Bikini Atoll inhabitants were moved first to Rongerik Atoll and then finally to Kili Island. In 1968 President Johnson declared Bikini Island safe for resettlement.

Rehabilitation efforts of Bikini Atoll began in 1969. These activities required persons to reside on Bikini Island. By April 1978, the population numbered 143 persons and consisted of caretakers and agriculturalists employed by the Trust Territory plus a few Bikini land owners and their families who found their way back via Trust Territory trade ships. This population remained on Bikini Island until they were relocated in August 1978 to Kili Island in the southern Marshalls and to Ejit Island, Majuro Atoll.

During the rehabilitation and repopulation years, the medical services already provided by Robert Conard, M.D. and the Brookhaven Medical Team on other atolls of the Marshall Islands were expanded to include sick call and body burden measurements on Bikini Islands. This team made body burden measurements in 1974 (CO 75) and in 1977 (CO 77). In August 1977, the responsibility for providing body burden measurements was transferred from the Medical Department to the Safety and Environmental Protection Division (SEP) at Brookhaven National Laboratory. The 1978, 1979 and 1980 body burden measurements of the Bikini population were conducted by the SEP organization.

This report summarizes all personnel monitoring activities which were conducted on the Bikini Atoll residents from 1970 through 1980. Using the body burden data along with the reported residence interval, individual dose equivalents have been calculated and are also reviewed.

A. Body Burden Measurements - Radiochemical Analysis of Urine

Prior to the assumption of responsibility for the total personnel monitoring program by the SEP Division in 1977, analysis of urine samples for

fission products and transuranic elements was conducted under contracts to Battelle Pacific Northwest Laboratories (BNWL) and Environmental Measurements Laboratory (EML). Analytical procedures for processing and analysis are similar and can be found in OL 81.

Urine data collected after 1977 were processed by the SEP Division. Sample collection and analysis procedures used by this division are outlined below.

1. Urine Collection Protocol

Twenty-four hour and five day urine samples were collected from Bikini Atoll residents. Twenty-four hour samples were used to define fission product body burdens while the five day urine samples were used both to determine fission products and transuranic body burdens. The normal procedure was to distribute the urine collection bottles just after the individual received a whole-body count. Individuals were informed to collect all urine excreta in the bottle for the specified collection period. Sample containers were collected after the selected sample period had elapsed.

Once collected, acidification procedures were followed to inhibit biological degradation of the sample. From 1977 to 1978, urine bottles were pretreated with 15 ml of a 10% thymol-alcohol solution. After urine collection, 10 ml of HNO_3 was added. This procedure was halted because of skin discomfort caused by thymol contamination during urine collection. In 1979 and 1980, 15g of boric acid was added to each one liter urine bottle after sample collection. Both acidification techniques minimize sample degradation. After acidification, samples were packaged and shipped to BNL for analysis.

Twenty-four hour urine samples are analyzed for gamma emitting nuclides and ^{90}Sr. Samples are first placed in an ultrasonic cleaner to loosen

and disperse solids. Total volume is measured and a 300 ml aliquot is then drawn for gamma analysis. Gamma spectroscopy is performed with a 125 cc active volume, 26% relative efficiency Ge(Li) detector which is connected to a computer based multi-channel analyzer. Samples were counted from 4000 to 10000 seconds depending on the activity in the sample. When gamma analysis was completed, the aliquot was returned to the initial sample and the total volume was analyzed for ^{90}Sr - ^{90}Y.

The sample is acidified to a pH of 1, stable strontium and yttrium carrier along with ^{85}Sr tracer are added to the sample. The sample is chemically processed according to the procedure reported in Appendix A. The final processing step results in a ^{90}Y precipitate which is used to determine the ^{90}Sr urine activity concentration. Sample results are corrected for chemical yield and radiological decay of ^{90}Y post separation from ^{90}Sr. Because of the duration between sample collection and sample analysis (in excess of two months) ^{90}Y and ^{90}Sr are in secular equilibrium at time of sample analysis.

^{137}Cs and ^{90}Sr urine activity concentrations for all pooled samples are reported in Table 1. ^{137}Cs and ^{90}Sr urine activity concentrations and the ^{90}Sr body burden at time of removal are reported in Tables 2 through 5 for Bikini Atoll residents sampled between 1973 and 1980. The ^{90}Sr data were used to calculate the bone marrow dose-equivalent commitment.

Five day urine samples were also collected from 1974 to 1978. These samples were analyzed by Battelle Northwest Laboratory (BNWL), Environmental Monitoring Laboratory (EML) and Los Alamos Scientific Laboratory (LASL) for fission products and transuranic nuclides. The results are presented in Table 6. All transuranic analyses were carried out by alpha spectroscopy. The minimum detectable limit was 3.7×10^{-5} Bq for all analysis systems.

Five samples were obtained sequentially from 16 persons during the January 1979 field trip to determine the variability inherent in the 24 hour urine sample program. The results of this study are listed in Table 7. For ^{137}Cs, the mean biological and counting variability (one standard deviation) associated with a single urine sample is 32%. For ^{90}Sr, most of the results were less than the minimum detection limits of the system or the average of the 5 urine sample results had an associated standard deviation which was larger than the result. Consequently, only 6 sample results were used to determine the biological and counting variability of the ^{90}Sr urine data. The mean standard deviation associated with this result is 65%. The counting error contributes 15% of the variability while other sources of variation account for 50%. These other sources are most likely related to the day to day metabolic changes normally exhibited by an individual.

B. Whole-Body Counting

Whole-body counting measurements on the Bikini population that were conducted in 1974, 1977, 1978, 1979 and 1980 are presented. The body burden measurements were performed by two different organizations; consequently, the experimental design included a mechanism to ensure that previous and current results are directly comparable. Key detection components were duplicated and the systems were calibrated in the same manner (CO 63). The operational procedures and counting geometries were basically similar, and an intercomparison study was conducted using Marshallese and Brookhaven personnel to ensure system comparability.

1. Instrumentation

The detector chosen for field use by both Brookhaven organizations is a 28 cm diameter, 10 cm thick, sodium iodide thallium activated scintillation

crystal. It is optically coupled to seven, 7.6 cm diameter low background magnetically shielded, photomultiplier tubes. The signal output from each photomultiplier tube is connected in parallel and the combined output routed to a preamplifier/amplifier and then to a microprocessor-based computer/pulse height analyzer (PHA). The PHA data is stored on a magnetic discette, and the results may be analyzed either in the field or at BNL using a matrix reduction, minimization of the sum of squares technique (TS 76).

2. Calibration

Analysis of spectra by the matrix reduction technique requires that the computer library contain individual standards for each radionuclide that is expected in the field measurements and that the field measurements and standards be the same geometry.

To accomplish this, a review of the previous whole body counting data (CO 75, CO 77) indicated the need to calibrate for ^{40}K, ^{60}Co and ^{137}Cs. The present system was calibrated in 1978 using an Anderson REMCAL phantom (CO 63) and in 1979 using a BOMAB bottle phantom. Each radionuclide was introduced into the phantom's organs in an amount equivalent to the fraction in organ of reference of that in total body as defined by the ICRP in Publication 2 (ICRP 59). Under conditions of continuous exposure where equilibrium has been reached these fractions are correct. This is achieved for the nuclide ^{40}K. The nuclides ^{60}Co and ^{137}Cs are in non-equilibrium throughout the exposure and post exposure intervals. Cesium is taken up principally in cells with 80% to muscle and 8% to bone (SP 68) where the mean residence times are both 160 days. This implies a nearly uniform distribution of the nuclide throughout the whole body. Thus, with 88% of the uptake spread throughout the body with a long halftime and with the remaining 12% of the uptake in the extracellular fluid, which retains

cesium with a short halftime (1.0 day), the source geometry will not be significantly affected with respect to an ingestion/excretion equilibrium of cesium within the body. ^{60}Co is not distributed uniformly throughout the body with 20% of an oral intake being retained in the liver with a very long biological halftime and about 80% being cleared from the extracellular fluid to out of the body with a biological halftime of one day or less. Thus source geometry will be significantly effected with respect to ingestion/excretion equilibrium of cobalt within the body.

To verify the activity in the phantom prior to use as a standard, an aliquot of the phantom solution was counted on a lithium drifted germanium detector which was calibrated with NBS standard sources. The phantom was then counted in a shadow shield whole body counter (WBC) (PA65). The whole body counting system consists of a stationary crystal and stationary bed. The counter detects radioactive material located principally in the thorax, so positioning of the phantom and the in vivo counting subjects must be as similar as possible. To facilitate reproducible counting geometries, each subject and the standard phantom was positioned such that the central axis of the crystal intersected the central axis of the body about 25 cm below the sternal notch. The distance between the surface of the bed and the bottom of the detector is 32.4 cm. The total system efficiencies for ^{40}K, ^{60}Co and ^{137}Cs are listed in Table 8 as are typical minimum detection limits for these nuclides.

In 1979, a shadow shield chair geometry replaced the shadow shield bed configuration. The chair whole-body counter used the same electronics as in the past. The system was calibrated using a 3omab bottle phantom. Uniformly distributed activity concentrations of ^{40}K, ^{60}Co and ^{137}Cs were used for system calibration. Verification of phantom activity was accomplished as previously

described. The chair geometry detects radioactive material located between the neck and the knee. The total system efficiencies are the same for the chair and bed geometries.

3. Quality Control

The quality control (QC) program consisted of a cross comparison of the radionuclide amounts estimated to be in the phantom volume versus NBS calibration standards. Agreement between the two activity concentrations is within plus or minus 5% for all radionuclides. Other quality control mechanisms employed were repetitive counting of secondary point source standards, multiple counts of Brookhaven personnel, repetitive counting of the Marshallese (blind duplicates) and an intercomparison study.

Two point sources were used in the QC program. Initially ^{137}Cs source, which has been used by the BNL medical surveys in previous years, was used to monitor potential changes in system resolution and efficiency as function of time. In subsequent years, a ^{137}Cs + ^{60}Co point source, was used for zero, gain, resolution and efficiency determination.

Replicate counting of Marshallese was conducted on 5% of the subjects. Results indicate that the data obtained from the field whole body counting system is reproducible to within plus or minus 6%. Almost all of this error is due to variable subject position. When subjects remain stationary, the difference between sequential results is plus or minus 1%.

An intercomparison of whole body counting systems was conducted between the field system and the whole body counter operated by S. Cohn for the Brookhaven Medical Department. Persons used in the study included 13 Marshallese with measurable ^{137}Cs body burdens plus several Brookhaven employees with current whole body counting records at the Medical Department. The results

of the study indicate that ^{137}Cs and ^{40}K body burdens which exceed the minimum sensitivity of both systems are in agreement to within plus or minus 5%.

RESULTS

Persons listed in Tables 9 through 12 have been identified as medically registered residents. This terminology means these individuals reported to BNL doctors for sick call during the April 1978 field survey and were assigned a registration number. For continuity, these numbers were retained by SEP for radiochemical analysis of urine identification. Individuals who donated urine for analysis of ^{90}Sr and ^{137}Cs in 1979 and did not report for sick call during the April 1978 survey at Bikini Atoll have been termed non-medically registered. Persons who had not resided at Bikini Atoll for more than three years as of January 1979 or had never resided at Bikini Atoll are labeled as comparisons.

Tables 9 and 10 present a list of adult individuals who were counted in 1974 (CO 75), 1977 (CO 77), 1978, 1979 and 1980. There is a general increase in body burdens of adult males from 1974 to 1977 by a factor of 13.3, and from 1977 to 1978 by a factor of 1.8. The general increase for adult females from 1977 to 1978 was slightly higher than that for males over the same period. In most cases, the January 1979 data are significantly lower than the 1978 with an averaged reduction in the ^{137}Cs body burden by a factor of 2.9. The May 1979 and August 1980 data follow the expected decreasing trend.

Tables 11 and 12 summarize the ^{137}Cs body burden data collected for adolescents and children. It must be noted that data reported here are uncorrected for height and weight differences between subjects and the standard, up to 15% deviations have been reported for adult data (MI 76). Body burdens of adoles-

cents and children reported in Tables 11, 12 and 13 were computed using efficiencies obtained from standard adolescent and juvenile Bomab phantoms.

Table 13 summarizes the ^{137}Cs data that are presently available. It shows the mean standard deviation from the mean, and range of values reported for the sampled population segregated by sex and age, as it has changed from 1974 to 1980.

Table 14 compares the observed reduction in ^{137}Cs body burdens from April 1978 to January 1979 with the reduction in ^{137}Cs body burden that was expected as a result of relocating the Bikini population in late August 1978. Values for the biological removal rate constants were obtained from NCRP Report 52 (NRCP 77) and ICRP Publication 10A (ICRP 71).

Table 15 presents the long term biological removal rate constants for individuals in the Bikini population as determined from sequential measurements in 1979 and 1980. Table 16 presents population subgroup mean values for the ^{137}Cs long term biological removal rate constant. The data are in good agreement with ICRP publication 10A (ICRP 71) and NCRP report 52 (NCRP 77).

In addition to the followup whole body counts performed on persons who were initially counted in April 1978 on Bikini Atoll, persons who had resided at Bikini Atoll and were concerned about their current body burdens were counted. Dependents of adult Bikini Atoll residents were counted regardless of their residence history. Results of this work conducted in January 1979, May 1979 and August 1980 at Majuro Atoll, Kili Island and Jaluit Atoll are presented for adult males, adult females, adolescents and juveniles in Tables 17 through 20 respectively. Most of the ^{137}Cs body burdens are at levels which are consistent with world fallout contamination. Some dividuals have higher than anticipated ^{137}Cs body burdens. Interviews with these subjects revealed that they either

of local food products from contaminated atolls or had recently visited these atolls.

Population Census and Residence Atolls

^{137}Cs body burdens from May 1979 of individuals whose residence history on Bikini was minimal and who had not recently (within 2 years of August 1978) resided at Bikini Atoll were grouped together to form a comparison population. In August 1980, a second comparison population was selected from Majuro Atoll and Kili Island residents who had never resided on Bikini Atoll. The whole-body counting data for this group is presented in Tables 21 through 24. Table 25 summarizes the ^{137}Cs data for both the May 1979 and August 1980 comparison populations. The comparison population data were used in the computation of the ^{137}Cs long term biological removal rate constants reported in Table 15.

Table 26 shows the number of April 1978 Bikini residents that were recounted on subsequent field trips. Column 2 lists the total number of people counted on each field trip. Column 3 lists the total number of persons who resided at Bikini Atoll in April 1978. Column 4 lists the number of persons who were medically registered in April 1978. The difference between column 3 and 4 reflects the presence of Rongelap or Utirik residents who had moved to Bikini Atoll between 1970 and 1978. Column 5 lists the number of persons counted that belong to the medically registered population listed in Column 3. Column 6 lists the number of persons counted who reportedly resided on Bikini Atoll at the time of relocation in August 1978. Column 7 lists the number of non-relocated former residents counted.

Table 27 presents the number of adult males, adult females, adolescents and juveniles which composed the medically registered, relocated population sampled in 1978 and 1979. Table 28 presents the same sample breakdown for the

non-medically registered population and medically registered children counted only in 1979.

Table 29 summarizes the residence locations of all persons counted. Tables 30 and 31 break this data down by sex, age and registry status for the January 1979 and May 1979 field trips. Tables 32 through 39 provide individual counting dates and residence atoll or island at time of counting. Table 40 lists registry numbers, age, name, sex and last known location of individuals who have not been whole body counted since their departure from Bikini Atoll.

DOSIMETRY

The dose equivalent to Bikini Atoll residents during their residency period was the result of internal and external sources of radiation. In 1975, external exposure measurements were performed (GR 79) at Bikini Atoll. Using these data and an estimate of the Marshallese living pattern developed by Gudiksen (GU 76), an estimate of the mean yearly net exposure rate for adult males, adult females, adolescents and juveniles was developed and reported in a previous publication (GR 79). The net external dose equivalent for each individual was determined as the product of the mean net exposure rate, the residency interval and a correction factor for radiological decay and is presented in Column 5 of Table 41.

The dose equivalent commitment for bone marrow due to ^{90}Sr has been calculated for individuals from urine data reported in Tables 2 through 5. The symbols, constants and equations used are presented in Appendix B. The retrospective dose equivalent was determined using several assumptions. First, persons returning to Bikini Atoll returned with an initial ^{90}Sr body burden at baseline levels. Second, while residing on Bikini Atoll, individuals were subjected to a constant and continuous uptake of ^{90}Sr through the ingestion pathway.

Finally, once strontium is ingested and absorbed into the blood, ^{90}Sr disintegrations are evenly distributed in cortical and cancelous bone tissues. Each individual was assumed to exhibit different ^{90}Sr ingestion rates. The daily activity ingestion rate was determined from urine data. The prospective dose equivalent was determined with the assumption that ingestion of ^{90}Sr ceased when the individual departed from Bikini Atoll. Disintegrations resulting from residual strontium-90 in bone post departure were calculated for an infinite post residence interval versus a fifty year period commonly chosen for radiation workers. The dose equivalent commitment, the sum of the retrospective and prospective dose equivalents, are listed in Table 41, Column 3.

The retrospective and prospective dose equivalent resulting from the ingestion of ^{137}Cs have been calculated for members of the Bikini Atoll population. The symbols, constants and equations used are presented in Appendix C. Data used for these calculations were obtained from Tables 9 through 12 of this report. Because the ^{137}Cs body burden data dramatically increased between 1974 and 1978, constant and continuous uptake of ^{137}Cs could not be assumed. Consequently, the dose equivalent during the uptake interval was calculated using a monotonic increasing uptake regime. The total residency period, was divided into three intervals during which constant and continuous ingestion of ^{137}Cs was assumed. These periods, January 1, 1970 to December 31, 1975, January 1, 1976 to April 5, 1977 and April 6 to August 31, 1978, were determined based on the bioassay data and the maturation period for vegetation planted in the early 1970's. It was also assumed that the initial ^{137}Cs body burdens of individuals returning to Bikini Atoll were at baseline levels. The prospective dose equivalent was determined with the assumption that the ingestion of ^{137}Cs ceased after

an individual departed from Bikini Atoll. The dose equivalent commitment as determined from these calculations are listed in Table 41, Column 4.

The total body dose equivalent commitment listed in Column 6, Table 41 is the sum of Columns 4 and 5. The total bone marrow dose equivalent commitment reported in Column 7 was obtained by summing the data in Columns 3, 4 and 5.

Figures 1 through 3 illustrate the distribution of the dosimetric information obtained from Table 41. Figure 1 describes the distribution of residence interval, net external exposure, ^{90}Sr bone marrow dose equivalent commitment, ^{137}Cs total body dose equivalent commitment, the total bone marrow and total whole body dose equivalent commitments for the Bikini population sampled in April 1978. Figure 2 presents this information for males only while Figure 3 presents the female dose distribution.

Discussion of Results

^{90}Sr body burdens do not appear to be significantly different for males, females and adolescents; however, the ^{137}Cs body burden as summarized in Table 13 indicates that male versus female adult body burden means are significantly different. There was also a small difference between the body burdens of the adult females and all children. These differences suggest that dietary and living patterns change as an individual matures thus effecting the body burden.

