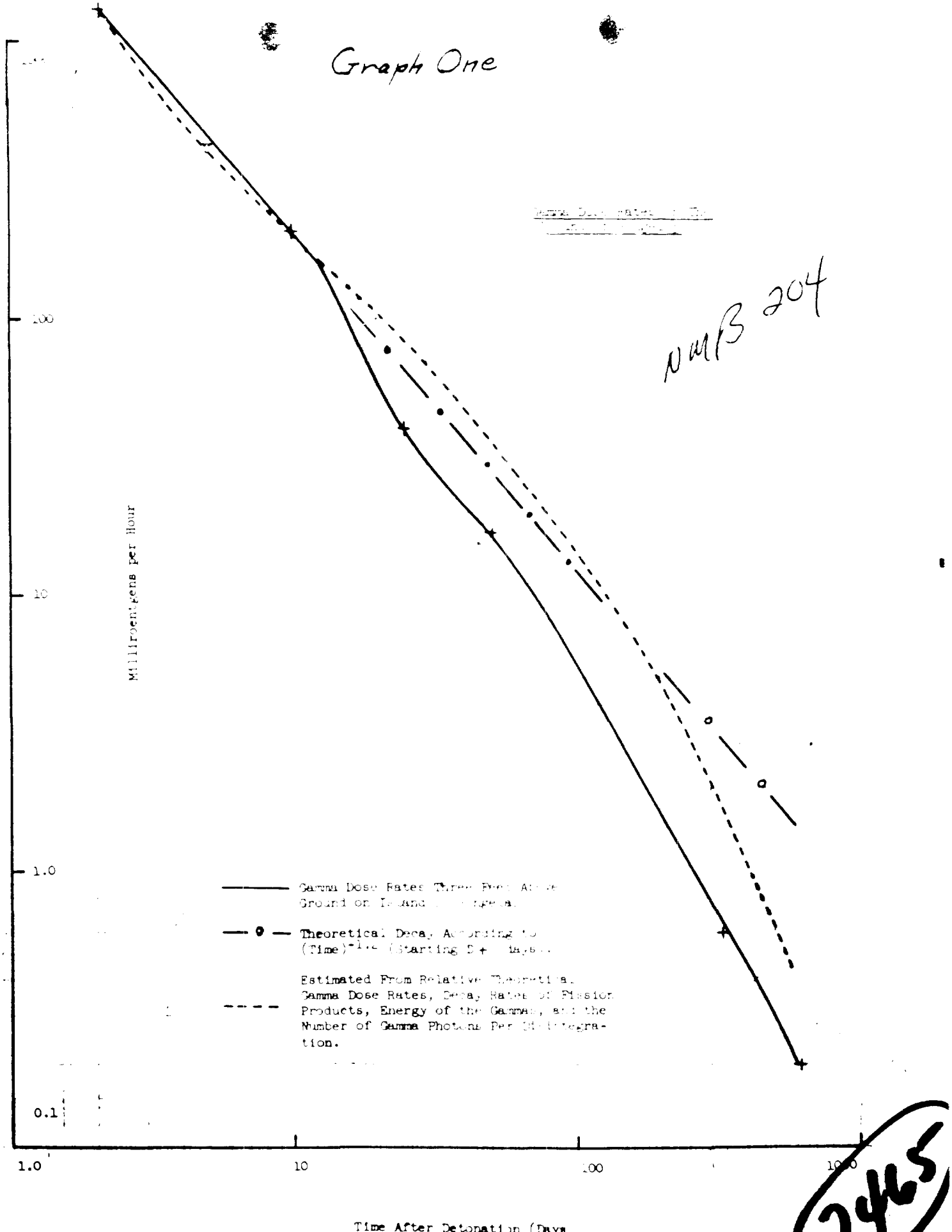

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TABLE ONE

ESTIMATES OF CONTAMINATION OF THE NORMAL FOOD SUPPLY OF RONGELAP[a]

