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MAR 1961

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

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2. After the relatively heavy fallout on the Marshall Islands March 1, 1954, 82 inhabitants were evacuated first to Enderbury and then to the Island of Erit on Majuro Atoll where they are now living. There have been public statements, occurring 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. S. Senate Select Committee on Veterans' Affairs, March 27, 1956 by Mr. R. Tammis Lee, Special Representative of the Administering Authority for the Trust Territory of the Pacific Islands.

3. Since the Rongelapese are now maintained by the United States Government with little regard for opportunities to actively improve their livelihood, there is the risk of an effect of inducement to the detriment of the best interest of the Rongelapese.

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DEPARTMENT OF ENERGY DECLASSIFICATION REVIEW	
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AND REVIEWER DATE	APR 1961
AUTHORITY	APR 1961
NAME:	John J. Doherty

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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 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.

STAFF JUDGMENT

a. The Divisions of Military Application, Information Services, Classification, Office of Special Projects, and Office of the General Counsel concurred in the recommendation of this paper.

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RECOMMENDATION

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

a. justify 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 "B" is a draft announcement which will be proposed to the Department of Interior for issuance when the Department determines that the natives can return.

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

DIRECTIONS

APPENDIX "A" - Background and Discretion . . . . .	-----
APPENDIX "B" - Rehabilitation Plans . . . . .	-----
APPENDIX "C" - Draft Letter to JCAG, NLC, and GAC . . . . .	-----
APPENDIX "D" - Draft Announcement . . . . .	-----

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APPENDIX A

BACKGROUND AND REACTION

REMARKS

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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 Bikini Atoll Testing Center. Between the 30th and 30th hour after detonation the inhabitants were evacuated to Rongerik 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 Eiki (Majuro Atoll) where they are now living.

2. There have been public statements, contained 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 Rongerik 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 McKey, 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 Rongerik 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 Rongerians 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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DISCUSSION

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4. States 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 62 people received about 175 roentgens while body gamma radiation, and a second group of 18 received 65 roentgens. The most highly exposed group might have received an additional 100 - 150 rads 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 80 individuals exposed, 45 experienced superficial skin lesions and 13 deep lesions while 35 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:<sup>\*</sup>

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 Marshall 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. Comard, 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 17 cases and in four of these there is also scarring with some adherence of the skin to the subcutaneous tissue. However, there is no gross evidence of tissue destruction 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 show 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 cataract 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 above 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."

### B. External Gamma Dose Rates on Rongelap Atoll.

1. 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 decayage of the 33 year half-life cesium-137. The latest survey of Rongelap Island at the end of July 1976 showed a range of values from 0.2 - 0.3 milliroentgen 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 Zeke. Since this relatively fresh radioactive material,

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the decay will be more rapid so that the dose rates on Bongelap Island at the time of repatriation should be less than 30 milliroentgens/week.

The maximum permissible external gamma exposure to adult workers recommended by the National Committee on Radiation Protection for 0.3 roentgens/week with an added restriction (now pending approval by ICRP), that the maximum permissible instantaneous dose at any age,  $D_1$ , equals 3 times ( $D_{10}$ ), 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 natural and other man-made sources, and background shall not exceed 15 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 Bongelap Island would not greatly exceed (if at all) 0.3 roentgens for the first year of repatriation, with lesser doses in subsequent years.

8. The gamma dose rates on other islands of Bongelap Atoll have not been followed as closely as on Bongelap but the data suggest the relative 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 Bongelap.

9. The Bongelapese go on fishing expeditions to other islands including those showing both higher and lower activity. However, these Bongelapese 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 Bongelap Island.

C. Food Supply

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D. The basic data on the normal food supply of the Bongelapese

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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 analysis.