This problem was addressed for external exposure in an earlier report (GU 77) and an estimated living pattern was developed for children, adult females and adult males. This information indicates that the adult males spend 5% more of their time in an environment which is radiologically substantially higher in activity than do the adult females. If one assumes that 5% more of the dietary uptake of radioactive materials occurs due to the longer duration of time spent in the interior section of the island, then one would expect that the mean adult

male body burden would be higher than the mean adult female body burden by a factor of 1.2. The ^{137}Cs data collected in April 1978 indicates that the mean adult male body burden is 1.5 times higher than the mean adult female body burden. Likewise, the mean child body burden for ^{137}Cs would be expected to be lower by a factor of 1.8. Our data indicates that the mean child ^{137}Cs body burden is a factor 2 less than the mean adult male body burden.

Other factors which influence the body burden include the age of the individual, the residence interval on Bikini Island and family relationships. ^{137}Cs body burden results weighted by the individual's body potassium and ordered by sex, age and residence interval were tested to determine the influence of age and residence interval on the body burden. The Bartlett test for homogeneity of variance was used to determine if the sample populations under consideration had the same variances. If the sample variances were the same then a one way analysis of variances was performed on each data set. If the sample variances were not equal, then the data was transformed by taking the log (ln or square root) of the activity and the test for homogeneity repeated. When the data passed the Bartlett test for homogeneity, the one way analysis of variance was performed. The data were grouped by sex because the mean of the adult male and adult female ^{137}Cs body burden were significantly different.

The result of the one way analysis of variance with age of the individual being the variable suspected of influencing the weighted ^{137}Cs body burden results indicates that no age or age group significantly influences the results. This implies that indigenous food products are consumed at a uniform rate by all individuals and that one age group does not have a preference for a type of food not found in the diet of other generations.

The result of the one way analysis of variance with residence time on Bikini as the variable of concern is unclear. The statistical analysis for adult males indicates that persons with residency periods greater than 6 years have higher weighted ^{137}Cs results than the rest of the male population. For adult females, the group residing on Bikini for 3-6 years have lower weighted ^{137}Cs results than the rest of the adult female population. Residency once past 1 year, was expected to have no effect on the ^{137}Cs body burden. This expectation was based on the mathematical models used by ICRP Publication 10A (ICRP 71) which indicate that equilibrium with the environment would be reached within the first 2 years of exposure to a constant uptake of ^{137}Cs.

Data for these analyses were grouped in age and residency intervals that would provide a minimum sample size of five data points per sample interval. The small sample size and large variance of the grouped data cast serious doubt as to the significance of the results generated by our statistical analysis.

The last variable considered was the impact of the social structure in the Marshallese society. This factor seems to be highly significant. Table 42 lists the ^{137}Cs body burden results ordered by family ranking. The family rank was accomplished by assigning the family placement number to the adult male's ^{137}Cs body burden. Examination of this table reveals that the family follows the pattern set by the adult male. This pattern does not follow a direct one to one relationship; however, the trend is apparent.

There are several possible reasons for this trend. First, individuals from the same family have a similar philosophy regarding the quantity of indigenous food crops that they want to consume each day. Second, the family only uses locally grown food products that are obtainable from that family's land. The family wato is also listed in Table 35. Finally, the significance of

processed food on the family diet will be a function of the first two items listed above and the willingness of the family to purchase food.

The whole-body counting data also indicates that previous estimates of the type of food and amount of various components in the Bikini diet did not adequately describe the dietary patterns that existed between 1974 and 1978. As certain local food crops, coconuts, became available in 1976, they were incorporated into the diet in the form of jekaru (the water sap of the coconut tree), jekomai (a syrup concentrate made from jekaru) and waini (drinking coconuts). The maturation time of the coconut tree is 5-7 years. Consequently, one would expect to observe a steady increase in the ^{137}Cs body burden through 1978 at which time an equilibrium body burden would be reached. Comparison of the observed reduction in the ^{137}Cs body burden from April 25, 1978 to January 24, 1979 with the expected reduction in the body burdens from September 1, 1978 to January 24, 1979 yields almost identical results for the adult male and adult female groups as shown in Tables 7 and 8. This implies that the Bikini population could have attained equilibrium and that the body burdens on September 1, 1978 were not significantly different than those measured in April 1978. The child data do not agree with the expected value; however, the difference is not beyond the range of half-times listed in NCRP Report 52 (NCRP 77). Although NCRP Report 52 lists a mean half-time for children ages 5 through 15, it does not specify the age distribution of the sample. Most of the Bikini children were in the 5-10 year category; hence, one would expect the observed reduction factor for this group to be somewhat higher than the expected value.

Although the data indicates that the ^{137}Cs body burdens may not have increased between April and September 1978, this is not assurance that the body

burdens would not have increased when new dietary items like pandanus and breadfruit became available for daily consumption.

Furthermore, while the population may have been near equilibrium with their April dietary uptake, individuals within the population may not have been. This was apparent in the adult male ^{137}Cs body burden data where two individuals show no decline in activity between the April 1978 and January 1979 whole body count. In one case, the individual was present on Bikini for only 5 months prior to the April 1978 count. This places the individual at approximately 60% of his equilibrium body burden value. In the second case, there seems to be no clear explanation for the lack of any reduction in the body burden, however

1. the individual may have lived away from Bikini prior to the April count; hence, equilibrium was not established at the time of counting, or

2. the individual changed his diet pattern between April and September.

These deviations from the norm do not alter the conclusion that equilibrium or near equilibrium may have been reached for the population as a whole for ^{137}Cs. Indeed, they illustrate variations about a mean value.

Data collected between January 1979 and August 1980 also indicate that certain individuals have been ingesting ^{137}Cs at a rate which exceeds that of the sample population. This could in large part be due to visits to Bikini or other contaminated atolls between measurement dates.

The individual dosimetric data presented here clearly illustrates that at least 19% of the Bikini residents would have received a dose equivalent in excess of 5 mSv (0.5 rem) due to the ingestion of ^{137}Cs had the April 1978 activity ingestion rate of ^{137}Cs continued. This dose equivalent level does not include the dose equivalent from external radiation or other internally deposited radioactive material. Removal of the Bikini population from Bikini Atoll

eliminated the ^{137}Cs source term from the diet and limited the dose equivalent received by this population.

The contribution of ^{90}Sr to the bone marrow dose equivalent commitment was small relative to the contribution from external exposure and ^{137}Cs. As residence intervals increased, and food products with higher ^{90}Sr concentrations became more available, then the body burdens and bone marrow dose equivalents would have correspondingly increased.

The total body and bone marrow total dose equivalent commitments have a standard deviation of 40% in the adult subgroups. For residence periods between the years 1969 and 1978, a maximally exposed person received a total dose equivalent commitment of 30 mSv (3 rem) and the population average total dose equivalent commitment was 12 mSv (1.2 rem) due to man-made radioactivity on Bikini Island.

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Appendix A

Urine Bioassay Chemistry Procedures

^{137}Cs and ^{90}Sr Assay of Urine in the Absence of Fresh Fission Products

A. Reagents

Strontium carrier solution: 20 mg Sr/ml

Yttrium carrier solution: 20 mg Y/ml

Calcium chloride: 0.1 M

Diethylhexylphosphoric acid: 20% in toluene

Nitric Acid: 16N

Hydrochloric: 0.08 N

Ammonium hydroxide: 15 N

Ammonium hydroxide wash solution: 1 ml 15 N in 500 ml H O

Sodium hydroxide: 6 M

B. Sample Preparation for ^{137}Cs Analysis

1. Loosen cap on sample bottle and place into ultrasonic cleaner for approximately 10 minutes to loosen and disperse solids.
2. Pour suspended sample into a 2 liter graduated cylinder and record total sample volume.
3. Measure 300 ml of sample into an aluminum can. Seal on lid.
4. Analyze sample with Ge(Li) detector system. Count for 4000 seconds.
5. When gamma analysis is completed and data is verified, return sample to analytical laboratory.

C. Procedure for ^{90}Sr Analysis

1. Remove urine from aluminum can and pour into 2 liter beaker. Rinse can and cover and add rinses to beaker.

2. Pour remaining sample from bottle into the 2 liter beaker, add 50 ml concentration HNO to bottle to rinse walls, add to beaker. Rinse with water and add to sample.
3. Adjust pH to approximately 1 and heat sample to 80°C. Stir.
4. Add to sample

   Strontium carrier: 40 mg

   Yttrium carrier: 40 mg

   ^{90}Sr tracer: 1 ml (X10,000 dpm)

   CaCl 0.1 M: 50 ml
5. Digest sample at 80°C for 30 minutes while stirring.
6. Adjust pH = 4.
7. Add 40 ml saturated oxalic acid solution and mix well.
8. Drop add 6 M NaOH to adjust pH = 4.
9. Digest (with stirring) for 30 minutes.
10. Remove from heat, remove stirring bar, let settle overnight.
11. Filter entire sample through a 2 inch Whatman 42 filter paper mounted in filter assembly. Wash the precipitate once with ammonia wash solution.
12. Transfer filter paper and precipitate to a 150 ml beaker. Dry at 125°C in a muffle furnace. Slowly raise the temperature (over an eight hour period) to a maximum of 500°C. Continue heating at 500°C overnight.
13. Cool the sample and add small volumes of concentrated HNO. Evaporate slowly to dryness. Dissolve residue in 60 ml of 0.08 N HCl. Adjust pH = 1.

14. Transfer sample solution to a 125 ml separatory funnel and extract the yttrium with 60 ml of 20% HDEHP solution. Note time of extraction. Save aqueous phase for possible future reanalysis.

15. Wash the organic phase twice with 60 ml of 0.08 N HCl. Save the first wash and combine the aqueous phase from step 14.

16. Extract the yttrium from the organic phase with 2, 60 ml volumes of 3 N HNO_3. Shake for 2 minutes for each extraction and then combine 3 N HNO_3 solutions in a 150 ml beaker.

17. Evaporate the sample solution to a volume of approximately 3 ml and quantitatively transfer to a 50 ml centrifuge tube with several volumes of water.

18. Adjust the pH to 8-10 with NH_4OH to precipitate $Y(OH)_3$.

19. Centrifuge, decant and discard supernatant liquid.

20. Wash the precipitate with water, centrifuge, discard wash.

21. Dissolve the precipitate in 1:1 HCl (a few drops), slurry and add 25 ml water.

22. Add saturated oxalic acid (2-3 ml), then 2-3 drops of NH_4OH. Digest at 85°C for 1 hour.

23. Filter through a preweighed glass fiber filter disc, wash with water and ethyl alcohol. Dry at 110°C for 15 minutes.

24. Weigh the dried precipitate and filter paper. Mount on nylon disc, cover with 0.25 ml mylar and beta count for 60 minutes using low background anti-coincidence counters.

25. Correct for gravimetric yttrium yield and yttrium decay single separation.

26. Report data in pci/l urine at time of collection.

Appendix 3

Symbols, constants and equations used to calculate ^{90}Sr-^{90}Y bone marrow dose equivalent during the uptake interval and the committed dose equivalent

The following definition, symbols, constants and equations describe the mathematical model used to calculate dose equivalent during and post the uptake interval. Intermediate steps can be used to determine body burdens or daily activity ingestion rates. The equations were developed with the assumption that the measured quantity from a bioassay program would be the urine activity concentration. Constant continuous uptake of ^{90}Sr-^{90}Y through the ingestion pathway was assumed for the entire residence period. For ^{90}Sr, the uptake interval equals the residency period. As indicated previously ^{90}Sr disintegrations are divided equally between cortical and trabecular bone.

Mathematical Model

Symbols, Definitions and Units of Physical Quantities

N_i^o ≡ the number of atoms of species of concern present at time zero in compartment i, atoms,

N_i ≡ the instantaneous number of atoms of species of concern present at time t in compartment i, atoms,

P_i ≡ atom intake rate into compartment i from blood, atoms day^{-1},

K_i ≡ the instantaneous fraction of atoms removed from compartment i per unit time by physiological mechanisms, day^{-1},

λ ≡ the instantaneous fraction of atoms removed from compartment i per unit time by radiological mechanisms, day^{-1},

q_i ≡ the instantaneous activity in compartment i at time t, Becquerels,

E_i ≡ the instantaneous activity excretion rate from compartment i at time t, Becquerels day^{-1},

f_u ≡ the fraction of body activity excreted in urine,

f_1 ≡ the fraction of GI tract activity entering blood,

q ≡ the instantaneous activity in the body, Becquerels,

P ≡ the atom ingestion rate, atoms day^{-1},

X_i ≡ the fraction of atoms entering blood deposited in compartment i,

t ≡ uptake interval, day,

U ≡ instantaneous urine activity concentration, Becquerels $liter^{-1}$,

U_m ≡ male urine excretion rate, liters day^{-1},

U_f ≡ female urine excretion rate, liters day^{-1},

Q ≡ quality factor,

D_C ≡ disintegrations due to ^{90}Sr remaining in body following uptake interval, Becquerel days,

D ≡ disintegrations due to ^{90}Sr in the body during uptake interval, Becquerel days,

H_M ≡ the dose equivalent to red marrow during uptake interval, mrem,

H_{BN} ≡ the dose equivalent to bone during uptake interval, mrem,

H_M^C ≡ the dose equivalent to red marrow post uptake, mrem,

H_{BN}^C ≡ the dose equivalent to bone post uptake, mrem,

S_i ≡ the absorbed dose to red marrow per disintegration of ^{90}Sr in cortical bone, rads dis^{-1},

S_1 ≡ the absorbed dose to red marrow per disintegration of ^{90}Sr in trabecular bone, rads dis^{-1},

S_2 ≡ the absorbed dose to red marrow per disintegration of ^{90}Y in cortical bone, rads dis^{-1},

S_3 ≡ the absorbed dose to red marrow per disintegration of ^{90}Y in trabecular bone, rads dis^{-1},

S_4 ≡ the absorbed dose to bone per disintegration of ^{90}Sr in cortical bone, rads dis^{-1},

S_5 ≡ the absorbed dose to bone per disintegration ^{90}Sr in trabecular bone, rads dis^{-1},

S_6 ≡ the absorbed dose to bone per disintegration of ^{90}Y in cortical bone, rads dis^{-1},

S_7 ≡ the absorbed dose to bone per disintegration of ^{90}Y in trabecular bone, rads dis^{-1}.

EQUATIONS

$$\frac{dN_i}{dt} = -(\lambda + K_i)\, N_i + P_i, \tag{1}$$

$$N_i = N_i^o\, e^{-(\lambda + K_i)t} + \frac{P_i}{\lambda+K_i}\,(1-e^{-(\lambda+K_i)t}), \tag{2}$$

$$q_i = \lambda N_i, \tag{3}$$

$$E_i = K_i N_i \lambda, \tag{4}$$

$$\lambda P = \frac{UU_m}{f_l\, f_u}\left(\frac{K_1 X_1}{\lambda+K_1}\,(1-e^{-(\lambda+K_1)t}) + \frac{K_2 X_2}{\lambda+K_2}\,(1-e^{-(\lambda+K_2)t}) + \frac{K_3 X_3}{\lambda+K_3}\,(1-e^{-(\lambda+K_3)t})\right)^{-1} \tag{5}$$

$$q = f_1 \lambda P \left[\frac{X_1}{\lambda+K_1} (1-e^{-(\lambda+K_1)t}) + \right.$$

$$\frac{X_2}{\lambda+K_2} (1-e^{-(\lambda+K_2)t}) +$$

$$\left. \frac{X_3}{\lambda+K_3} (1-e^{-(\lambda+K_3)t}) \right], \qquad (6)$$

$$D = \frac{f_1 \lambda P X_1}{\lambda+K_1} \left(t - \frac{(1-e^{-(\lambda+K_1)t})}{\lambda+K_1}\right) +$$

$$\frac{f_1 \lambda P X_2}{\lambda+K_2} \left(t - \frac{(1-e^{-(\lambda+K_2)t})}{\lambda+K_2}\right) +$$

$$\frac{f_1 \lambda P X_3}{\lambda+K_3} \left(t - \frac{(1-e^{-(\lambda+K_3)t})}{\lambda+K_3}\right), \qquad (7)$$

$$D_C = \frac{f_1 \lambda P X_1}{(\lambda+K_1)^2} (1-e^{-(\lambda+K_1)t}) +$$

$$\frac{f_1 \lambda P X_2}{(\lambda+K_2)^2} (1-e^{-(\lambda+K_2)t}) +$$

$$\frac{f_1 \lambda P X_3}{(\lambda+K_3)^2} (1-e^{-(\lambda+K_3)t}), \qquad (8)$$

$$H_M = 4.32 \times 10^7 \, D \, Q \, (S_1 + S_2 + S_3 + S_4), \quad (9)$$

$$H_{BN} = 4.32 \times 10^7 \, D \, Q \, (S_5 + S_6 + S_7 + S_8), \quad (10)$$

$$H_M^C = 4.32 \times 10^7 \, D_C Q \, (S_1 + S_2 + S_3 + S_4), \quad (11)$$

$$H_{BN}^C = 4.32 \times 10^7 \, D_C Q \, (S_5 + S_6 + S_7 + S_8), \quad (12)$$

Values for Constants

Symbol	Value	Reference
K_1	3.33×10^{-1} d^{-1}	W. S. Snyder, M. J. Cook and M. R. Ford, Health Physics, 10, 171 (1964).
K_2	2.27×10^{-2} d^{-1}	"
K_3	2.5×10^{-4} d^{-1}	"
X_1	0.73	"
X_2	0.10	"
X_3	0.17	"
λ	6.54×10^{-5} d^{-1}	12th Edition, Chart of the Nuclides (1977).
f_u	0.85	ICRP 10 (1967).
f_1	0.20	ICRP 73/C2-34; ICRP 20 (1972).
U_m	1.4 ℓ d^{-1}	ICRP Reference Man
U_f	1.0 ℓ d^{-1}	ICRP Reference Man
Q	1.0	NCRP

Values for Constants (Cont'd)

Symbol	Value	Reference
S_1	9.8×10^{-15} rads dis^{-1}	MIRD 11
S_2	7.3×10^{-13} rads dis^{-1}	MIRD 11
S_3	2.5×10^{-13} rads dis^{-1}	MIRD 11
S_4	4.3×10^{-12} rads dis^{-1}	MIRD 11
S_5	6.3×10^{-13} rads dis^{-1}	MIRD 11
S_6	4.1×10^{-13} rads dis^{-1}	MIRD 11
S_7	3.0×10^{-12} rads dis^{-1}	MIRD 11
S_8	1.7×10^{-12} rads dis^{-1}	MIRD 11

Appendix C

Symbols, constants and equations used to calculate the ^{137}Cs - ^{137m}Ba total body dose equivalent during the uptake interval and the committed dose equivalent

The following definitions, symbols, constants and equations describe the mathematical model used to calculate the dose equivalent and the committed dose equivalent. Intermediate steps can be used to determine urine activity concentrations or daily ingestion rates. The equations were developed with the assumption that the body burden as determined from whole body counting, would be the measured quantity from the bioassay program. Three intervals of monotonically increasing, but constant and continuous uptake throughout an interval were assumed. Consequently, the equations must be repeated 3 times in order to obtain the total dose equivalent during the uptake interval. For ^{137}Cs, the uptake interval corresponds to the number of days out of the residence period that an individual maintained the proposed daily activity ingestion rate.