	A Daily Intake Pounds/day/ Person	B Calcium Content (gms Ca/gm wet weight)	C Daily Intake of Ca (gms)	D Fraction of Total Ca Intake	E Strontium-90 Content (S. U.)	F Contribution To Total Sr^{90} Intake (S. U.) (Column D x E)
Fish	1.22	0.001	0.56	0.645	12	7.73
Pandanus	0.36	0.001	0.16	0.184	500 [b]	92.0 [b]
Clams	0.1	0.004	0.018	0.021	5	0.11
Arrowroot	0.09	0.0006[d]	0.025	0.029	250	7.26
Wild Birds (muscle)	0.09 [e]	0.0001	0.004	0.0046	300	1.38 [b, c]
Land Crabs	0.09	0.004	0.055	0.063	(4000)[b, c]	(252.0)
Coconut Meat&Milk	0.02	0.0004	0.004	0.0046	40	0.02
Bread Fruit	0.07	0.0006	0.003	0.0034	260	0.88
Imported:						
Rice						
Flour						
Canned Beef						
Milk	0.1	0.0001	0.045	0.046	few	small
Sardines						
Shoyu						
Coffee						
Tea						

a. Average values
b. These data are from island of Kabelle (no date from island of Rongelap for July 1956 survey). General contamination of island of Rongelap is about one-fifth that of Kabelle. Lagoon waters around these islands do not show as great a difference in activity.
c. These are land crabs from island of Kabelle. The strontium-90 concentration is higher than from earlier surveys, which is contrary to the plant activity as well as to the soil, and marine life data. It has been estimated that about one-third of the intake of crab meat is from ocean crabs which have very little strontium-90 content.
d. Estimated.
e. An unknown part of this intake may be sea crabs, (which contain considerably less Sr^{90}) but is assumed here to be all land crabs.

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TABLE TWO

ANALYSIS OF A ROOSTER COLLECTED

ON ISLAND OF [illegible] FEBRUARY 1956

	[illegible]	[illegible]	[illegible]	S. B.
[illegible]	[illegible] *	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]

* [illegible]

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APPENDIX C

DRAFT LETTER TO JCAE, MLC AND G&C

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1. After the relatively heavy fallout on the Marshall Islands March 1, 1954, 82 inhabitants were evacuated first to Kwajalein and to Ejit where they are now living. There have been public statements, concurred in by the Atomic Energy Commission, Department of Interior and the Department of State to the effect that these people will be returned to their home Island of Rongelap as soon as it is possible from health considerations. Such a statement was submitted to the 17th Session of the U. N. Trusteeship Council, Committee of Petitions, March 27, 1956 by Mr. Vernon D. McKay, Special Representative of the Administering Authorities for the Trust Territory of the Pacific Islands.

2. [illegible] radiological surveys of the Marshall Islands especially [illegible] have been made during the past two and one-half years. The latest [illegible] ([illegible] 1956) indicates a presence of a residual contamination on the Island of Rongelap, but at a level that is acceptable from health point of view both for the potential external gamma radiation exposure and the strontium-90 content in the food supply, with the possible exception of land crabs.

3. Therefore, the position of the Atomic Energy Commission is that the Rongelapese could be returned to their home island as soon as rehabilitation procedures on the Island of Rongelap are completed, with the advice that land crabs not be eaten at this time.

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Appendix D Draft Announcement

Eighty-one inhabitants of the island of Rongelap, who were evacuated following radioactive fallout resulting from a thermonuclear detonation at the Atomic Energy Commission's Eniwetok Proving Ground on March 1, 1954, will be returned to their home island on _____ (date) the Department of the Interior announced today.

The decision to return the Rongelap inhabitants was made after the Atomic Energy Commission had advised that it would be safe for them to live on the atoll. Periodic radiological surveys of the atoll have been made under the sponsorship of the Commission since March 1, 1954. According to the Commission, residual radioactivity on the island has decreased to non-hazardous levels.

The Rongelap inhabitants have been advised not to eat land crabs which have the highest present concentrations of Strontium-90, pending the results of future radiological surveys. Land crabs are not a significant part of their normal diet.