11. The intake of potassium-40 in the food chain is strontium-90. For an adult under the maximum permissible body burden is 1000 Sunshine Units (1000 microcuries of  $K^{40}$  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 360 Sunshine Units. (The data on land crabs shown in Table One are from the Island of Kabeile which is more heavily contaminated than the Island of Rongelap). However, if crabs were eliminated from the diet, the intake might average about 167 Sunshine Units. Further, elimination or restriction of the consumption of jambon 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 Ebelille (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 Ebelille. 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 Ebelille Island.

**D. Estimated Future Body Burden of Strontium-90**

14. Although precise values have not been established, there is a reasonably fair correlation between the ratio in the food supply and the ratio in the body. All the above factors and related to this date suggest a ratio of about 100:1 for the body to the diet.

15. If the Rongelapans returned to their food, land, their diet would be supplemented by vegetables (and fish, which contain) foods, especially land crabs. The strontium would be cleaned out and purified from the diet.

16. Considering the present level of the strontium-90 in the Rongelapans and the life style of the Pacific Islands area, in general, the ratio of diet with diet in the food chain (except land crabs).

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 Rongelapans would be substantially less than 100 mc of Sr<sup>90</sup> per gram of calcium. Limiting the intake of pandanus would further reduce the estimated Sr<sup>90</sup> 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 before ~~RESTRICTED DATA~~ were released.

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E. Medical Surveillance

18. If the Bengaliapese were returned to their home island, a program would be inaugurated of continuing medical inspections. The Bengaliapese would be examined over a month and complete medical examination performed once a year by an American Doctor. A radio would be provided on Bengaliap for communication with the Trust Territories office on Enewetak (Emajelek Atoll) where a plane would be available at all times for any emergency. A fully equipped dispensary would be provided on Bengaliap 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. Radiobiological Research

19. Plans are currently being developed for a continuing and long range program for radiobiological researches on and around the Marshall Islands.

G. Animal Studies on Bengaliap

20. Of considerable interest are the results obtained from animals (swine, chickens, ducks, rats) living on the Island of Bengaliap 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 200 roentgens for the two years.

21. Of equal interest is the body burdens of strontium-90 in these animals. The analyses have not been completed yet.

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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 spans, 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 Bangladeshi (under the condition stated) would be substantially less than 100 microcuries per gram of calcium.

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APPENDIX B

REHABILITATION PLANS

1. The Division of Military Application has had plans prepared for the reconstruction and rehabilitation of houses and facilities on Rongelap. These plans have been incorporated into a comprehensive program for the return of the Rongelap people to their home area 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 matter), the Commander JTF SEVEN, and the Division of Military Application have approved this program. The cost of the program is estimated at approximately \$175,000. Of this amount the Department of Defense is contributing about \$125,000 as the sum of rental of an LST to support the operation for the duration of the project and for subsistence support of the Rongelap people for one year after their return to Rongelap. The remaining \$50,000 for reconstruction of the villages at Rongelap, rehabilitation of facilities there, and emergency radio equipment, will be provided by ADC.

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

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and JTF BETTER included \$24,000 for this purpose in their FY 6 budget.  
Because of this budgeting by JTF BETTER, ABC has never 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 re-  
paired and the entire village must be reconstructed. The cost of this  
reconstruction and other rehabilitation measures is \$250,000. In an effort  
to resolve this problem and in consonance with CENPAC's statement, we requested  
CEO (the Executive Agent of the Joint Chiefs of Staff) to provide funds for  
the construction on Rongelap. The CEO reply (copy of letter is attached) states  
that he do not see the cost of replacement of the Rongelapese home considered  
a K.I.A. responsibility. In view of this situation ABC will accept the responsi-  
bility and funds for the reconstruction and other rehabilitation measures  
of Rongelap and DIA will send the \$250,000 available out of the ABCG operating  
fund.