Mathematical Model

Symbols, Definitions and Units of Physical Quantities

N_i^o ≡ the number of atoms of species of concern present at time zero in compartment i, atoms,

N_i ≡ the instantaneous number of atoms of species of concern present at time t in compartment i, atoms,

P_i ≡ atom intake rate into compartment i from blood, atoms day^{-1},

K_i ≡ the instantaneous fraction of atoms removed from compartment i per unit time by physiological mechanisms, day^{-1},

λ ≡ the instantaneous fraction of atoms removed from compartment i per unit time by radiological mechanisms, day^{-1},

q_i ≡ the instantaneous activity in compartment i at time t, Becquerels,

E_i ≡ the instantaneous activity excretion rate from compartment i at time t, Becquerels day^{-1},

f_u ≡ the fraction of body activity excreted in urine,

f_l ≡ the fraction of GI tract activity entering blood,

q ≡ the instantaneous activity in the body, Becquerels,

q^o ≡ the initial activity in the body, Becquerels,

P ≡ the atom ingestion rate, atoms day^{-1},

X_i ≡ the fraction of atoms entering blood deposited in compartment i,

t ≡ uptake interval, day,

Q ≡ quality factor,

D_C ≡ committed disintegrations due to ^{137}Cs remaining in body following uptake interval, Becquerel days,

M ≡ mass of individual, kg,

D ≡ disintegrations due to ^{137}Cs in the body during uptake interval, Becquerel days,

H_{RB} ≡ the dose equivalent to the total body during the uptake interval, mRem,

H_{PB} ≡ the dose equivalent to the total body post uptake interval, mRem,

X_i' ≡ the fraction of radioactive atoms in the total body remaining in compartment i at the end of the uptake interval,

S ≡ the absorbed dose to the total body per disintegration of ^{137}Cs-^{137m}Ba in the total body, rads dis^{-1},

EQUATIONS

$$\frac{dNi}{dt} = (\lambda+K_i)N_i + P_i, \tag{1}$$

$$N_i = N_i^o\, e^{-(\lambda+K_i)t} + \frac{P_i}{\lambda+K_i}\,(1-e^{-(\lambda+K_i)t}), \tag{2}$$

$$q_i = \lambda N_i, \tag{3}$$

$$E_i = K_i N_i \lambda_i \tag{4}$$

$$X_i' = \frac{\frac{X_i}{(Ki+\lambda)}\left(1-e^{-(K_i+\lambda)t}\right)}{\sum_i \frac{X_i}{(K_i+\lambda)}\left(1-e^{-(K_i+\lambda)t}\right)} \tag{5}$$

$$q = \lambda P\left(\frac{X_1 f_1}{(K_1+\lambda)}\,(1-e^{-(K_1+\lambda)t}) +\right.$$

$$\left.\frac{X_2 f_1}{(K_2+\lambda)}\,(1-e^{-(K_3+\lambda)t})\right) +$$

$$\overset{o}{q}\,\left(X_1'\, e^{-(K_1+\lambda)t} + X_2'\, e^{-(K_2+\lambda)t}\right) \tag{6}$$

$$D = \frac{\lambda P X_1 f_1}{K_1+\lambda}\left(t - \frac{(\lambda e^{-(\lambda+K_1)t})}{K_1+\lambda}\right) +$$

$$\frac{\lambda P X_2 f_1}{K_2+\lambda}\left(t - \frac{(1-e^{-(\lambda+K_2)t})}{K_2+\lambda}\right) \tag{7}$$

$$D_C = \frac{X_i' q^o}{K_1+\lambda} (1-e^{-(\lambda+K_1)t}) +$$

$$\frac{X_2' q^o}{K_2+\lambda} (1-e^{-(\lambda+K_2)}) , \qquad (8)$$

$$H_{RB} = 8.64 \times 10^7 \, DQS , \qquad (9)$$

$$H_{PB} = 8.64 \times 10^7 \, D_C QS . \qquad (10)$$

Values for Constants

Symbol	Value	Reference
K_1	$0.7\ d^{-1}$	ICRP
K_2	$0.006\ d^{-1}$	ICRP 10
X_1	0.15	ICRP 10
X_2	0.85	ICRP 10
X_1'	0.002	Uptake interval >> 140 days
X_2'	0.998	Uptake interval >> 140 days
λ	$6.33 \times 10^{-5}\ d^{-1}$	Nuclear data tables
f_1	1.0	ICRP 10
Q	1.0	ICRP 26
S	1.05×10^{-13} rads dis^{-1}	MIRD 11

Table 1

Pooled or Mean Urine Activity Concentration for ^{90}Sr and ^{137}Cs

Year of Collection	^{90}Sr Urine Conc pCi/ℓ	^{137}Cs Urine Conc nCi/ℓ	Comment
1970	1.2	0.10	3640 ml - pooled
1970	1.3	0.13	3365 ml - pooled
1970	2.2	-	1100 ml - pooled
1970	1.9	-	930 ml - pooled
1971	0.96	0.22	3920 ml - pooled
1971	0.89	0.20	2960 ml - pooled
1971	1.2	0.21	3300 ml - pooled
1971	3.9	0.11	500 ml - pooled
1972	4.2	0.91	2700 ml - pooled
1973	6.7	1.3	mean of 14 people
1974	2.3	1.3	mean of 21 people
1975	7.3	1.8	pooled
1975	3.1	1.3	pooled
1976	5.3	2.2	mean of 26 people
1977	3.9	7.7	mean of 4 people
1978	6.1	14.	mean of 35 people
1979	2.6	1.3	January, mean of 50 people
1979	2.8	.87	May, mean of 40 people
1980	NA	NA	August

NA = Not Analyzed

PRIVACY ACT MATERIAL REMOVED

Table 2

Urine Activity Concentrations for Former Adult Male Bikini Island Residents

1970 - 1980

ID #	1973		1974		1976		1977		1978		1979 - Jan.		1979 - May		1980 - Aug.	
	^{90}Sr Urine Conc. pCi/ℓ	^{137}Cs Urine Conc. nCi/ℓ	^{90}Sr Urine Conc. pCi/ℓ	^{137}Cs Urine Conc. nCi/ℓ	^{90}Sr Urine Conc. pCi/ℓ	^{137}Cs Urine Conc. nCi/ℓ	^{90}Sr Urine Conc. pCi/ℓ	^{137}Cs Urine Conc. nCi/ℓ	^{90}Sr Urine Conc. pCi/ℓ	^{137}Cs Urine Conc. nCi/ℓ	^{90}Sr Urine Conc. pCi/ℓ	^{137}Cs Urine Conc. nCi/ℓ	^{90}Sr Urine Conc. pCi/ℓ	^{137}Cs Urine Conc. nCi/ℓ	^{90}Sr Urine Conc. pCi/ℓ	^{137}Cs Urine Conc. nCi/ℓ
(A)	8.9	2.1	≤0.4	0.40												
(A)	5.7	1.1														
(A)	5.5	2.6														
(A)	2.0	0.40														
(A)	1.9	0.40														
(A)	7.8	2.0	-	-												
(A)			2.4	0.80												
(A)					2.7 ± 0.2	3.9 ± 0.2	NA	0.58								
863									8.7 ± 2.6	20. ± 0.45						
6070			1.2	1.0	10. ± 0.6	3.0 ± 0.2			11 ± 1.6	16 ± 0.41	2.8 ± 0.70	6.3 ± 0.14				
6119*									NA	16 ± 0.44						

PRIVACY ACT MATERIAL REMOVED

Table 2 (Cont'd)

ID #	1973		1974		1976		1977		1978		1979 - Jan.		1979 - May		1980 - Aug.	
	^{90}Sr Urine Conc. pCi/ℓ	^{137}Cs Urine Conc. nCi/ℓ	^{90}Sr Urine Conc. pCi/ℓ	^{137}Cs Urine Conc. nCi/ℓ	^{90}Sr Urine Conc. pCi/ℓ	^{137}Cs Urine Conc. nCi/ℓ	^{90}Sr Urine Conc. pCi/ℓ	^{137}Cs Urine Conc. nCi/ℓ	^{90}Sr Urine Conc. pCi/ℓ	^{137}Cs Urine Conc. nCi/ℓ	^{90}Sr Urine Conc. pCi/ℓ	^{137}Cs Urine Conc. nCi/ℓ	^{90}Sr Urine Conc. pCi/ℓ	^{137}Cs Urine Conc. nCi/ℓ	^{90}Sr Urine Conc. pCi/ℓ	^{137}Cs Urine Conc. nCi/ℓ
6033									12 ± 1.2	NA						
6018			3.0	0.60	7.1± 0.6	2.8 ± 0.2			7.6 ± 0.91	NA						
6069*									NA	16 ± 0.44			1.2 ± 1.2	1.2 ± .12		
6068					2.3± 0.2	0.29± 0.06			2.9 ± 1.6	9.1 ± 0.31						
6067					5.6± 0.6	1.9 ± 0.2			2.3 ± 0.73	NA	0.54± 0.25	5.2 ± 0.10	0.51± 0.95	2.0 ± 0.09		
6067					2.8± 0.4	1.0 ± 0.2										
6017	6.2	0.90							12 ± 2.7	37 ± 0.61			4.6 ± 2.0	1.4 ± 0.13		
6019					1.6± 0.2	1.1 ± 0.2			10 ± 1.3	NA	3.1 ± 1.2	2.7 ± 0.17				
6001					4.8± 0.8	2.9 ± 0.2										
					12 ± 1.2	6.9 ± 0.4					0.56± 0.01	4.1 ± 0.21				

Table 2 (Cont'd)

ID #	1973		1974		1976		1977		1978		1979 - Jan.		1979 - May		1980 - Aug.	
	^{90}Sr Urine Conc. pCi/ℓ	^{137}Cs Urine Conc. nCi/ℓ	^{90}Sr Urine Conc. pCi/ℓ	^{137}Cs Urine Conc. nCi/ℓ	^{90}Sr Urine Conc. pCi/ℓ	^{137}Cs Urine Conc. nCi/ℓ	^{90}Sr Urine Conc. pCi/ℓ	^{137}Cs Urine Conc. nCi/ℓ	^{90}Sr Urine Conc. pCi/ℓ	^{137}Cs Urine Conc. nCi/ℓ	^{90}Sr Urine Conc. pCi/ℓ	^{137}Cs Urine Conc. nCi/ℓ	^{90}Sr Urine Conc. pCi/ℓ	^{137}Cs Urine Conc. nCi/ℓ	^{90}Sr Urine Conc. pCi/ℓ	^{137}Cs Urine Conc. nCi/ℓ
6073			≤0.2	1.5												
6005									2.0 ± 1.3	6.9 ± 0.26			-1.2 ± 16	1.3 ± 0.045		
6008					5.5± 1.4	1.7 ± 0.2					1.3 ± 0.62	6.1 ± 0.25				
6086	5.4	0.50	4.6	1.2	5.5± 0.4	0.9 ± 0.2			9.4 ± 1.6	16 ± 0.40	0.71± 0.52	2.9 ± 0.17	5.9 ± 1.3	2.1 ± 0.095		
6071*									NA	16 ± 0.44	0.55± 1.0	4.5 ± 0.21				
6076					1.2± 0.2	1.2 ± 0.2			0.93± 2.0	18 ± 0.43	0.37± 0.80	6.2 ± 0.25				
6072*			2.5	0.50					NA	16 ± 0.44						
813							NA	7.8			2.5 ± 1.0	2.9 ± 0.11				
6118									1.8 ± 0.70	NA	1.4 ± 0.59	3.5 ± 0.085	0.67± 1.1	0.46 ± 0.076		
6126					4.1± 0.4	3.2 ± 0.2			6.1 ± 2.6	11 ± 0.15						

Table 2 (Cont'd)

ID #	1973 ^{90}Sr Urine Conc. pCi/ℓ	1973 ^{137}Cs Urine Conc. nCi/ℓ	1974 ^{90}Sr Urine Conc. pCi/ℓ	1974 ^{137}Cs Urine Conc. nCi/ℓ	1976 ^{90}Sr Urine Conc. pCi/ℓ	1976 ^{137}Cs Urine Conc. nCi/ℓ	1977 ^{90}Sr Urine Conc. pCi/ℓ	1977 ^{137}Cs Urine Conc. nCi/ℓ	1978 ^{90}Sr Urine Conc. pCi/ℓ	1978 ^{137}Cs Urine Conc. nCi/ℓ	1979 - Jan. ^{90}Sr Urine Conc. pCi/ℓ	1979 - Jan. ^{137}Cs Urine Conc. nCi/ℓ	1979 - May ^{90}Sr Urine Conc. pCi/ℓ	1979 - May ^{137}Cs Urine Conc. nCi/ℓ	1980 - Aug. ^{90}Sr Urine Conc. pCi/ℓ	1980 - Aug. ^{137}Cs Urine Conc. nCi/ℓ
6003									9.8 ± 1.9	17 ± 0.41						
6117					4.3± 0.4	1.9 ± 0.2	<0.62	NA	8.4 ± 1.0	NA	1.4 ± 0.57	4.3 ± 0.21	1.2 ± 1.1	2.3 ± 0.16		
6128					3.3± 0.4	2.7 ± 0.2	4.2 ± 2.0	NA	23.0 ± 6.0	5.1 ± 0.23	0.37± 0.41	1.5 ± 0.13				
6125							4.1 ± 1.5	8.3	1.2 ± 0.64	NA			-0.4 ± 1.4	1.7 ± 0.059		
6007									4.8 ± 1.1	10 ± 0.32	1.2 ± 0.69	1.4 ± 0.12				
											0.04± 0.68	8.0 ± 0.29				
6066											1.5 ± 11	1.3 ± 0.16				
864					13 ± 1.4	5.1 ± 0.2	NA	12								
966					6.8± 0.6	-	6.6 ± 1.8	16								
6135									2.4 ± 0.88	NA						

Table 2 (Cont'd)

	1973		1974		1976		1977		1978		1979 - Jan.		1979 - May		1980 - Aug.	
ID #	^{90}Sr Urine Conc. pCi/ℓ	^{137}Cs Urine Conc. nCi/ℓ	^{90}Sr Urine Conc. pCi/ℓ	^{137}Cs Urine Conc. nCi/ℓ	^{90}Sr Urine Conc. pCi/ℓ	^{137}Cs Urine Conc. nCi/ℓ	^{90}Sr Urine Conc. pCi/ℓ	^{137}Cs Urine Conc. nCi/ℓ	^{90}Sr Urine Conc. pCi/ℓ	^{137}Cs Urine Conc. nCi/ℓ	^{90}Sr Urine Conc. pCi/ℓ	^{137}Cs Urine Conc. nCi/ℓ	^{90}Sr Urine Conc. pCi/ℓ	^{137}Cs Urine Conc. nCi/ℓ	^{90}Sr Urine Conc. pCi/ℓ	^{137}Cs Urine Conc. nCi/ℓ
6096									4.3 ± 1.6	6.1 ± 0.25	0 ± 0.72	4.0 ± 0.20	1.1 ± 1.1	2.1 ± 0.15		
6002					1.1± 0.2	0.9 ± 0.2			1.1 ± 0.39	NA						
6161	2.2	0.60									0.86± 0.40	0.33 ± 0.030				
6166											0.29± 0.52	ND	0.39± 0.9	ND		
6184											0.22± 0.53	0.10 ± 0.049	2.8 ± 3.0	0.099± 0.037		
6210			3.2	1.7	2.0± 0.2	3.0 ± 0.2							0 ± 1.95	1.4 ± 0.12		
6190																
6205													0.4 ± 1.6	ND		
6211													1.5 ± 5.3	ND		
6218													0.9 ± 2.5	ND		
6219													3.8 ± 5.4	ND		

Table 2 (Cont'd)

ID #	1973 ^{90}Sr Urine Conc. pCi/ℓ	1973 ^{137}Cs Urine Conc. nCi/ℓ	1974 ^{90}Sr Urine Conc. pCi/ℓ	1974 ^{137}Cs Urine Conc. nCi/ℓ	1976 ^{90}Sr Urine Conc. pCi/ℓ	1976 ^{137}Cs Urine Conc. nCi/ℓ	1977 ^{90}Sr Urine Conc. pCi/ℓ	1977 ^{137}Cs Urine Conc. nCi/ℓ	1978 ^{90}Sr Urine Conc. pCi/ℓ	1978 ^{137}Cs Urine Conc. nCi/ℓ	1979 Jan. ^{90}Sr Urine Conc. pCi/ℓ	1979 Jan. ^{137}Cs Urine Conc. nCi/ℓ	1979 - May ^{90}Sr Urine Conc. pCi/ℓ	1979 - May ^{137}Cs Urine Conc. nCi/ℓ	1980 Aug. ^{90}Sr Urine Conc. pCi/ℓ	1980 Aug. ^{137}Cs Urine Conc. nCi/ℓ
6220													0.25 ± 1.3	ND		
6221													-.06 1.0	ND		
6136											2.9 ± 1.6	0.079 0.043				
6138											0.25 ± 0.47	2.6 ± 0.66				
6153											0 ± 1.6	0.11 ± 0.043	-0.06 ± 1.6	ND		
6168													3.7 ± 5.6	ND		
6180											1.3 ± 0.53	0.16 ± 0.047				
6182											0.36 ± 0.39	3.2 ± 0.19				
80													12 ± 1.3	ND		
Isaw							NA	1.3								
Steve							NA	7.8								

Table 2 (Cont'd)

	1973		1974		1976		1977		1978		1979 - Jan.		1979 - May		1980 - Aug.	
ID #	^{90}Sr Urine Conc. pCi/ℓ	^{137}Cs Urine Conc. nCi/ℓ	^{90}Sr Urine Conc. pCi/ℓ	^{137}Cs Urine Conc. nCi/ℓ	^{90}Sr Urine Conc. pCi/ℓ	^{137}Cs Urine Conc. nCi/ℓ	^{90}Sr Urine Conc. pCi/ℓ	^{137}Cs Urine Conc. nCi/ℓ	^{90}Sr Urine Conc. pCi/ℓ	^{137}Cs Urine Conc. nCi/ℓ	^{90}Sr Urine Conc. pCi/ℓ	^{137}Cs Urine Conc. nCi/ℓ	^{90}Sr Urine Conc. pCi/ℓ	^{137}Cs Urine Conc. nCi/ℓ	^{90}Sr Urine Conc. pCi/ℓ	^{137}Cs Urine Conc. nCi/ℓ
6004*									NA	16 ± 0.44						
Sample Size	9	9	8	8	19	18	4	7	21	17	24	22	22	12		
Mean	5.1	1.2	2.2	0.96	5.0	2.5	3.9	7.7	6.7	15	1.0	3.3	1.9	1.4		
Stnd Dev	2.5	0.84	1.5	0.47	3.5	1.7	2.5	5.5	5.4	7.3	0.95	2.2	2.9	0.74		
Low	1.9	0.4	0.2	0.5	1.1	0.29	.62	0.58	0.93	5.1	0	0.10	-1.2	0.099		
High	8.9	2.6	4.6	1.7	13	5.1	6.6	16	23	37	3.1	6.3	12	2.3		