The inhabitants of Rongelap were moved to Kwajalein Atoll shortly after the fallout occurred. On June 9, 1954, they were moved to the Island of Ejit on Majuro Atoll and have been living there under the care of the U. S. Government. One death - from heart disease not connected with the radiation exposure - and nine births all normal have occurred among the group.

A comprehensive program for the return of the Rongelap people to their home atoll has been approved by the High Commissioner of the Trust Territories of the Pacific Islands, the Commander in Chief, U. S. Pacific

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Fleet, the Commander of Joint Task Force Seven, and the Atomic Energy Commission.

Under this program, the village on Rongelap will be reconstructed, since the buildings have deteriorated during the time they have been unoccupied. Subsistence support for the inhabitants will be provided for a year after their return.

A fully equipped medical dispensary will be provided on Rongelap, and an experienced health aide will be on the island. Each inhabitant will be given a complete medical examination yearly by an American physician.

Of the inhabitants, one group of 64 people received about 175 roentgens and a high gamma radiation and a second group of 18 received 69 roentgens. Fifty-eight experienced skin lesions which have healed, and 39 showed some temporary loss of hair. The internal deposition of radioisotopes, including strontium-90, was small.

The Rongelapese have been given periodic medical examinations. The condition of the group two years after the fallout was summarized as follows in the report of the medical team which conducted the examinations:

"The medical survey of the Rongelap people two years after exposure to fallout radiation shows that the people appear to have been in generally good state of health and nutrition and are making satisfactory recovery from their radiation exposure. Serious illness has occurred in two individuals but neither these illnesses nor clinical findings in other individuals can be attributed to radiation effects. One death in May 1956, that of a 46-year-old Rongelap man, was due to hypertensive heart disease. Previous examinations had shown that the disease was undoubtedly present at the time of exposure to fallout radiation.

(more)

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There is evidence of continued improvement of hemopoiesis. The mean lymphocyte count is slightly increased over the one-year levels, but is still slightly below the mean control count. The mean platelet level is about the same as found at one year after exposure and is still slightly below the control level. The mean neutrophils count at one year after exposure had reached the control level. The delay in complete recovery of lymphocytes and platelets is similar to that reported in the two-year follow-up studies of the Japanese casualties of the atomic bombings. Evidence from the Marshallese exposures indicates that the lowered levels of these blood elements have not lowered the resistance of the people to disease, and the present levels are not considered to represent a serious condition.

[illegible] changes in the skin from the beta irradiation continue to show improvement. Pigment accretions are still evident in the chest and in four of these cases is also scarring with some adherence of the skin to the underlying tissues. However, there is no gross evidence of tissue breakdown or malignant changes in any of these lesions, and surgical repair is not considered necessary at this time. Histological examination of skin biopsies at sites of radiation lesions shows residual effects of radiation damage, but no evidence of premalignant or malignant changes.

Ophthalmological survey reveals that there are no radiation-induced lens opacities, and the incidence of ocular lesions is similar in exposed and control populations.

The radiochemical analysis of the urine of the Rongelap people shows measurable activity which is largely due to cerium-144-praseodymium-144 with only slight activity due to strontium-90. The body burden of these isotopes is estimated to be well below the permissible levels. Examination

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of bone specimens in the case of the one man who died shows no radiation that can be definitely associated with fallout deposition in the bones. Studies of radiographs of the femurs of the exposed children show no evidence of any bone defects from possible deposits of radionuclides.

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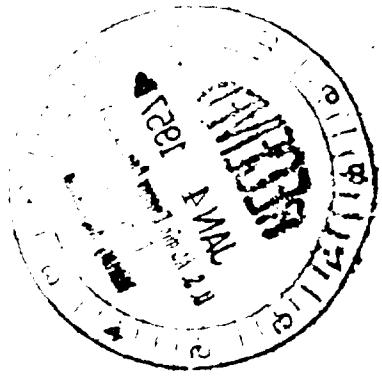

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