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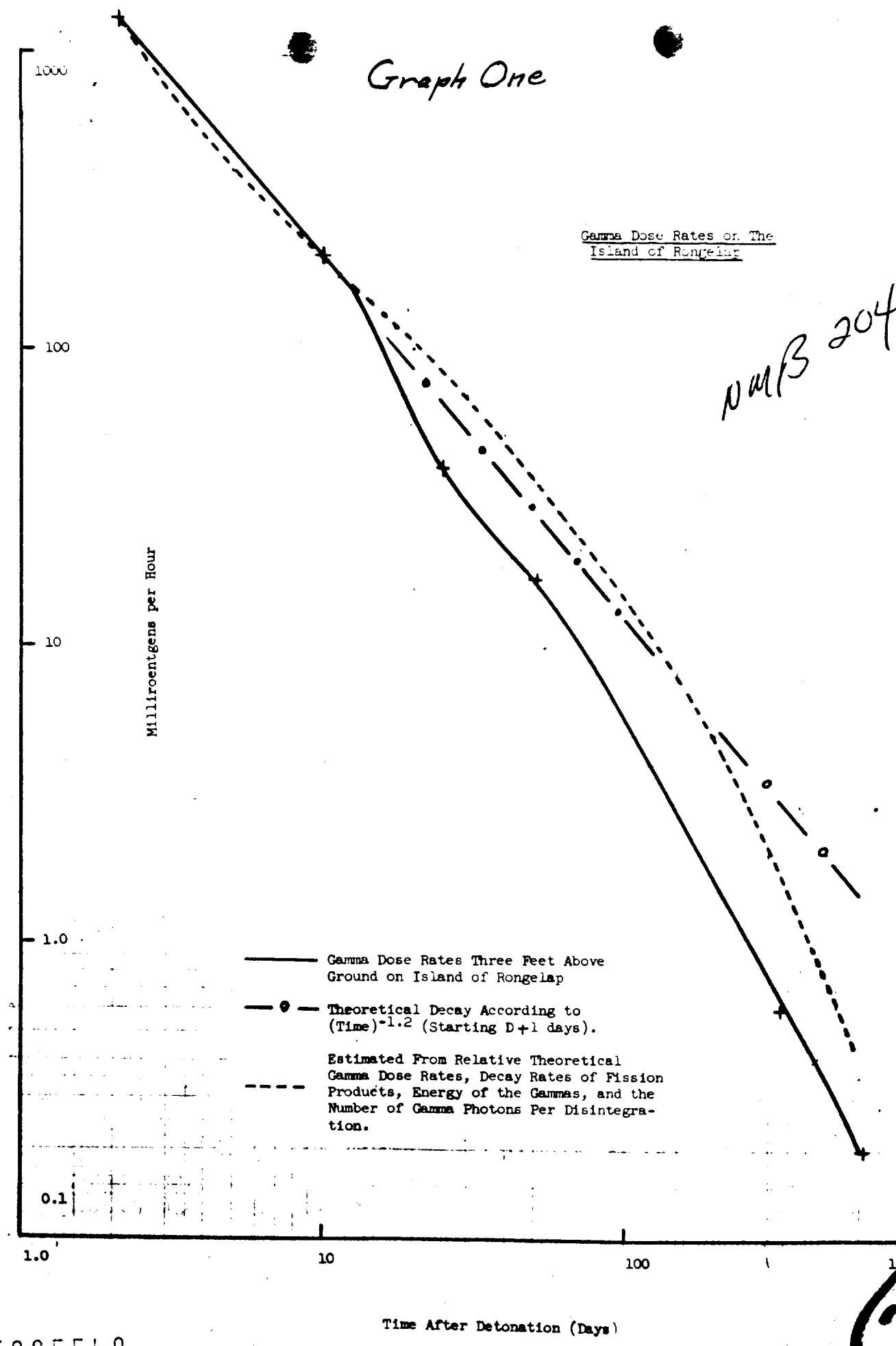
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**JOHN WILSON 40 Years Book Trade is a  
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Daily Intake; Pounds/day/ Person	Calcium Content (gas Ca/gm wet weight)	Daily Intake of Ca (gas)	Fraction of Strontium-89 Distribution		Content of Total Sr-89 (S. V.)	(Column B x E)
			Total Ca Intake	Ca (gas)		
1.22	0.001	0.56	0.615	7.73	500	92.0
0.36	0.001	0.16	0.184	0.12	5	7.26
0.1	0.001	0.038	0.021	0.009	250	1.38
0.09	0.00064	0.025	0.029	0.063	300	(252.0)
0.09	0.0001	0.004	0.006	0.004	40	0.02
0.09	0.0001	0.001	0.003	0.003	260	0.86
0.01	0.0006	0.0004	0.0004	0.0004		
		0.0006	0.0006	0.0006		