Table 3

Urine Activity Concentrations for Former Adult Female Bikini Island Residents

1973 - 1980

	1973		1974		1976		1978		1979 - Jan.		1979 - May		1980 - Aug.	
ID #	^{90}Sr Urine Conc. pCi/ℓ	^{137}Cs Urine Conc. nCi/ℓ	^{90}Sr Urine Conc. pCi/ℓ	^{137}Cs Urine Conc. nCi/ℓ	^{90}Sr Urine Conc. pCi/ℓ	^{137}Cs Urine Conc. nCi/ℓ	^{90}Sr Urine Conc. pCi/ℓ	^{137}Cs Urine Conc. nCi/ℓ	^{90}Sr Urine Conc. pCi/ℓ	^{137}Cs Urine Conc. nCi/ℓ	^{90}Sr Urine Conc. pCi/ℓ	^{137}Cs Urine Conc. nCi/ℓ	^{90}Sr Urine Conc. pCi/ℓ	^{137}Cs Urine Conc. nCi/ℓ
	11.6	2.1	3.8	3.2	-	-								
	4.8	1.2	-	-	-	-								
	-	-	≤0.1	1.0	-	-								
	-	-	-	-	2.3 ± 0.4	1.4 ± 0.2								
	-	-	-	-	9.6 ± 7.0	1.4 ± 0.2								
6045							3.6± 1.9	17 ± 0.42						
6112							3.9± 2.0	18 ± 0.42	0.082± 0.89	6.5 ± 0.13	2.5 ± 1.1	1.3 ± 0.076		
6114							6.0± 2.7	NA	1.1 0.69	0.77 0.095				
6111							3.9± 3.4	19 ± 0.50	0.39 ± 1.3	4.9 ± 0.23				

Table 3 (Cont'd)

ID #	1973 ^{90}Sr Urine Conc. pCi/ℓ	1973 ^{137}Cs Urine Conc. nCi/ℓ	1974 ^{90}Sr Urine Conc. pCi/ℓ	1974 ^{137}Cs Urine Conc. nCi/ℓ	1976 ^{90}Sr Urine Conc. pCi/ℓ	1976 ^{137}Cs Urine Conc. nCi/ℓ	1978 ^{90}Sr Urine Conc. pCi/ℓ	1978 ^{137}Cs Urine Conc. nCi/ℓ
6122							3.8± 2.4	8.9± 0.40
6123								
6059							4.8± 2.2	7.6± 0.29
6063					1.5 ± 0.4	1.6 ± 0.2		
6032*							2.0± .91	16 ± 0.44
6185								
6108					7.6 ± 1.8	0.9 ± 0.2	4.5± 2.9	7.0± 0.27
6206								
6113							2.0± 1.2	6.7± 0.26
6065							13 ± 2.0	3.6± 0.19

ID #	1979 - Jan. ^{90}Sr Urine Conc. pCi/ℓ	1979 - Jan. ^{137}Cs Urine Conc. nCi/ℓ	1979 - May ^{90}Sr Urine Conc. pCi/ℓ	1979 - May ^{137}Cs Urine Conc. nCi/ℓ	1980 - Aug. ^{90}Sr Urine Conc. pCi/ℓ	1980 - Aug. ^{137}Cs Urine Conc. nCi/ℓ
6122	0 ± 0.54	1.3 ± 0.12	1.8 ± 1.4	0.66 ± 0.089		
6123	3.8 ± 2.3	5.0 ± 0.23				
6059						
6063						
6032*	0 ± 0.51	2.8 ± 0.17	7.5 ± 3.4	0.61 ± 0.069		
6185			0.26± 0.99	0.046± 0.035		
6108	2.3 ± 0.89	4.8 ± 0.23				
6206			-0.06± 1.2	ND *		
6113	4.5 ± 5.4	2.6 ± 0.18	0.8 ± 1.8	0.57 ± 0.083		
6065	2.4 ± 2.4	2.8 ± 0.23				

Table 3 (Cont'd)

ID #	1973 ^{90}Sr Urine Conc. pCi/ℓ	1973 ^{137}Cs Urine Conc. nCi/ℓ	1974 ^{90}Sr Urine Conc. pCi/ℓ	1974 ^{137}Cs Urine Conc. nCi/ℓ	1976 ^{90}Sr Urine Conc. pCi/ℓ	1976 ^{137}Cs Urine Conc. nCi/ℓ	1978 ^{90}Sr Urine Conc. pCi/ℓ	1978 ^{137}Cs Urine Conc. nCi/ℓ	1979 Jan. ^{90}Sr Urine Conc. pCi/ℓ	1979 Jan. ^{137}Cs Urine Conc. nCi/ℓ	1979 - May ^{90}Sr Urine Conc. pCi/ℓ	1979 - May ^{137}Cs Urine Conc. nCi/ℓ	1980 - Aug. ^{90}Sr Urine Conc. pCi/ℓ	1980 - Aug. ^{137}Cs Urine Conc. nCi/ℓ
6097*							NA	16 ± 0.44	0.38 ± 0.98	0.33 0.064	0.81 ± 1.1	0.83 ± 0.097		
6109*							NA	16 ± 0.44			1.9 ± 1.3	0.11 ± 0.043		
6046							5.6 ± 1.2	13 ± 0.37			1.9 ± 1.3	0.11 ± 0.043		
6098									0.71 ± 0.69	0.69 ± 0.20				
6060									1.2 ± 0.82	1.7 ± 0.20	1.9 ± 1.4	0.59 ± 0.085		
6222											0.58 ± 1.3	ND		
6110											4.4 ± 1.8	0.61 ± 0.088		
525							2.2 ± 0.82	NA			3.7 ± 1.6	0.17 ± 0.059		
6064*							NA	16 ± 0.44	0.91 ± 0.45	2.0 ± 0.066	2.7 ± 0.91	1.8 ± 0.088		
6061							4.6 ± 0.91	14 ± 0.38						

Table 3 (Cont'd)

ID #	1973		1974		1976		1978		1979 - Jan.		1979 - May		1980 - Aug.	
	^{90}Sr Urine Conc. pCi/ℓ	^{137}Cs Urine Conc. nCi/ℓ	^{90}Sr Urine Conc. pCi/ℓ	^{137}Cs Urine Conc. nCi/ℓ	^{90}Sr Urine Conc. pCi/ℓ	^{137}Cs Urine Conc. nCi/ℓ	^{90}Sr Urine Conc. pCi/ℓ	^{137}Cs Urine Conc. nCi/ℓ	^{90}Sr Urine Conc. pCi/ℓ	^{137}Cs Urine Conc. nCi/ℓ	^{90}Sr Urine Conc. pCi/ℓ	^{137}Cs Urine Conc. nCi/ℓ	^{90}Sr Urine Conc. pCi/ℓ	^{137}Cs Urine Conc. nCi/ℓ
6051											0.99 ± 0.84	0.20 ± 0.034		
934					5.4 ± 0.4	NA	8.2 ± 1.4	NA			2.6 ± 1.5	2.1 ± 0.16		
6062											10 ± 4.1	1.5 ± 0.13		
6035							9.9 ± 2.0	14 ± 0.37	4.3 ± 2.9	2.7 ± 0.13				
6115					5.1 ± 0.8	3.2 ± 0.2	6.0 ± 2.3	10 ± 0.33	0.61 ± 1.0	4.2 ± 0.21				
6034*							NA	16 ± 0.44			1.7 ± 1.6	0.57 ± 0.082		
865					4.0 ± 0.4	1.4 ± 0.2					1.4 ± 1.1	0.71 ± 0.059		
6036*							NA	16 ± 0.44						
6137									0.31 ± 0.87	0.36 ± 0.17				
6139									1.1 ± 12.3	ND				

Table 3 (Cont'd)

ID #	1973		1974		1976		1978		1979 - Jan.		1979 - May		1980 - Aug.	
	^{90}Sr Urine Conc. pCi/ℓ	^{137}Cs Urine Conc. nCi/ℓ	^{90}Sr Urine Conc. pCi/ℓ	^{137}Cs Urine Conc. nCi/ℓ	^{90}Sr Urine Conc. pCi/ℓ	^{137}Cs Urine Conc. nCi/ℓ	^{90}Sr Urine Conc. pCi/ℓ	^{137}Cs Urine Conc. nCi/ℓ	^{90}Sr Urine Conc. pCi/ℓ	^{137}Cs Urine Conc. nCi/ℓ	^{90}Sr Urine Conc. pCi/ℓ	^{137}Cs Urine Conc. nCi/ℓ	^{90}Sr Urine Conc. pCi/ℓ	^{137}Cs Urine Conc. nCi/ℓ
6140									5.7 ± 6.9	0.17 ± 0.11				
6144									0.82 ± 0.76	0.13 ± 0.050				
6148									0.33 ± 0.73	0.13 ± 0.051	0.22 ± 0.98	0.10 ± 0.050		
6151									3.1 ± 1.5	0.96 ± 0.11	1.7 ± 1.0	1.9 ± 0.091		
6152									2.1 ± 2.5	ND	-0.35 1.2	ND		
6155					3.4 ± 0.6	0.50 ± 0.10			1.7 ± 0.73	2.5 ± 0.16	3.9 ± 1.2	0.82 ± 0.94		
6159					2.4 ± 0.2	1.2 ± 0.2			0.17 ± 0.23	0.13 ± 0.022	0 ± 1.33	0.059 ± 0.027		
6160									5.7 ± 0.95	2.8 ± 0.17	0.27 ± 0.81	0.33 ± 0.066		
6163									0.38 ± 0.42	0.16 ± 0.054				
6165									0.85 ± 0.89	0.075 ± 0.011				

Table 3 (Cont'd)

ID #	1973		1974		1976		1978		1979 - Jan.		1979 - May		1980 - Aug.	
	^{90}Sr Urine Conc. pCi/ℓ	^{137}Cs Urine Conc. nCi/ℓ	^{90}Sr Urine Conc. pCi/ℓ	^{137}Cs Urine Conc. nCi/ℓ	^{90}Sr Urine Conc. pCi/ℓ	^{137}Cs Urine Conc. nCi/ℓ	^{90}Sr Urine Conc. pCi/ℓ	^{137}Cs Urine Conc. nCi/ℓ	^{90}Sr Urine Conc. pCi/ℓ	^{137}Cs Urine Conc. nCi/ℓ	^{90}Sr Urine Conc. pCi/ℓ	^{137}Cs Urine Conc. nCi/ℓ	^{90}Sr Urine Conc. pCi/ℓ	^{137}Cs Urine Conc. nCi/ℓ
6167									0.02± 0.52	0.081± 0.045	1.5 ± 1.2	ND		
6175											2.7 ± 1.4	ND		
6181											8.2 ± 11.3	ND		
Sample Size	2	2	1	2	9	8	16	18	28	26	27	21		
Mean	8.2	1.7	3.8	2.1	6.0	1.5	5.3	13	1.6	2.1	2.4	0.74		
Stnd. Dev.	4.8	0.64	-	1.6	5.2	0.79	3.0	4.6	1.7	1.9	2.6	0.63		
Low	4.8	1.2	-	1.0	1.5	0.50	2.0	3.6	0	.075	-0.35	0.046		
High	11.6	2.1	-	3.2	9.6	3.2	13	19	5.7	6.5	10	2.1		

Table 4

Urine Activity Concentrations for Former Adolescent Residents of Bikini Atoll

1978, 1979, and 1980

		1978		Jan. 1979		May 1979		August 1980	
ID #	Sex	^{90}Sr pCi/ℓ	^{137}Cs nCi/ℓ	^{90}Sr pCi/ℓ	^{137}Cs nCi/ℓ	^{90}Sr pCi/ℓ	^{137}Cs nCi/ℓ	^{90}Sr pCi/ℓ	^{137}Cs nCi/ℓ
6127	M	1.7±0.54	NA	2.2 ±0.77	0.66±0.037	1.4 ± 1.5	0.28±0.066		
6132	M	11 ±2.4	30 ± .55						
6011	M	29 ±3.1	18 ±0.43			33 ± 3.9	0.53±0.083		
6065	M					3.0 ± 1.2	0.18±0.052		
6169	M					0.78± 0.96	ND		
6178	M					1.3 ± 1.3	ND		
6183	M					4.4 ± 5.0	ND		
6200	M					4.6 ± 1.5	1.1 ±0.11		
6131*	M	NA	16 ±0.44			1.9 ± 1.2	0.79±0.095		
6207	M					-1.0 ±18	ND		
Sample Size		3	3	1	1	9	5		
Mean		14	21	2.2	0.66	5.5	0.58		
Stnd. Dev.		14	7.6	-	-	11	0.38		
Low		1.7	16	-	-	-1.0	0.18		

Table 4 (Cont'd)

		1978		Jan. 1979		May 1979		August 1980	
ID #	Sex	^{90}Sr pCi/ℓ	^{137}Cs nCi/ℓ	^{90}Sr pCi/ℓ	^{137}Cs nCi/ℓ	^{90}Sr pCi/ℓ	^{137}Cs nCi/ℓ	^{90}Sr pCi/ℓ	^{137}Cs nCi/ℓ
High		29	30	-	-	33	1.1		
6129	F			0.47±4.3	3.2 ±0.24				
6091	F					17 ±14	0.57±0.11		
6173	F					5.5 ± 2.0	ND		
6048	F					-0.11±10	0.18 ±0.13		
6212	F					-0.04± 1.5	ND		
Sample Size				1	1	4	2		
Mean				0.47	3.2	5.6	0.38		
Stnd Dev				-	-	8.0	0.28		
Low				-	-	0.11	0.18		
High				-	-	17	0.57		

Table 5

Urine Activity Concentrations for Former Children

Residents of Bikini Atoll - 1979, 1980

		May 1979		August 1980
ID #	Sex	^{90}Sr pCi/ℓ	^{137}Cs nCi/ℓ	
6172	M	3.9 ± 1.5	N.D.	
6156	M	2.7 ± 1.3	N.D.	
6009	M	6.8 ± 3.8	0.15 ±0.052	
6012	M	11 ± 3.4	0.31 ±0.060	
6014	M	3.5 ± 2.2	0.093±0.030	
6043	M	22 ±23	N.D.	
6202	M	6.8 ± 9.4	0.071±0.049	
6208	M	-.43± 1.1	N.D.	
Sample Size		8	4	
Mean		7.0	0.16	
Stnd. Dev.		6.9	0.11	
Low		-0.43	0.071	
High		22	0.31	
6203	F	-.32±15	N.D.	
6204	F	-.22± 1.7	1.0 ±0.11	
6213	F	-.15± 1.8	N.D.	
6217	F	-.08± 3.7	N.D.	
Sample Size		4	1	
Mean		-0.19	1.0	

Table 5 (Cont'd)

		May 1979		August 1980
ID #	Sex	^{90}Sr pCi/ℓ	^{137}Cs nCi/ℓ	
Stnd. Dev.		.10	-	
Low		-0.33	-	
High		-0.08	-	

PRIVACY ACT MATERIAL REMOVED

Table 6

Transuranic Urine Activity Concentrations at Bikini Atoll Residents: 1975-1977

ID #	Name	EML. 1970 ^{239}Pu fCi/ℓ	EML. 1973 ^{239}Pu fCi/ℓ	EML. 1974 ^{239}Pu fCi/ℓ	EML. 1975 Fall ^{239}Pu fCi/ℓ	EML. 1976 Spring ^{239}Pu fCi/ℓ	EML. 1976 Fall ^{239}Pu fCi/ℓ	BNML. 1977 Spring ^{239}Pu fCi/ℓ	BNML. 1977 Spring ^{239}Pu fCi/ℓ	LASL. 1977 Spring ^{239}Pu fCi/ℓ	LASL. 1977 Fall ^{239}Pu fCi/ℓ
No ID		-	-	-	-	-	-	-	-	<10	-
6159		-	-	60	-	-	-	-	-	-	-
813		-	-	-	-	-	-	.73±0.53	0.48 ±0.45	<10	<10
6166		-	-	10	-	-	-	-	-	-	-
6125		-	-	-	-	-	-	.73±0.53	0.48 ±0.45	<10	
No ID		-	-	10	-	-	-	-	-	-	-
966		-	-	10	-	-	-	-.01±0.64	-0.50 ± .53	-	<10
6167		-	-	10	-	-	-	0.73±0.53	0.48 ±0.45	-	-
864		-	-	9	-	-	6.2± 1.4	1.02±0.63	0.51 ±0.43	-	<10
No ID		-	-	10	-	-	-	-	-	-	-
No ID		-	-	-	-	-	-	-	-	<10	-
6161		-	-	4	-	-	-	-	-	-	-
No ID		-	-	-	-	-	-	-	-	<10	-
914		-	-	20	-	-	-	-	-	-	-
6117		-	-	-	-	-	-	0.73±0.53	0.48 ±0.45	-	-

PRIVACY ACT MATERIAL REMOVED

PRIVACY ACT MATERIAL REMOVED

Table 6 (Cont'd)

ID #	Name	EML 1970 ^{239}Pu fCi/ℓ	EML 1971 ^{239}Pu fCi/ℓ	EML 1974 ^{239}Pu fCi/ℓ	EML 1975 Fall ^{239}Pu fCi/ℓ	EML 1976 Spring ^{239}Pu fCi/ℓ	EML 1976 Fall ^{239}Pu fCi/ℓ	BNML 1977 Spring ^{239}Pu fCi/ℓ	BNML 1977 Spring ^{239}Pu fCi/ℓ	LASL 1977 Spring ^{239}Pu fCi/ℓ	LASL 1977 Fall ^{239}Pu fCi/ℓ
6128		-	-	-	-	-	-	0.73±0.53	0.48 ±0.45	-	-
							7.2± 7.2	0.46±0.27	-0.04±0.093	-	-
6067		-	-	-	-	-	3.9± 0.7	-	-	-	-
6001		-	-	20	-	-	3.7± 3.7	-	-	-	-
6067		-	-	-	-	-	21. ±21.	-	-	-	-
6210		-	-	-	-	-	19. ±19.	-	-	-	-
6126		-	-	-	-	-	12. ±12.	-	-	-	-
No ID		-	-	-	-	-	3.4± 3.4	-	-	-	-
	Pooled	3	4	-	11±2	9±2	3.2± 2.1	-	-	-	-
		2	4	-	12±2	-	-	-	-	-	-
	Urine	20	-	-	-	-	-	-	-	-	-
	Urine	24	-	-	-	-	-	-	-	-	-
	Controls										
	Fbeye	-	-	-	-	-	1.0± 0.6	-	-	-	-
	Watje	-	-	-	-	-	1.4± 1.4	-	-	-	-
	Majuro Hospital	-	-	-	-	-	3.5± 3.5	-	-	-	-
	Majuro Polio Wing	-	-	-	-	-	2.0± 2.0	-	-	-	-
	BNL	-	-	-	-	-	1.7± 1.7	-	-	-	-

PRIVACY ACT MATERIAL REMOVED

Table 7

Five Day Consecutive Urine Concentrations for ^{137}Cs and ^{90}Sr: January 1979

	^{137}Cs					^{90}Sr				
		Standard Deviation of	Counting Error of	Range			Standard Deviation of	Counting Error of	Range	
ID #	Mean nCi/ℓ	Mean nCi/ℓ	Mean nCi/ℓ	Low nCi/ℓ	High nCi/ℓ	Mean pCi/ℓ	Mean pCi/ℓ	Mean pCi/ℓ	Low pCi/ℓ	High pCi/ℓ
55	0.32	0.13	0.015	0.21	0.50	0.41	0.41	0.12	0.12	1.1
58	0.40	0.16	0.016	0.21	0.60	-0.03	0.35	0.12	-0.41	0.50
6159	0.11	0.039	0.011	0.064	0.16	0.17	0.47	0.12	-0.19	0.92
6118	3.5	1.0	0.043	2.1	4.9	1.4	1.6	0.30	0.48	4.2
57	0.18	0.039	0.012	0.12	0.23	0.27	0.65	0.17	-0.86	0.78
6066	1.3	1.1	0.082	0.41	3.1	1.5	2.5	5.5	-0.30	5.8
6112	6.5	2.9	0.064	2.0	9.8	.082	0.57	0.45	-0.71	0.73
6060	1.7	0.49	0.10	1.2	2.5	1.2	0.47	0.41	0.86	1.86
6064	2.0	0.36	0.033	1.5	2.4	0.91	1.4	0.22	0.14	3.2
6067	5.2	0.47	0.052	4.5	5.8	0.54	0.42	0.13	0	1.2
6070	6.3	1.1	0.070	5.0	7.0	2.8	0.90	0.35	2.1	3.8
6035	2.7	0.19	0.069	2.5	2.9	4.3	2.1	1.4	2.4	6.5
6161	0.33	0.11	0.015	0.23	0.48	0.86	0.79	0.20	0.12	2.1
254	0.26	0.067	0.013	0.19	0.34	0.16	0.21	0.14	-.060	0.45

Table 7 (Cont'd)

ID #	^{137}Cs Mean nCi/ℓ	^{137}Cs Standard Deviation of Mean nCi/ℓ	^{137}Cs Counting Error of Mean nCi/ℓ	^{137}Cs Range Low nCi/ℓ	^{137}Cs Range High nCi/ℓ	^{90}Sr Mean pCi/ℓ	^{90}Sr Standard Deviation of Mean pCi/ℓ	^{90}Sr Counting Error of Mean pCi/ℓ	^{90}Sr Range Low pCi/ℓ	^{90}Sr Range High pCi/ℓ
255	0.23	0.11	0.013	0.10	0.39	-0.20	0.46	0.37	-0.81	0.43
257	0.19	0.044	0.010	0.13	0.25	-0.26	0.22	0.18	-0.02	.49
N	16									
$\bar{X}$	2.0	0.52	0.064	9.8	1.7	1.1	0.25	0.69	0.42	2.1

Table 8

Summary of System Efficiency and MDLS for Field WBC System

Nuclide	Energy	Efficiency	MDL	Time
^{137}Cs	662 KeV	8.7×10^{-3}	37 Bq (1 nCi)	900 sec
^{60}Co	1173 & 1334 KeV	6.7×10^{-3}	37 Bq (1 nCi)	900 sec
^{40}K	1460 KeV	7.0×10^{-3}	222 Bq (6 nCi)	900 sec

Table 9

Body Burden Data for Medically Registered Adult Males Relocated from Bikini Atoll

Medical ID	Weight in Kilograms	Age (Yr)	Years on Bikini	1974[1] Potassium grams	1974[1] ^{137}Cs nCi	1977[2] Potassium grams	1977[2] ^{137}Cs nCi	1978 Potassium grams	1978 ^{60}Co nCi	1978 ^{137}Cs nCi	January 1979 Potassium grams	January 1979 ^{60}Co nCi	January 1979 ^{137}Cs nCi	May 1979 Potassium grams	May 1979 ^{60}Co nCi	May 1979 ^{137}Cs nCi	August 1980 Potassium grams	August 1980 ^{60}Co nCi	August 1980 ^{137}Cs nCi
80	61	69	0.75	-	-	-	-	97.6	1.42	1.14	-	-	-	133	-	0.12	-	-	-
6006	63	37	0.75	-	-	-	-	141	2.39	1.47	-	-	-	123*	-	0.163[A]	134	-	.037
863	67	27	4	-	-	146	0.729	156	4.93	2.34	179	2.5	1.1	-	-	-	204	1.2	.087
6070	85	28	10	170	0.093	167	1.51	152	8.17	3.92	137	3.0	1.6	-	-	-	-	-	-
6004	95	28	0.25	-	-	-	-	167	1.88	1.33	-	-	-	-	-	-	-	-	-
6033	79	27	6	148	0.095	136	1.52	132	8.65	3.84	-	-	-	-	-	-	127	-	.035
6018	89	34	6	198	0.22	-	-	180	14.3	5.88	-	-	-	-	-	-	-	-	-
6069	61	32	8	-	-	-	-	132	4.01	1.17	-	-	-	166	2.0	0.38	-	-	-
6068	79	56	6	165	0.051	144	0.778	141	6.17	3.07	-	-	-	-	-	-	139	-	.029
6067	74	56	7	-	-	-	-	151	5.91	2.99	137	2.4	1.0	169	1.2	0.63	164	1.2	.088
6066	94	32	3	-	-	-	-	168	2.04	0.820	171	1.2	0.48	197	-	0.45	-	-	-
6017	80	49	8	-	-	-	-	153	13.9	5.72	-	-	-	165	1.5	0.52	145	-	.042
6019	60	48	5	-	-	119	0.791	107	3.95	1.03	135	2.9	0.39	-	-	-	139	1.5	.006
6001	85	66	7	143	0.078	-	-	126	3.33	1.73	132	1.9	0.77	-	-	-	160	-	.055
6073	85	24	7	-	-	132	0.775	127	4.19	2.18	-	-	-	134	-	0.12	160	1.4	.16
6005	70	58	1.5	-	-	-	-	133	3.40	2.08	-	-	-	177	1.1	0.16	154	-	.007
6008	55	32	4	-	-	153	1.99	125	5.00	1.94	148	3.2	1.3	-	-	-	152	1.5	.10
6086	78	46	8	170	0.17	149	2.14	151	7.92	3.51	179	2.8	0.86	161	1.9	0.40	186	1.0	.029
6071	78	32	0.75	-	-	-	-	136	2.26	1.72	136	1.2	0.93	-	-	-	185	-	.058
6076	69	39	3	-	-	-	-	163	6.64	3.44	171	2.9	2.4	-	-	-	232	1.1	.15
6072	55	20	0.67	-	-	-	-	128	2.96	1.75	-	-	-	-	-	-	-	-	-
813	58	23	4	-	-	143	0.995	138	3.65	1.69	154	1.8	0.61	-	-	-	-	-	-
6118	55	22	6	126	0.77	-	-	108	1.92	0.631	144	1.6	0.75	126	0.9	0.41	111	-	.028
6126	55	35	2	-	-	149	2.21	137	7.79	3.30	-	-	-	-	-	-	141	-	.032
6003	77	22	8	168	0.076	161	0.923	139	5.60	2.44	-	-	-	-	-	-	-	-	-
6117	80	22	6	-	-	169	1.15	148	6.09	2.68	172	2.9	0.90	168	1.5	0.44	177	-	.022
6128	52	31	7	-	-	149	1.29	119	4.79	1.85	155	2.7	0.92	-	-	-	138	1.0	.042
6125	64	35	9	159	0.10	150	1.54	144	5.65	2.52	-	-	-	164	2.0	0.33	169	1.4	.021
6007	82	35	0.58	-	-	-	-	127	2.58	1.49	144	0.67	0.32	-	-	-	175	-	.018
6130	69	29	0.42	-	-	-	-	143	2.20	1.46	156	1.5	1.5	134	-	0.97	111	-	.065
6119	54	17	7	-	-	138	0.641	124	4.58	2.13	-	-	-	-	-	-	-	-	-
864	90	51	7	163	0.29	133	3.23	136	5.99	3.05	-	-	-	-	-	-	-	-	-
966	75	56	7	-	-	162	2.22	174	14.8	5.71	-	-	-	149	2.5	0.48	155	-	.021
6135	81	35	1	-	-	-	-	142	3.30	2.12	-	-	-	-	-	-	190	-	.10
6096	66	48	3	-	-	145	1.93	146	4.32	1.91	146	2.5	1.3	156	0.9	0.7	120	-	.053
6002	66	65	2	-	-	130	1.04	116	2.21	1.26	-	-	-	-	-	-	-	-	-
6161[3,4]	64	34	5	130	0.081	-	-	-	-	-	142	-	0.109	126	-	0.048	-	-	-
6166[3,4]	64	58	7	150	0.072	-	-	-	-	-	146	-	0.023	146	-	0.011	146	-	.0020
6184[4]	50	59	5	160	0.043	-	-	-	-	-	130	-	0.067	144	-	0.025	148	-	.007
6210[4]	85	35	10	156	0.124	141	0.74	-	-	-	-	-	-	160	-	0.29	145	-	.029

[1] Conard, R.A., BNL 50424.

[2] Personal communication with S. Cohn.

[3] Individuals left Bikini Atoll 8 months prior to the August 1978 Relocation Program.

[4] Individuals received sick call medical care prior to April 1978 but were not officially registered.

[A] Data obtained August 1979.

Table 10

Body Burden Data for Medically Registered Adult Females Relocated from Bikini Atoll

Medical ID	Weight in Kilograms	Age (Yr)	Years on Bikini	1974[1] Potassium grams	1974[1] ^{137}Cs pCi	1977[2] Potassium grams	1977[2] ^{137}Cs pCi	1978 Potassium grams	1978 ^{60}Co nCi	1978 ^{137}Cs pCi	January 1979 Potassium grams	January 1979 ^{60}Co nCi	January 1979 ^{137}Cs pCi	May 1979 Potassium grams	May 1979 ^{60}Co nCi	May 1979 ^{137}Cs pCi	August 1980 Potassium grams	August 1980 ^{60}Co nCi	August 1980 ^{137}Cs pCi
6045	83	28	0.75	-	-	-	-	95	1.79	1.15	-	-	-	116*	-	0.075*	130	-	.019
6112	90	35	1	-	-	-	-	96	2.18	1.76	94	1.6	0.98	118	-	0.46	109	-	.023
6114	54	32	0.75	-	-	-	-	79	1.40	0.818	102	-	0.12	-	-	-	119	-	.0055
6111	84	32	0.5	-	-	-	-	100	2.11	1.31	107	1.2	0.53	-	-	-	108	-	.021
6122	73	70	10	94	0.013	-	-	86	3.20	1.34	93	1.9	0.31	90	1.1	0.11	96	-	.0050
6123	77	50	4	-	-	107	1.53	99	3.81	1.41	126	2.5	0.62	97	-	0.25	104	1.3	.011
6059	45	19	1	-	-	-	-	80	1.33	0.861	-	-	-	-	-	-	105	-	.0033
6063	49	24	4	-	-	89.6	0.799	81	3.16	1.52	-	-	-	-	-	-	-	-	-
6032	63	32	3	-	-	96.4	1.88	100	5.49	3.07	94	1.7	0.77	109	1.0	0.26	93	-	.0044
6124	53	54	0.58	-	-	-	-	71	1.27	0.957	-	-	-	-	-	-	85	-	.0064
6108	86	24	4	94	0.029	98.0	0.706	93	2.48	0.729	114	1.6	0.53	-	-	-	112	-	.022
6058	66	18	5	106	0.077	88.8	0.690	92	4.63	2.08	-	-	-	-	-	-	-	-	-
6113	54	25	4	-	-	91.7	0.534	91	2.33	1.03	107	1.1	0.30	107	-	0.11	97	-	.0064
6065	52	19	4	-	-	101	0.734	93	2.39	1.06	96	1.3	0.36	-	-	-	112	-	.0080
6097	53	19	4	86	0.036	88.9	0.468	90	2.15	1.27	95	1.0	0.34	86	-	0.16	99	-	.017
6109	50	15	4	-	-	110	0.621	88	1.49	0.411	106	-	0.060	116	-	0.018	92	-	.0013
6046	88	43	1.75	-	-	94.3	0.833	100	3.81	2.10	-	-	-	104	1.2	0.36	88	-	.022
6098	60	16	3	-	-	91.4	0.706	93	2.38	.891	66	1.2	0.47	92	-	0.18	101	-	.0030
6060	55	22	2	-	-	-	-	81	2.00	1.39	105	-	0.18	115	-	0.059	-	-	-
6036	56	27	0.34	-	-	-	-	73	1.54	1.53	-	-	-	-	-	-	-	-	-
6110	77	32	8	111	0.11	-	-	94	3.98	1.50	-	-	-	110	-	0.11	116	1.4	.0083
525	78	37	0.75	-	-	-	-	106	2.96	2.36	-	-	-	109	-	0.32	98	-	.014
6064	60	30	7	-	-	-	-	83	2.55	0.907	74	1.6	0.42	88	-	0.22	87	-	.011
6061	65	32	6	-	-	-	-	81	3.62	2.22	-	-	-	-	-	-	-	-	-
6051	50	19	5	-	-	95.9	0.545	88	2.25	1.44	-	-	-	83	-	0.045	92	-	.19
934	74	43	6	-	-	98.8	2.23	110	10.8	5.48	-	-	-	104	2.1	0.48	108	-	.022
6062	54	21	4	-	-	96.8	0.840	79	2.53	1.44	-	-	-	100	-	0.088	97	-	.0035
6035	77	20	6	-	-	111	0.573	100	4.94	2.78	100	2.3	0.65	-	-	-	-	-	-
6115	56	43	7	95	0.058	85.9	1.15	80	4.16	2.28	84	1.8	0.48	95	2.0	0.17	93	-	.0068
6034	76	46	7	102	0.12	93.7	0.995	92	6.92	3.89	-	-	-	104	-	0.15	86	1.2	.0075
865	54	45	7	59	0.018	89.4	0.558	78	1.70	1.31	-	-	-	82	1.0	0.13	-	-	-
6050	62	22	2	-	-	112	1.14	81	3.42	1.40	-	-	-	-	-	-	89	-	.014
6167[3,4]	60	59	7	89	0.030	-	-	-	-	-	92	-	0.015	97	-	0.0079	88	-	.0032
6159[3,4]	111	27	4	124	0.073	-	-	-	-	-	115	-	0.028	125	-	0.012	127	-	.023
6148[3]	94	42	3	60	0.018	-	-	-	-	-	90	-	0.037	96	-	0.015	96	-	.0055
6163[3,5]	84	38	-	-	-	142	0.570	-	-	-	136	-	0.061	-	-	-	-	-	-
6151[3]	82	31	2	-	-	102	0.971	-	-	-	87	-	0.121	77	-	0.059	-	-	-

[1] Conard, R.A., BNL 50424.
[2] Personal communication with S. Cohn.
[3] Individuals received sick call medical care prior to April 1978 but were not officially registered.
[4] Individuals left Bikini Atoll 8 months prior to the August 1978 Relocation Program.
[5] Individuals left Bikini Atoll 14 months prior to the August 1978 Relocation Program.
* Data obtained August 1979.

Table II

Body Burden Data for Medically Registered Adolescents Relocated from Bikini Atoll

Medical ID	Weight in Kilograms	Age (Yr)	Years on Bikini	1977		1978			January 1979			May 1979			August 1980	
				Potassium grams	^{137}Cs μCi	Potassium grams	^{60}Co nCi	^{137}Cs μCi	Potassium grams	^{60}Co nCi	^{137}Cs μCi	Potassium grams	^{60}Co nCi	^{137}Cs μCi	Potassium grams	^{137}Cs μCi
Males																
6147	36	12	4.5	84	0.959	-	-	-	51	-	0.204	94	-	0.075	95	.0035
6132	33	12	2	-	-	58	3.45	1.85	-	-	-	-	-	-	82	.0038
6131	38	14	6	96	1.31	69	1.40	1.69	108	2.1	0.76	133	1.4	0.32	139	.015
6011	40	11	6	-	-	53	1.34	0.830	59	1.0	0.055	74	-	0.017	99.7	.0009
6127	32	13	7	91	0.824	53	2.17	0.732	95	2.0	0.21	60	-	0.053	92	.0033
6133	27	11	7	-	-	53	3.42	2.09	-	-	-	55	1.0	0.022	59	-
6015	29	11	1.42	-	-	57	1.18	1.28	37	-	0.071	60	-	0.016	-	-
Females																
6129	48	13	4	91	0.682	69	1.32	.744	73	1.2	0.27	89	-	0.076	100	.0044
6048	40	13	0.25	-	-	70	2.61	2.05	-	-	-	121	-	0.074	108	.0014
6091	43	13	6	-	-	69	2.20	1.17	103	1.4	0.15	86	-	0.037	-	-

Table 12

Body Burden Data for Medically Registered Children Relocated from Bikini Atoll

Medical ID	Weight in Kilograms	Age (Yr)	Years on Bikini	1978 Potassium grams	1978 ^{60}Co nCi	1978 ^{137}Cs pCi	January 1979 Potassium grams	January 1979 ^{137}Cs pCi	May 1979 Potassium grams	May 1979 ^{137}Cs pCi	August 1980 Potassium grams	August 1980 ^{137}Cs pCi
Males												
6009	20	6	4	36	0.98	1.26	-	-	59	0.007	88	.0010
6049	23	8	2	47	2.7	1.71	-	-	-	-	59	.0032
6042	23	7	0.25	43	1.0	1.07	-	-	-	-	-	-
6014	20	5	1.34	41	1.7	1.50	-	-	69	0.012	46	-
6012	24	7	7	41	1.7	1.27	-	-	63	0.022	58	.0025
6023	28	8	4	52	1.7	1.28	43	0.16	-	-	71	-
6016	27	10	7	53	2.5	1.43	-	-	51	0.039	62	.0014
6013	18	5	2	33	1.3	1.00	-	-	-	-	-	-
6031*	20	5	3	-	-	-	-	-	35	0.0028	37	-
6029	20	6	5	-	-	-	-	-	25	0.0047	48	.0009
6100*	17	5	4.3	-	-	-	-	-	24	0.015	43	-
6021*	19	5	4.3	-	-	-	NC	0.046	51	0.0062	49	-
6020	20	6	2	-	-	-	72	0.056	37	0.0074	38	-
6107*	15	5	4.3	-	-	-	46	0.016	40	0.0026	37	-
6074*	20	5	4.3	-	-	-	34	.009	25	-	-	-
6116*	14	5	3	-	-	-	-	-	-	-	33	-
Females												
6094	34	10	6	51	2.3	2.02	-	-	-	-	-	-
6092	29	8	6	52	2.8	2.25	-	-	-	-	-	-
6080	34	7	0.58	50	-	0.543	-	-	-	-	-	-
6010	29	8	7	56	1.8	1.41	50	0.17	-	-	71	.0021
6038	21	6	2	42	1.3	1.00	-	-	-	-	53	.0019
6105	22	5	3	31	1.2	0.967	65	0.053	29	0.0074	51	-
6103	-	9	3	48	1.4	1.40	-	-	-	-	99	.0046
6028	25	7	5	52	1.4	1.26	-	-	49	0.015	75	.0011
6030	34	10	3	54	3.0	2.38	34	0.26	70	0.064	63	.0018
6027	22	6	3	36	5.6	1.16	58	0.042	-	-	56	-
6044	18	6	5	35	6.4	1.15	-	-	36	0.0062	-	-
6025	21	5	3	44	0.97	1.03	45	0.13	67	0.028	52	-
6081	26	9	0.67	49	-	1.02	-	-	-	-	-	-
6106	22	6	3	32	-	0.622	37	0.077	44	0.013	53	-
6078*	17	5	-	-	-	-	28	0.0030	-	-	-	-
6088*	15	5	4.3	-	-	-	-	-	33	0.0030	-	-
6090	25	6	5	-	-	-	-	-	31	0.0049	47	-
6101	19	6	5.3	-	-	-	12	0.051	15	0.0069	36	-
6056*	17	6	4.3	-	-	-	NC	0.046	49	0.0074	41	-
6057	26	7	1	-	-	-	-	-	66	0.0058	33	-
6079*	19	5	3	-	-	-	-	-	-	-	33	-