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B. - *Vestiges v. linea*

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 St. Thomas than ~~Native~~ here to be all land crabs.

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TABLE TWO

ANALYSIS OF A DISCHARGE COLLECTOR  
ON ISLAND OF JAMAICA, DECEMBER 1926

<u>For</u>	<u>g/g. Cr<sup>39</sup>/cm<sup>2</sup></u>	<u>C<sub>1</sub>/cm<sup>2</sup> sec (sec)</u>	<u>S. H.</u>
1.00 mm	25.00	20.0 ± 3.0	10. ± 2.
1.00 cm <sup>2</sup>	41.0	17.0 ± 2.0	6.0 ± 1.

\* Dry weight of a 1-mm. layer.

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APPENDIX C

DRAFT LETTER TO JEW, NLC AND GAC

1. After the relatively heavy fallout on the Marshall Islands March 1, 1956, 82 inhabitants were evacuated first to Majuro and to Rongerik where they are now living. There have been public statements, occurring 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 Rongerik 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. Vernon D. Mallay, Special Representative of the Administering Authorities for the Trust Territory of the Pacific Islands.

2. General radiological surveys of the Marshall Islands especially Rongerik Island, have been made during the past two and one-half years. The latest survey (Aug. 23-24) (U.S.) indicates a presence of a residual contamination on the Island of Rongerik, but at a level that is acceptable from health point of view, both for the potential external gamma radiation exposure and the plutonium content in the food supply, with the possible exception of land crabs.

3. Therefore, the position of the Atomic Energy Commission is that the Rongerikans could be returned to their home island as soon as rehabilitation procedures on the Island of Rongerik 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 Enewetak Proving Ground on March 1, 1954, will be returned to their home island on \_\_\_\_\_ (date) the Department of the Interior announced today.

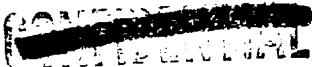
The decision to return the Rongelap inhabitants was made after the Atomic Energy Commission had advised that it would be safe for them to live on the atoll. Periodic radiological surveys of the atoll have been made under the sponsorship of the Commission since March 1, 1954. According to the Commission, 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 Ejet 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 whole body gamma radiation, and a second group of 10 received 65 roentgens. Fifty-eight experienced skin lesions which have healed, and 35 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."

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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 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 Marashige 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.

"Residual changes in the skin from the beta irradiation continue to show improvement. Pigment accretions are still evident in 10 cases and in four of these there is also scarring with some adherence of the skin to the subcutaneous tissue. However, there is no gross 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 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.

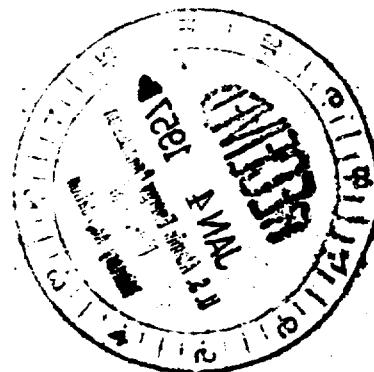
"The radiochemical analysis of the urine of the Rongelap people shows measurable activity which is largely due to cerium-144-praseodymium-144 with only slight activity due to strontium-90. The body burden of these isotopes is estimated to be well below the permissible levels. Examination

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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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