NC = Not calculated

*Individuals less than 5 years of age on 4/27/78

Table 11

Summary of ^{137}Cs Body Burdens for Bruton Inhabitants, 1976 to 1979

Population	Number Counted 1976(3)	Range of ^{137}Cs Results 1976(3)	Mean ^{137}Cs Results 1976(3)	Number Counted 1977(3)	Range of ^{137}Cs Results 1977(3)	Mean ^{137}Cs Results 1977(3)	Number Counted 1978	Range of ^{137}Cs Results 1978	Mean ^{137}Cs Results 1978	Number Counted Jan. 1979	Range of ^{137}Cs Results Jan. 1979	Mean ^{137}Cs Results Jan. 1979	Number Counted May 1979	Range of ^{137}Cs Results May 1979	Mean ^{137}Cs Results May 1979	Number Counted Aug. 1980	Range of ^{137}Cs Results Aug. 1980	Mean ^{137}Cs Results Aug. 1980
Adult Male	18	1.6 kBq (0.043 μCi) to 15 kBq (0.40 μCi)	4.7 kBq (0.13 μCi) ± 3.4 kBq (.093 μCi)	22	28 kBq (0.57 μCi) to 120 kBq (3.2 μCi)	48 kBq (1.3 μCi) ± 27 kBq (0.73 μCi)	36[1]	23 kBq (0.61 μCi) to 220 kBq (5.9 μCi)	50 kBq (2.4 μCi) ± 49 kBq (1.3 μCi)	17	32 kBq (0.31 μCi) to 89 kBq (2.4 μCi)	32 kBq (1.0 μCi) ± 19 kBq (0.51 μCi)	18	0.47 kBq (0.011 μCi) to 36 kBq (0.97 μCi)	13 kBq (0.36 μCi) ± 9.5 kBq (0.26 μCi)	27	0.10 kBq (0.0018 μCi) to 5.9 kBq (0.16 μCi)	1.8 kBq (0.049 μCi) ± 1.5 kBq (0.041 μCi)
Adult Female	13	0.67 kBq (0.018 μCi) to 9.3 kBq (0.25 μCi)	2.7 kBq (0.073 μCi) ± 2.3 kBq (0.063 μCi)	20	20 kBq (0.53 μCi) to 83 kBq (2.2 μCi)	35 kBq (0.93 μCi) ± 17 kBq (0.47 μCi)	32	15 kBq (0.41 μCi) to 200 kBq (5.5 μCi)	62 kBq (1.7 μCi) ± 32 kBq (1.0 μCi)	16	2.2 kBq (0.060 μCi) to 36 kBq (0.98 μCi)	16 kBq (0.44 μCi) ± 8.9 kBq (0.24 μCi)	23	0.29 kBq (0.0079 μCi) to 14 kBq (0.40 μCi)	6.3 kBq (0.1a μCi) ± 5.1 kBq (0.14 μCi)	28	0.068 kBq (0.0013 μCi) to 2.0 kBq (0.019 μCi)	0.64 kBq (0.017 μCi) ± 1.1 kBq (0.0035 μCi)
Male Children 11-15 yrs	0	ND	ND	3	24 kBq (0.65 μCi) to 35 kBq (1.0 μCi)	30 kBq (0.82 μCi) ± 7.6 kBq (0.21 μCi)	6[2]	27 kBq (0.73 μCi) to 77 kBq (2.1 μCi)	52 kBq (1.4 μCi) ± 21 kBq (0.56 μCi)	4	2.0 kBq (0.055 μCi) to 20 kBq (0.76 μCi)	10 kBq (0.27 μCi) ± 12 kBq (0.33 μCi)	6	0.59 kBq (0.016 μCi) to 12 kBq (0.32 μCi)	3.1 kBq (0.084 μCi) ± 4.4 kBq (0.12 μCi)	5	0.013 kBq (0.0019 μCi) to 0.56 kBq (0.015 μCi)	0.20 kBq (0.0055 μCi) ± 0.21 kBq (0.0025 μCi)
Female Children 11-15 yrs	0	ND	ND	3	20 kBq (0.54 μCi) to 35 kBq (0.94 μCi)	25 kBq (0.68 μCi) ± 8.5 kBq (0.23 μCi)	3	28 kBq (0.74 μCi) to 76 kBq (2.1 μCi)	46 kBq (1.3 μCi) ± 23 kBq (0.66 μCi)	2	5.6 kBq (0.15 μCi) to 10 kBq (0.27 μCi)	7.8 kBq (0.21 μCi) ± 3.1 kBq (0.080 μCi)	3	1.4 kBq (0.037 μCi) to 2.8 kBq (0.076 μCi)	2.3 kBq (0.062 μCi) ± 0.83 kBq (0.022 μCi)	2	0.032 kBq (0.0014 μCi) to 0.36 kBq (0.0064 μCi)	0.11 kBq (0.0029 μCi) ± 0.16 kBq (0.0043 μCi)
Male Children 5-10 yrs	0	ND	ND	0	ND	ND	0[3]	32 kBq (1.0 μCi) to 64 kBq (1.7 μCi)	50 kBq (1.3 μCi) ± 2.6 kBq (0.21 μCi)	1	5.9 kBq (0.16 μCi)	5.9 kBq (0.16 μCi)	10	0.10 kBq (0.0026 μCi) to 1.4 kBq (0.039 μCi)	0.46 kBq (0.012 μCi) ± 0.42 kBq (0.011 μCi)	5	0.033 kBq (0.0009 μCi) to 0.12 kBq (0.0032 μCi)	0.067 kBq (0.0018 μCi) ± 0.037 kBq (0.0010 μCi)
Female Children 5-10 yrs	0	ND	ND	0	ND	ND	14	20 kBq (0.54 μCi) to 92 kBq (2.4 μCi)	47 kBq (1.3 μCi) ± 21 kBq (0.56 μCi)	6	1.6 kBq (0.042 μCi) to 9.6 kBq (0.26 μCi)	6.4 kBq (0.12 μCi) ± 3.0 kBq (0.080 μCi)	11	0.11 kBq (0.003 μCi) to 2.4 kBq (0.064 μCi)	0.56 kBq (0.015 μCi) ± 0.66 kBq (0.018 μCi)	5	0.041 kBq (0.0011 μCi) to 0.17 kBq (0.0046 μCi)	0.083 kBq (0.0023 μCi) ± 0.051 kBq (0.0031 μCi)
All Adults	31	0.67 kBq (0.018 μCi) to 15 kBq (0.40 μCi)	3.9 kBq (0.11 μCi) ± 3.1 kBq (0.085 μCi)	42	20 kBq (0.53 μCi) to 120 kBq (3.2 μCi)	42 kBq (1.1 μCi) ± 24 kBq (0.64 μCi)	68	15 kBq (0.41 μCi) to 220 kBq (5.9 μCi)	57 kBq (2.1 μCi) ± 46 kBq (1.3 μCi)	33	2.2 kBq (0.060 μCi) to 89 kBq (2.4 μCi)	27 kBq (0.73 μCi) ± 18 kBq (0.49 μCi)	41	0.29 kBq (0.0079 μCi) to 36 kBq (0.97 μCi)	9.3 kBq (0.25 μCi) ± 8.1 kBq (0.22 μCi)	55	0.068 kBq (0.0013 μCi) to 7.0 kBq (0.19 μCi)	1.4 kBq (0.038 μCi) ± 1.5 kBq (0.041 μCi)

Table 13 (Cont'd)

Summary of ^{137}Cs Body Burdens for Bikini Inhabitants, 1974 to 1979

Population	Number Counted 1974(5)	Range of ^{137}Cs Results 1974(5)	Mean ^{137}Cs Results 1974(5)	Number Counted 1977(5)	Range of ^{137}Cs Results 1977(5)	Mean ^{137}Cs Results 1977(5)	Number Counted 1978	Range of ^{137}Cs Results 1978	Mean ^{137}Cs Results 1978	Number Counted Jan. 1979	Range of ^{137}Cs Results Jan. 1979	Mean ^{137}Cs Results Jan. 1979	Number Counted May 1979	Range of ^{137}Cs Results May 1979	Mean ^{137}Cs Results May 1979	Number Counted Aug. 1980	Range of ^{137}Cs Results Aug. 1980	Mean ^{137}Cs Results Aug. 1980
All Children	0	NR	NR	6	20 kBq (0.56 μCi) to 39 kBq (1.0 μCi)	28 kBq (0.75 μCi) ± 7.8 kBq (0.21 μCi)	31	20 kBq (0.56 μCi) to 92 kBq (2.3 μCi)	50 kBq (1.4 μCi) ± 18 kBq (0.49 μCi)	13	1.6 kBq (0.042 μCi) to 26 kBq (0.7a μCi)	8.3 kBq (0.22 μCi) ± 7.8 kBq (0.21 μCi)	30	0.10 kBq (0.0026 μCi) to 12 kBq (0.32 μCi)	1.2 kBq (0.032 μCi) ± 2.2 kBq (0.059 μCi)	17	0.033 kBq (0.0009 μCi) to 0.56 kBq (0.015 μCi)	0.11 kBq (0.0031 μCi) ± 0.12 kBq (0.0033 μCi)
Total Average	31	0.67 kBq (0.018 μCi) to 35 kBq (0.a0 μCi)	3.9 kBq (0.11 μCi) ± 3.1 kBq (0.085 μCi)	48	20 kBq (0.55 μCi) to 320 kBq (3.2 μCi)	40 kBq (1.1 μCi) ± 22 kBq (0.61 μCi)	99	15 kBq (0.41 μCi) to 240 kBq (5.9 μCi)	68 kBq (1.8 μCi) ± 36 kBq (1.0 μCi)	46	1.6 kBq (0.042 μCi) to 89 kBq (2.4 μCi)	21 kBq (0.5y μCi) ± 18 kBq (0.49 μCi)	71	0.10 kBq (0.0026 μCi) to 36 kBq (0.97 μCi)	5.9 kBq (0.16 μCi) ± 7.4 kBq (0.20 μCi)	32	0.033 kBq (0.0009 μCi) to 2.0 kBq (0.19 μCi)	0.vt kBq (0.02a μCi) ± 1.5 kBq (0.0.0 μCi)

NR - No data available for the specific column.

(1) One adult, counted at Bikini, was a visitor from Rongelap Atoll. He remained on ship with our staff while at Bikini and returned at Ebeye with us. His body count was not used in this table.

(2) One male child in this age group was counted twice to determine what effect showering prior to the body count had on the final result. Only one result was used for this individual since both results were similar.

(3) A six month old child's data has not been included in this table and category due to the difference in geometry between a baby and our calibration phantom.

(4) The 1978 mean value for all individual count includes the > 10 year age group while the 1977 mean value has no representation in this sample section and the 1974 mean value has no child representation.

(5) The 1974 (CDC 75) and 1977 ^{137}Cs body burden data were obtained from S. Cohn, Brookhaven National Laboratory, Medical Department.

Table 14

Comparison of Observed
Versus Expected Reduction Factors

Description	# of Persons	Mean Reduction Factor
Expected Reduction Factor for Adult Males(1)	NA	2.4
Observed Reduction Factor for Adult Bikini Males	17	2.3
Expected Reduction Factor for Adult Females(2)	NA	3.5
Observed Reduction Factor for Adult Bikini Females	16	3.8
Expected Reduction Factor for Children Ages 5-14(2)	NA	5.9
Observed Reduction Factor for Children Ages 5-14	12	12.

NA = Data Not Available

(1) Effective half time obtained from ICRP Publication 10A (ICRP 71).

(2) Effective half time obtained from NCRP Report 52 (NCRP 77).

Table 15

^{137}Cs Biological Removal Rate Constants for Marshallese Adult Males

ID#	Date	^{137}Cs μCi	Date	^{137}Cs μCi	Date	^{137}Cs μCi	K d^{-1}	K d^{-1}	K d^{-1}
863	1/23/79	1.1	8/2/80	8.6×10^{-2}			4.7×10^{-3}		
6067	1/24/79	1.0	5/17/79	.63	8/1/80	8.8×10^{-2}	4.0×10^{-3}	4.5×10^{-3}	4.6×10^{-3}
6066	1/24/79	.48	5/18/79	.45			NA		
6017	5/21/79	.52	7/31/80	4.2×10^{-2}			6.2×10^{-3}		
6019	1/22/79	.39	7/31/80	6.8×10^{-3}			NA		
6001	1/22/79	.77	7/31/80	5.5×10^{-2}			5.0×10^{-3}		
6073	5/15/79	.12	8/1/80	1.6×10^{-1}			NA		
6005	5/21/79	.16	7/31/80	7.8×10^{-3}			NA		
6008	1/23/79	1.3	8/1/80	1.0×10^{-1}			4.7×10^{-3}		
6086	1/23/79	.86	5/16/79	.40	7/30/80	2.9×10^{-2}	6.7×10^{-3}	6.7×10^{-3}	6.7×10^{-3}
6071	1/23/79	.93	8/3/80	5.8×10^{-2}			5.2×10^{-3}		
6076	1/22/79	2.4	7/31/80	1.5×10^{-1}			5.0×10^{-3}		
6118	1/24/79	.75	5/17/79	.41	8/1/80	2.8×10^{-2}	5.3×10^{-3}	6.6×10^{-3}	6.9×10^{-3}
6117	1/24/79	.90	5/16/79	.44	7/31/80	2.2×10^{-2}	6.3×10^{-3}	7.6×10^{-3}	7.9×10^{-3}
6128	1/25/79	.92	8/4/80	4.2×10^{-2}			5.9×10^{-3}		
6125	5/18/79	.33	8/5/80	2.1×10^{-2}			7.4×10^{-3}		
6007	1/23/79	.32	8/4/80	1.8×10^{-2}			6.3×10^{-3}		
6130	1/22/79	1.5	5/15/79	.97	7/31/80	6.5×10^{-2}	3.8×10^{-3}	5.8×10^{-3}	6.4×10^{-3}
966	5/15/79	.48	7/31/80	2.1×10^{-2}			8.3×10^{-3}		
6096	1/22/79	1.3	5/16/79	.70	7/31/80	5.3×10^{-2}	5.4×10^{-3}	6.0×10^{-3}	6.2×10^{-3}
6161	1/24/79	.109	5/17/79	.048			7.4×10^{-3}		
6166	1/24/79	.023	5/16/79	.011	7/31/80	2.8×10^{-3}	7.3×10^{-3}	NA	NA

Table 15 (Cont'd)

^{137}Cs Biological Removal Rate Constants for Marshallese Adult Males (Cont'd)

ID#	Date	^{137}Cs μCi	Date	^{137}Cs μCi	Date	^{137}Cs μCi	K d^{-1}	K d^{-1}	K d^{-1}
6184	1/25/79	.067	5/17/79	.025	8/1/80	7.3×10^{-3}	9.1×10^{-3}	NA	NA
6210	5/21/79	.290	7/31/80	2.9×10^{-2}			6.0×10^{-3}		
6190	5/16/79	6.0×10^{-3}	7/31/80	7.1×10^{-3}			NA		
6223	5/21/79	99×10^{-3}	8/4/80	1.5×10^{-2}			6.3×10^{-3}		
6226	5/21/79	MDL	8/4/80	4.4×10^{-3}			NA		
6153	1/23/79	5.8×10^{-3}	5/16/79	5.4×10^{-3}			NA		
6168	1/24/79	2.4×10^{-3}	5/16/79	MDL	7/31/80	MDL	NA	NA	NA
6180	1/25/79	34×10^{-3}	7/30/80	5.9×10^{-3}			NA		
6182	1/25/79	1220×10^{-3}	5/16/79	620×10^{-3}			6.0×10^{-3}		

Table 15 (Cont'd)

^{137}Cs Biological Removal Rate Constants for Marshallese Adult Females

ID#	Date	^{137}Cs μCi	Date	^{137}Cs μCi	Date	^{137}Cs μCi	K d^{-1}	K d^{-1}	K d^{-1}
6112	1/24/79	.98	5/16/79	.46	7/30/80	2.3×10^{-2}	6.7×10^{-3}	7.1×10^{-3}	7.2×10^{-3}
6114	1/23/79	.12	8/3/80	5.5×10^{-3}			8.7×10^{-3}		
6111	1/23/79	.53	8/4/80	2.1×10^{-2}			6.1×10^{-3}		
6122	1/22/79	.31	5/16/79	.11	7/31/80	5.0×10^{-3}	9.1×10^{-3}	1.19×10^{-2}	1.26×10^{-2}
6123	1/22/79	.62	5/17/79	.25	7/31/80	1.1×10^{-2}	7.86×10^{-3}	8.15×10^{-3}	8.21×10^{-3}
6032	1/22/79	.77	5/16/79	.26	7/31/80	4.4×10^{-3}	9.5×10^{-3}	NA	
6108	1/23/79	.53	8/1/80	2.2×10^{-2}			6.07×10^{-3}		
6113	1/23/79	.30	5/16/79	.11	8/2/80	6.4×10^{-3}	8.9×10^{-3}	9.1×10^{-3}	9.2×10^{-3}
6065	1/22/79	.36	8/2/80	8.0×10^{-3}			8.3×10^{-3}		
6097	1/23/79	.31	5/16/79	.16	7/31/80	1.7×10^{-2}	5.8×10^{-3}	NA	
6109	1/23/79	.060	5/16/79	.018	7/31/80	1.3×10^{-3}	1.2×10^{-2}	NA	
6046	5/15/79	.36	8/2/80	2.2×10^{-2}			6.7×10^{-3}		
6098	1/22/79	.47	5/17/79	.18	7/31/80	3.0×10^{-3}	8.3×10^{-3}	NA	
6060	1/24/79	.18	5/17/79	.059			9.8×10^{-3}		
6110	5/21/79	.11	7/31/80	8.3×10^{-3}			7.7×10^{-3}		
525	5/21/79	.32	8/4/80	1.4×10^{-2}			7.9×10^{-3}		
6064	1/24/79	.42	5/15/79	.22	7/31/80	1.1×10^{-2}	5.8×10^{-3}	7.5×10^{-3}	7.9×10^{-3}
6051	5/15/79	.045	7/31/80	1.9×10^{-1}			NA		
934	5/15/79	.48	7/31/80	2.2×10^{-2}			7.4×10^{-3}		
6062	5/16/79	.088	7/31/80	3.5×10^{-3}			NA		
6115	1/23/79	.48	5/16/79	.17	7/30/80	6.8×10^{-3}	9.2×10^{-3}	9.6×10^{-3}	9.8×10^{-3}
6034	5/21/79	.15	8/1/80	7.5×10^{-3}			8.9×10^{-3}		

Table 15 (Cont'd)

^{137}Cs Biological Removal Rate Constants for Marshallese Adult Females (Cont'd)

ID#	Date	^{137}Cs μCi	Date	^{137}Cs μCi	Date	^{137}Cs μCi	K d^{-1}	K d^{-1}		K d^{-1}
6167	1/24/79	.015	5/16/79	.0079	7/31/80	3.2×10^{-3}	6.7×10^{-3}		NA	
6159	1/24/79	.028	5/17/79	.012	8/2/80	2.3×10^{-2}	8.2×10^{-3}		NA	
6148	1/23/79	.037	5/16/79	.015	7/31/80	5.5×10^{-3}	8.5×10^{-3}	6.6×10^{-3}		6.1×10^{-3}
6151	1/23/79	.121	5/17/79	.059			6.4×10^{-3}			
6137	1/22/79	3.8×10^{-3}	5/17/79	1.7×10^{-3}	8/1/80	2.4×10^{-3}	2.7×10^{-2}		NA	
6140	1/22/79	27×10^{-3}	5/17/79	8.6×10^{-3}	7/31/80	5.6×10^{-4}	1.1×10^{-2}		NA	
6144	1/22/79	37×10^{-3}	5/17/79	13×10^{-3}	8/1/80	2.0×10^{-3}	9.8×10^{-3}		NA	
6152	1/23/79	2.4×10^{-3}	5/16/79	3.9×10^{-3}	8/2/80	4.8×10^{-3}			NA	
6155	1/23/79	390×10^{-3}	5/16/79	150×10^{-3}	8/2/80	7.3×10^{-3}	8.4×10^{-3}	8.9×10^{-3}		9.0×10^{-3}
6160	1/24/79	360×10^{-3}	5/17/79	140×10^{-3}			8.4×10^{-3}			
6175	1/24/79	11×10^{-3}	5/17/79	5.2×10^{-3}			8.4×10^{-3}			
6181	1/25/79	8.5×10^{-3}	5/17/79	4.6×10^{-3}			7.4×10^{-3}		NA	
6185	1/25/79	2.7×10^{-3}	5/16/79	3.4×10^{-3}					NA	

Table 15 (Cont'd)

^{137}Cs Biological Removal Rate Constants for Marshallese Adolescents

ID#	Date	^{137}Cs μCi	Date	^{137}Cs μCi	Date	^{137}Cs μCi	K d^{-1}	K d^{-1}		K d^{-1}
Males										
6147	1/23/79	.204	5/16/79	.075	7/31/80	3.5×10^{-3}	8.9×10^{-3}		NA	
6131	1/23/79	.76	5/16/79	.32	8/1/80	1.5×10^{-2}	7.6×10^{-3}	7.7×10^{-3}		7.7×10^{-3}
6011	1/23/79	.055	5/16/79	.017	7/31/80	9.0×10^{-4}	1.1×10^{-2}		NA	
6127	1/22/79	.21	5/16/79	.053	8/1/80	3.3×10^{-3}	1.2×10^{-2}		NA	
6133	5/16/79	.022	7/31/80	6.6×10^{-4}			NA			
6015	1/24/79	.071	5/17/79	.016			1.4×10^{-2}			
6178	1/24/79	2.0×10^{-3}	5/17/79	1.7×10^{-3}			NA			
Females										
6129	1/22/79	.27	5/17/79	.076	7/31/80	4.4×10^{-3}	1.1×10^{-2}		NA	
6048	5/21/79	.074	8/5/80	1.4×10^{-3}			NA			
6091	1/24/79	.15	5/17/79	.037			1.3×10^{-2}			
6173	1/24/79	4.0×10^{-3}	8/1/80	2.2×10^{-3}			NA			
6170	1/24/79	2.8×10^{-3}	5/17/79	1.8×10^{-3}	7/31/80	9.7×10^{-4}	NA			
6141	1/22/79	2.7×10^{-3}	5/16/79	1.5×10^{-3}			NA			

Table 15 (Cont'd)

^{137}Cs Biological Removal Rate Constants for Marshallese Children

ID#	Date	^{137}Cs μCi	Date	^{137}Cs μCi	Date	^{137}Cs μCi	K d^{-1}	K d^{-1}	K d^{-1}
Males									
6031	5/15/79	2.8×10^{-3}	8/1/80	7.6×10^{-4}			NA		
6029	5/15/79	4.7×10^{-3}	7/31/80	9.0×10^{-4}			NA		
6100	5/15/79	15×10^{-3}	8/1/80	6.0×10^{-4}			NA		
6021	1/24/79	46×10^{-3}	5/16/79	6.2×10^{-3}	7/30/80	3.0×10^{-4}	2.0×10^{-2}		NA
6020	1/22/79	56×10^{-3}	5/16/79	7.4×10^{-3}	7/31/80	5.0×10^{-4}	1.9×10^{-2}		NA
6107	1/23/79	16×10^{-3}	5/16/79	2.6×10^{-3}	8/1/80	3.2×10^{-4}	2.4×10^{-2}		NA
6023	1/22/79	.16	7/31/80	7.5×10^{-4}			NA		
6016	5/15/79	1.3	7/31/80	1.4×10^{-3}			1.9×10^{-2}		
6156	1/24/79	2.0×10^{-3}	5/17/79	3.4×10^{-3}	8/1/80	1.9×10^{-3}	NA		NA
6172	1/24/79	2.8×10^{-3}	5/16/79	1.9×10^{-3}	7/31/80	1.0×10^{-3}	NA		NA
Females									
6171	1/24/79	4.0×10^{-3}	5/16/79	1.1×10^{-3}	7/31/80	4.7×10^{-4}	NA		NA
6157	1/24/79	7.2×10^{-3}	8/3/80	3.4×10^{-3}			1.5×10^{-3}		
6158	1/24/79	3.5×10^{-3}	5/18/79	1.2×10^{-3}	8/3/80	6.5×10^{-3}	NA		NA
6150	1/23/79	4.0×10^{-3}	5/16/79	1.5×10^{-3}	8/1/80	9.5×10^{-4}			NA
6101	1/24/79	51×10^{-3}	5/15/79	6.9×10^{-3}			2.0×10^{-2}		
6056	1/24/79	46×10^{-3}	5/16/79	7.4×10^{-3}			1.8×10^{-2}		
6057	5/21/79	5.8×10^{-3}	8/5/80	5.4×10^{-4}			NA		
6010	1/23/79	.17	7/31/80	2.1×10^{-3}			9.2×10^{-3}		
6105	1/23/79	.053	5/16/79	7.4×10^{-3}	7/30/80	3.4×10^{-4}	1.9×10^{-2}		NA

Table 15 (Cont'd)

^{137}Cs Biological Removal Rate Constants for Marshallese Children (Cont'd)

ID#	Date	^{137}Cs μCi	Date	^{137}Cs μCi	Date	^{137}Cs μCi	K d^{-1}	K d^{-1}	K d^{-1}
Females (Cont'd)									
6028	5/15/79	.015	7/31/80	1.1×10^{-3}					
6030	1/22/79	.26	5/16/79	.064	7/31/80	1.8×10^{-3}	1.2×10^{-2}	1.1×10^{-2}	1.0×10^{-2}
6025	1/23/79	.13	5/16/79	.028			1.4×10^{-2}		
6160	1/23/79	.077	5/16/79	.013	7/31/80	2.7×10^{-4}	1.7×10^{-2}	NA	
6142	1/22/79	2.3×10^{-3}	5/16/79	1.0×10^{-3}	7/31/80	1.0×10^{-3}	NA	NA	

Table 16

Comparison of Mean Long Term ^{137}Cs Biological Removal Rate Constants for the Former Bikini Atoll Population

Population Description	Group Size	K, d^{-1} 1/79-5/79	Group Size	K, d^{-1} 1/79-8/80	Group Size	K, d^{-1} 5/79-8/80	Group Size	Average K, d^{-1}
Adult Males (22-59a)	10	.0061±.0017	13	.0057±.00094	12	.0068±.0010	35	.0062±.0012
Adult Females (19-70a)	21	.0084±.0016	13	.0082±.0017	12	.0084±.0016	46	.0083±.0016
Adolescents (11-15a)	7	.011±.0022	1	.0077	1	.0077	9	.010±.0024
Juveniles (5-10a)	9	.018±.0035	2	.0072±.0050	3	.015±.0064	14	.016±.004

Table 17

Body Burden Data for Non-Medically Registered Adult Male Prior Residents of Bikini Atoll

						January		May		August	
ID #	Age (yr)	Height (cm)	Weight (kg)	Yrs. On Bikini	Yrs. Off Bikini	1979 ^{137}Cs Result nCi	1979 Potassium Result Gram	1979 ^{137}Cs Result nCi	1979 Potassium Result Gram	1980 ^{137}Cs Result nCi	1980 Potassium Result Gram
6136	48	150	58	--	4	8.5	144	--	--	--	--
6138	20	163	57	--	3	2.8	165	--	--	--	--
6153	23	160	65	1	1.42	5.8	170	5.4	146	--	--
6168	16	150	44	7	1.0	2.4	101	--	100	--	104
6174	52	174	84	--	6	17	158	--	--	--	--
6180	22	173	67	4	1	34	141	--	--	5.9	153
6182	18	161	53	6	0.42	1220	122	620	131	--	--
6190	19	166	57	0.25	2	--	--	6.0	161	7.1	153
6205	42	170	81	4	4.5	--	--	--	159	--	--
6211	19	163	55	1	3	--	--	--	134	--	--
6218	56	158	72	2	10	--	--	--	169	--	--
6219	30	173	60	2	9	--	--	--	143	--	--
6220	26	166	66	2	9	--	--	--	165	--	--
6221	53	175	82	2	9	--	--	4.2	139	--	--

Table 17 (Cont'd)

Body Burden Data for Non-Medically Registered Adult Male Prior Residents of Bikini Atoll

						January		May		August	
ID #	Age (yr)	Height (cm)	Weight (kg)	Yrs. On Bikini	Yrs. Off Bikini	1979 ^{137}Cs Result nCi	1979 Potassium Result Gram	1979 ^{137}Cs Result nCi	1979 Potassium Result Gram	1980 ^{137}Cs Result nCi	1980 Potassium Result Gram
6223	66	152	65	2 days May 14, 15, 1979	.016	--	--	99	127	15	135
6224	45	158	55	2 days May 14, 15, 1979	.016	--	--	120	146	--	--
6226	18	164	58	2	3	--	--	--	137	4.4	152

Table 18

Body Burden Data for Non-Medically Registered Adult Female Prior Residents of Bikini Atoll

						January		May		August	
ID #	Age (yr)	Height (cm)	Weight (kg)	Yrs. On Bikini	Yrs. Off Bikini	1979 ^{137}Cs Result nCi	1979 Potassium Result Gram	1979 ^{137}Cs Result nCi	1979 Potassium Result Gram	1980 ^{137}Cs Result nCi	1980 Potassium Result Gram
6137	38	161	64	0.33	4	3.8	113	1.7	112	2.4	99
6139	22	140	38	--	3	2.1	89	--	--	--	--
6140	16	146	46	0.17	0.42	27	94	8.6	94	--	69
6144	21	150	44	1	0.42	37	105	13	89	2.0	--
6152	20	157	59	1	1.42	2.4	123	3.9	117	4.8	148
6155	24	155	66	6	0.42	390	120	150	96	7.3	88
6160	65	153	55	6	0.67	360	67	140	87	--	--
6165	36	142	60	--	1.5	6.6	76	--	--	--	--
6175	24	155	63	--	--	11	90	5.2	92	--	--
6181	44	151	55	4	1	8.5	105	4.6	105	--	--
6185	21	144	41	3	2.5	2.7	74	3.4	79	--	69
6187	21	152	54	0.019	1	--	--	1.6	107	--	--
6189	21	155	--	2.5	1	--	--	1.9	114	--	--
6206	32	151	73	3	5.5	--	--	--	116	--	--
6222	39	156	66	2.5	3	--	--	--	98	--	--

Table 19

Body Burden Data for Non Medically Registered Adolescents Prior Residents of Bikini Atoll

ID #	Age (yr)	Height (cm)	Weight (kg)	Yrs. On Bikini	Yrs. Off Bikini	January 1979 ^{137}Cs Result nCi	January 1979 Potassium Result Gram	May 1979 ^{137}Cs Result nCi	May 1979 Potassium Result Gram	August 1980 ^{137}Cs Result nCi	August 1980 Potassium Result Gram
Males											
6169	14	167	46	7	1.0	1.2	108	--	120	--	--
6178	12	157	33	5	1.0	2.0	46	1.7	70	--	--
6183	12	139	35	--	1.67	1.0	36	--	74	--	--
6200	14	155	43	1	.71	--	--	110	111	--	--
6225	11	125	25	5	1.33	--	--	--	53	--	--
6207	12	138	35	4	4.5	--	--	--	78	--	--
Females											
6173	13	142	47	3	0.42	4.0	33	--	48	2.2	74
6170	13	140	45	7	1.0	2.8	58	1.8	77	.97	100
6162	12	147	50	--	1.5	5.0	36	--	--	--	--
6212	14	151	50	1	3	--	--	--	73	--	--
6141	12	138	33	0	--	2.7	63	1.5	112	--	60
6188	14	146	49	0	--	--	--	2.9	107	--	--

Table 20

Body Burden Data for Non-Medically Registered Children Prior Residents of Bikini Atoll

						January		May		August	
ID #	Age (yr)	Height (cm)	Weight (kg)	Yrs. On Bikini	Yrs. Off Bikini	1979 ^{137}Cs Result nCi	1979 Potassium Result Gram	1979 ^{137}Cs Result nCi	1979 Potassium Result Gram	1980 ^{137}Cs Result nCi	1980 Potassium Result Gram
Males											
6156	9	130	34	6	1.0	2.0	53	3.4	59	1.9	75
6164	5	85	15	--	1.5	8.0	40	--	--	--	--
6172	10	130	30	7	1.0	2.8	40	1.9	74	1.0	73
6202	6	100	19	5.3	.72	--	--	1.8	53	--	--
6208	10	136	33	4	4.5	--	--	--	76	--	--
6145	5	110	21	--	--	1.0	46	--	--	--	--
6186	5	104	20	--	--	--	--	--	22	--	--
Females											
6179	8	115	22	4	1	1.2	--	--	59	--	--
6177	6	103	18	--	6	--	--	--	36	--	--
6176	8	144	24	--	6	--	--	--	38	--	--
6171	6	96	15	2.67	1.0	4.0	16	1.1	47	--	29
6157	5	106	20	4	1.0	7.2	32	--	54	3.4	44
6158	6	103	20	4	1.0	3.5	32	1.2	46	6.5	53

Table 20 (Cont'd)

ID #	Age (yr)	Height (cm)	Weight (kg)	Yrs. On Bikini	Yrs. Off Bikini	January 1979 ^{137}Cs Result nCi	January 1979 Potassium Result Gram	May 1979 ^{137}Cs Result nCi	May 1979 Potassium Result Gram	August 1980 ^{137}Cs Result nCi	August 1980 Potassium Result Gram
Females (cont'd)											
6150	8	120	25	4	0.42	4.0	42	1.5	40	.95	45
6149	5	99	19	4.3	0.42	1.6	37	--	32	--	42
6203	5	92	15	4.3	.72	--	--	--	54	--	--
6204	5	104	21	1	.72	--	--	1.1	57	--	--
6142	10	126	26	0	--	2.3	52	1.0	72	1.0	67
6143	4	104	19	0	--	1.2	41	--	35	--	--
6191	6	113	23	0	--	--	--	1.1	61	--	--
6213	10	121	25	1	3	--	--	--	56	--	--
6217	10	126	25	2	9	--	--	--	44	--	--

Table 2:

Comparison Adult Males from Kili

Name	ID#	Age	August 1980 ^{137}Cs uCi	August 1980 Potassium Grams
	2102	30	1.2×10^{-2}	164
	2103	20	1.3×10^{-2}	173
	2104	37	1.1×10^{-2}	166
	2105	38	9.5×10^{-3}	170
	2107	38	1.5×10^{-2}	177
	2114	35	6.2×10^{-3}	172
	2116	45	8.1×10^{-3}	134
	2117	49	7.2×10^{-3}	158
	2118	27	7.3×10^{-3}	162
	2100	50	9.4×10^{-3}	152
	2101	54	9.1×10^{-3}	156
	1109	22	1.3×10^{-2}	176
	1111	34	1.5×10^{-2}	191
	1098	34	8.4×10^{-3}	191
	1101	37	1.6×10^{-2}	188
	1102	39	3.1×10^{-3}	112
	1103	55	6.5×10^{-3}	121
	1104	26	5.7×10^{-3}	135
	1105	22	3.9×10^{-3}	136
	1107	36	2.8×10^{-3}	180
	1106	26	1.4×10^{-3}	184
	1108	23	7.5×10^{-3}	189

Table 21 (Cont'd)

Comparison Adult Males from Kili (Cont'd)

			August 1980	
Name	ID#	Age	^{137}Cs μCi	Potassium Grams
	1110	40	1.3×10^{-2}	156
	2120	34	6.0×10^{-3}	158
	2121	46	5.4×10^{-3}	152
	2122	56	9.4×10^{-3}	138
	2123	25	1.7×10^{-2}	180
	2124	22	$3.7 \times 10^{-}$	143
	2125	28	3.4×10^{-3}	147

Table 21 (Cont'd)

Comparison Adult Males from Majuro

Name	ID#	Age	August 1980 ^{137}Cs uCi	August 1980 Potassium Grams
	1047	31	$6.1x10^{-3}$	184
	2084	32	$8.3x10^{-3}$	168
	2085	55	$3.2x10^{-2}$	112
	2087	62	$1.7x10^{-2}$	134
	2089	21	$3.5x10^{-3}$	149
	2019	26	$1.4x10^{-2}$	152
	2060	50	$3.0x10^{-2}$	122
	2065	44	$1.2x10^{-2}$	137
	1048	70	$9.1x10^{-3}$	144
	1056	62	$8.2x10^{-3}$	131
	1074	34	$5.2x10^{-3}$	143
	1076	35	$8.2x10^{-3}$	174
	1084	80	$6.3x10^{-3}$	155
	1088	19	$4.4x10^{-3}$	191
	1089	21	$5.4x10^{-3}$	168
	1090	27	$1.6x10^{-2}$	179
	1091	34	$3.2x10^{-3}$	169
	1092	29	$8.5x10^{-3}$	183
	1004	44	$4.8x10^{-3}$	136
	2028	17	$2.2x10^{-3}$	136
	2050	17	$2.5x10^{-3}$	133

Table 22 PRIVACY ACT MATERIAL REMOVED

Comparison Adult Females from Majuro

Name	ID#	Age	August 1980 ^{137}Cs uCi	August 1980 Potassium Grams
	2015	36	2.3×10^{-3}	97
	2091	40	4.0×10^{-3}	117
	2055	38	4.7×10^{-3}	98
	2059	32	9.6×10^{-3}	86

PRIVACY ACT MATERIAL REMOVED

Table 22 (Cont'd)

Comparison Adult Females from Kili

Name	ID#	Age	August 1980 ^{137}Cs uCi	August 1980 Potassium Grams
	2119	45	2.5×10^{-3}	99

Table 26

Whole Body Counting Census

Date Counted	Total Counted	Medically Registered Population Total in April '78	Bikinians Medically Registered[1] in April '78	Number of Medically Registered Population Total Counted	Number of Relocated Bikini Residents Counted	Number of Non-relocated Residents Counted
April 1978	99	143	135	99	99	--
January 1979	101	143	135	53	64	33
May 1979	129	143	135	63	79	44
January plus May 1979 Non Duplicate Counts	---	---	---	82	98	50

[1] Bikini Medical Registry included 34 persons under 5 years of age and not eligible for whole body counting in April 1978.

Table 27

Census of Medically Registered, Whole Body Counted, Relocated Bikini Residents

Date Counted	Adult Males	Adult Females	Male Adolescents Ages 11-15	Female Adolescents Ages 11-15	Male Children Ages 5-10	Female Children Ages 5-10	Total Persons Counted	Medically Registered Population Total in April 1978*	% of Medically Registered Population Counted
April 1978	36	32	6	3	8	14	99	143	69
January 1979	17	16	4	2	1	6	46	143	32
May 1979	14	19	5	3	4	6	51	143	36
January plus May 1979 Duplicate Counts	7	11	4	2	0	4	28	143	20

*Bill Scott-Medical Dept-BNL

Table 28

Census of Non-Medically Registered Persons and Medically Registered Children Whole Body Counted Only in 1979

Date Counted/ Classification	Adult Males	Adult Females	Male Adolescents Ages 11-15	Female Adolescents Ages 11-15	Male Children Ages 5-10	Female Children Ages 5-10	Total Persons Counted
January 1979/							
Non-relocated residents.	8	11	3	2	3	6	33
Relocated residents, not medically registered.	2	5	1	1	0	2	11
Relocated residents medically registered.	0	0	0	0	4	3*	7*
Non-residents.	0	0	0	1	1	2	4
TOTAL	10	16	4	4	8	13	55

Table 28 (Cont'd)

Date Counted/ Classification	Adult Males	Adult Females	Male Adolescents Ages 11-15	Female Adolescents Ages 11-15	Male Children Ages 5-10	Female Children Ages 5-10	Total Persons Counted
May 1979/							
Non-relocated residents.	12	12	5	2	3	8	42
Relocated residents not medically registered.	3	5	2	1	1	4	16
Relocated residents medically registered.	0	0	0	0	7	5	12
Transient.	2	0	0	0	0	0	2
Non-resident.	0	0	0	2	1	3	6
TOTAL	17	17	7	5	12	20	78
January and May 1979 Duplicate Counts	6	13	4	3	6	12	44

*All but one individual in this classification recounted in May 1979.

Table 29

Summary of Residence Location for Persons Whole Body Counted in January and May 1979

Group/Class		Residence Atolls - Islands				
		Majuro-Ejit	Rita	Kili	Jaluit-Jabor	Total Counted
Relocated Marshallese/ Residents of Bikini Atoll	Jan	26	37	1	0	64
	May	34	30	15	0	79
Nonrelocated Marshallese/ Residents of Bikini Atoll	Jan	4	29	0	0	33
	May	3	24	0	17	44
Controls	Jan	1	3	0	0	4
	May	3	3	0	0	6

Table 30

Frequency Distribution of Residence Location in January 1979

	Residence Atolls - Islands				
	Majuro-Ejit	Rita	Kili	Jaluit-Jabor	Total Counted
Relocated Medically Registered:					
Adult Males	8	8	1	0	17
Adult Females	8	8	0	0	16
Adolescent Males	1	3	0	0	4
Adolescent Females	1	1	0	0	2
Male Children	1	0	0	0	1
Female Children	3	3	0	0	6
Relocated Nonmedically Registered:					
Adult Males	0	2	0	0	2
Adult Females	2	3	0	0	5
Adolescent Males	0	1	0	0	1
Adolescent Females	0	1	0	0	1
Male Children	1	3	0	0	4
Female Children	1	4	0	0	5
Other Nonmedically Registered:					
Adult Males	2	6	0	0	8
Adult Females	2	9	0	0	11
Adolescent Males	0	3	0	0	3
Adolescent Females	0	3	0	0	3
Male Children	1	3	0	0	4
Female Children	0	8	0	0	8

Table 31

Frequency Distribution of Residence Location in May 1979

	Residence Atolls - Islands				
	Majuro-Ejit	Majuro-Rita	Kili	Jaluit-Jabor	Total Counted
Relocated Medically Registered:					
Adult Males	6	5	3	0	14
Adult Females	9	7	3	0	19
Adolescent Males	3	2	0	0	5
Adolescent Females	1	1	1	0	3
Male Children	1	0	3	0	4
Female Children	3	3	0	0	6
Relocated Nonmedically Registered:					
Adult Males	1	1	1	0	3
Adult Females	3	2	0	0	5
Adolescent Males	1	1	0	0	2
Adolescent Females	0	1	0	0	1
Male Children	3	4	1	0	8
Female Children	3	3	3	0	9
Other Nonmedically Registered:					
Adult Males	1	4	0	9	14
Adult Females	2	8	0	2	12
Adolescent Males	0	3	0	2	5
Adolescent Females	1*	2**	0	1	4
Male Children	1*	2	0	1	4
Female Children	1*	8**	0	2	11

*individual is part of the control population.
**one or more individuals participated in the program as a control.

PRIVACY ACT MATERIAL REMOVED

Table 32

Medically Registered Relocated Adult Male ID Number, Name and Residence Location

ID#	Name	January 1979 Count Date	January 1979 Residence Atoll-Island	May 1979 Count Date	May 1979 Residence Atoll-Island
80		---	---	5/21	Kili
6006		---	---	---	Kwajalein-Ebeye
863		1/23	Majuro-Rita	---	Majuro-Ejit
6070		1/24	Majuro-Rita	---	Maloelap
6004		---	---	---	Jaluit
6033		---	---	---	Majuro - (Rita?)
6018		---	---	---	Wotje
6069		---	---	5/15	Majuro-Rita
6068		---	---	---	Majuro - (?)
6067		1/24	Majuro-Rita	5/17	Majuro-Rita
6066		1/24	Majuro-Rita	5/18	Majuro-Rita
6017		---	---	5/21	Kili
6019		1/22	Majuro-Ejit	---	Majuro-Ejit
6001		1/22	Majuro-Ejit	---	Majuro-Ejit
6073		---	---	5/15	Majuro-Ejit
6005		---	---	5/21	Kili
6008		1/23	Majuro-Rita	---	Majuro-Ejit
6086		1/23	Majuro-Ejit	5/16	Majuro-Ejit
6071		1/23	Majuro-Ejit	---	Kili
6076		1/22	Majuro-Ejit	---	Majuro-Ejit
6072		---	---	---	Kili

PRIVACY ACT MATERIAL REMOVED

Table 32 (Cont'd)

Medically Registered Relocated Adult Male ID Number, Name and Residence Location (cont'd)

813	1/22	Majuro-Rita	---	Kili
6118	1/24	Majuro-Rita	5/17	Majuro-Rita
6126	---	---	---	Kili
6003	---	---	---	Ugelang
6117	1/24	Majuro-Rita	5/16	Majuro-Rita
6128	1/25	Kili	---	Kili
6125	---	---	5/18	Majuro-Ejit
6007	1/23	Majuro-Ejit	---	Kili
6130	1/22	Majuro-Ejit	5/15	Majuro-Ejit
6119	---	---	---	Majuro- (Rita?)
864	---	---	---	Majuro-Ejit
966	---	---	5/15	Majuro-Ejit
6135	---	---	---	Lib
6096	1/22	Majuro-Ejit	5/16	Majuro-Ejit
6002	---	---	---	Kili

Table 23

Medically Registered Relocated Adult Female ID Number, Name and Residence Location

ID#	Name	January 1979 Count Date	January 1979 Residence Atoll Island	May 1979 Count Date	May 1979 Residence Atoll-Island
6045		---	---	---	Kwajalein-Ebeye
6112		1/24	Majuro-Rita	5/16	Majuro-Rita
6114		1/23	Majuro-Ejit	---	Kili
6111		1/23	Majuro-Ejit	---	Kili
6122		1/22	Majuro-Ejit	5/16	Majuro-Ejit
6123		1/22	Majuro-Ejit	5/17	Majuro-Ejit
6059		---	---	---	Kili
6063		---	---	---	Deceased
6032		1/22	Majuro-Ejit	5/16	Majuro-Ejit
6124		---	---	---	Kili
6108		1/23	Majuro-Rita	---	Majuro-Rita
6058		---	---	---	Kili
6113		1/23	Majuro-Rita	5/16	Majuro-Rita
6065		1/22	Majuro-Ejit	---	Kili
6097		1/23	Majuro-Rita	5/16	Majuro-Rita
6109		1/23	Majuro-Rita	5/16	Majuro-Rita
6046		---	---	5/15	Majuro-Ejit
6098		1/22	Majuro-Ejit	5/17	Majuro-Ejit
6060		1/24	Majuro-Rita	5/17	Majuro-Rita
6036		---	---	---	Jaluit
6110		---	---	5/21	Kili

Table 33 (Cont'd)

Medically Registered Relocated Adult Female ID Number, Name and Residence Location (cont'd)

525	---	---	5/21	Kili
6064	1/24	Majuro-Rita	5/15	Majuro-Rita
6061	---	---	---	Wotje
6051	---	---	5/15	Majuro-Ejit
934	---	---	5/15	Majuro-Rita
6062	---	---	5/16	Majuro-Ejit
6035	1/24	Majuro-Rita	---	Maloelap
6115	1/23	Majuro-Ejit	5/16	Majuro-Ejit
6034	---	---	5/21	Kili
865	---	---	5/15	Majuro-Ejit
6050	---	---	---	Kili

Table 34

Medically Registered Adolescents (Ages 11-14) ID Number, Name and Residence Location

ID#	Name	January 1979 Count Date	January 1979 Residence and Island	May 1979 Count Date	May 1979 Residence Atoll-Island
Males:					
6132		---	---	---	Kili
6131		1/[illegible]	Majuro-Rita	5/16	Majuro-Ejit
6011		1/23	Majuro-Rita	5/16	Majuro-Rita
6127		1/22	Majuro-Ejit	5/16	Majuro-Ejit
6133		---	---	5/15	Majuro-Ejit
6015		1/24	Majuro-Rita	5/17	Majuro-Rita
Females:					
6129		1/22	Majuro-Ejit	5/17	Majuro-Ejit
6048		---	---	5/21	Kili
6091		1/24	Majuro-Rita	5/17	Majuro-Rita

Table 35

Medically Registered Children (Ages 5-10) ID Number.

Name and Residence Location

ID#	Name	January 1979 Count Date	January 1979 Residence Atoll-Island	May 1979 Count Date	May 1979 Residence Atoll-Island
Males:					
6009		---	---	5/21	Kili
6049		---	---	---	Kili
6042		---	---	---	Jaluit
6014		---	---	5/21	Kili
6012		---	---	5/21	Kili
6023		1/22	Majuro-Ejit	---	Majuro-Ejit
6016		---	---	5/15	Majuro-Ejit
6013		---	---	---	Kili
Females:					
6094		---	---	---	Wotje
6092		---	---	---	Wotje
6080		---	---	---	Kili
6010		1/23	Majuro-Ejit	---	Majuro-Ejit
6038		---	---	---	Kili
6105		1/23	Majuro-Ejit	5/16	Majuro-Ejit
6103		---	---	---	Maloelap
6028		---	---	5/15	Majuro-Ejit
6030		1/22	Majuro-Ejit	5/16	Majuro-Ejit
6027		1/23	Majuro-Rita	---	Majuro-Rita
6044		---	---	5/15	Majuro-Rita
6025		1/23	Majuro-Rita	5/16	Majuro-Rita
6081		---	---	---	Majuro-Ejit
6106		1/23	Majuro-Rita	5/16	Majuro-Rita

Table 36

PRIVACY ACT MATERIAL REMOVED

Nonmedically Registered Adult Female ID Number, Name and Residence Location

ID#	Name	January 1979 Count Date	January 1979 Residence Atoll-Island	May 1979 Count Date	May 1979 Residence Atoll-Island
6137		1/22	Majuro-Ejit	5/17	Majuro-Ejit
6139		1/22	Majuro-Ejit	---	Majuro-Ejit
6140		1/22	Majuro-Ejit	5/17	Majuro-Ejit
6144		1/22	Majuor-Ejit	5/17	Majuro-Ejit
6148		1/23	Majuro-Rita	5/16	Majuro-Ejit
6151		1/23	Majuro-Rita	5/17	Majuro-Rita
6152		1/23	Majuro-Rita	5/16	Majuro-Rita
6155		1/23	Majuro-Rita	5/16	Majuro-Rita
6159		1/24	Majuro-Rita	5/17	Majuor-Rita
6160		1/24	Majuor-Rita	5/17	Majuro-Rita
6163		1/24	Majuro-Rita	---	Majuro-Rita
6165		1/24	Majuro-Rita	---	Majuro-Rita
6167		1/24	Majuro-Rita	5/16	Majuro-Rita
6175		1/24	Majuro-Rita	5/17	Majuro-Rita
6181		1/25	Majuro-Rita	5/17	Majuro-Rita
6185		1/25	Majuro-Rita	5/16	Majuro-Rita
6187		---	---	5/16	Majuro-Ejit
6189		---	---	5/16	Majuro-Rita
6206		---	---	5/21	Jaluit-Jabor
6222		---	---	5/21	Jaluit-Jabor

PRIVACY ACT MATERIAL REMOVED

Table 37

PRIVACY ACT MATERIAL REMOVED

Nonmedically Registered Adult Male ID Number, Name and Residence Location

ID#	Name	January 1979 Count Date	January 1979 Residence Atoll-Island	May 1979 Count Date	May 1979 Residence Atoll-Island
6136		1/22	Majuro-Ejit	---	Majuro-Ejit
6138		1/22	Majuro-Ejit	---	Majuro-Ejit
6153		1/23	Majuro-Rita	5/16	Majuro-Rita
6161		1/24	Majuro-Rita	5/17	Majuro-Rita
6166		1/24	Majuro-Rita	5/16	Majuro-Rita
6168		1/24	Majuro-Rita	5/16	Majuro-Rita
6174		1/24	Majuro-Rita	---	Majuro-Rita
6180		1/25	Majuro-Rita	---	Enewetak-Enewetak
6182		1/25	Majuro-Rita	5/16	Majuro-Rita
6184		1/25	Majuro-Rita	5/17	Majuro-Ejit
6190		---	---	5/16	Majuro-Ejit
6205		---	---	5/21	Jaluit-Jabor
6210		---	---	5/21	Kili
6211		---	---	5/21	Jaluit-Jabor
6218		---	---	5/21	Jaluit-Jabor
6219		---	---	5/21	Jaluit-Jabor
6220		---	---	5/21	Jaluit-Jabor
6221		---	---	5/21	Jaluit-Jabor
6223		---	---	5/21	Jaluit-Jabor
6224		---	PRIVACY ACT MATERIAL REMOVED	5/21	Jaluit-Jabor
6226		---	---	5/21	Jaluit-Jabor

Table 38

Nonmedically Registered Adolescent ID Number,

Name and Residence Location

ID#	Name	January 1979 Count Date	January 1979 Residence Atoll-Island	May 1979 Count Date	May 1979 Residence Atoll-Island
6200		---	---	5/17	Majuro-Rita
6207		---	---	5/21	Jaluit-Jabor
6225		---	---	5/21	Jaluit-Jabor
6188		---	---	5/16	Majuro-Ejit
6212		---	---	5/21	Jaluit-Jabor
6147		1/23	Majuro-Rita	5/16	Majuro-Ejit
6169		1/24	Majuro-Rita	5/16	Majuro-Rita
6178		1/24	Majuro-Rita	5/17	Majuro-Rita
6183		1/25	Majuro-Rita	5/16	Majuro-Rita
6173		1/24	Majuro-Rita	5/17	Majuro-Rita
6170		1/24	Majuro-Rita	5/17	Majuro-Rita
6162		1/24	Majuro-Rita	---	Aur
6141		1/22	Majuro-Rita	5/16	Majuro-Rita

Nonmedically Registered Juvenile ID Number,

Name and Residence Locations

ID#	Name	January 1979 Count Date	January 1979 Residence Atoll-Island	May 1979 Count Date	May 1979 Residence Atoll-Island
6186		---	---	5/16	Majuro-Ejit
6202		---	---	5/21	Kili
6208		---	---	5/21	Majuro-Ejit
6191		---	---	5/16	Majuro-Ejit
6203		---	---	5/21	Kili
6204		---	---	5/21	Kili
6213		---	---	5/21	Jaluit-Jabor
6217		---	---	5/21	Jaluit-Jabor
6156		1/24	Majuro-Rita	5/17	Majuro-Rita
6164		1/24	Majuro-Rita	---	Aur
6172		1/24	Majuro-Rita	5/16	Majuro-Rita
6179		1/24	Majuro-Rita	5/17	Majuro-Rita
6177		1/24	Majuro-Rita	5/17	Majuro-Rita
6176		1/24	Majuro-Rita	5/17	Majuro-Rita
6171		1/24	Majuro-Rita	5/16	Majuro-Rita
6157		1/24	Majuro-Rita	5/17	Majuro-Rita
6158		1/24	Majuro-Rita	5/18	Majuro-Rita
6150		1/23	Majuro-Rita	5/16	Majuro-Rita
6149		1/23	Majuro-Rita	5/16	Majuro-Rita
6142		1/22	Majuro-Rita	5/16	Majuro-Rita
6143		1/22	Majuro-Rita	5/17	Majuro-Rita

Table 39 (Cont'd)

Nonmedically Registered Juvenile ID Number,

PRIVACY ACT MATERIAL REMOVED

Name and Residence Locations

		January 1979		May 1979	
ID#	Name	Count Date	Residence Atoll-Island	Count Date	Residence Atoll-Island
6145		1/22	Majuro-Ejit	---	Majuro-Ejit
6031		---	---	5/15	Majuro-Ejit
6029		---	---	5/15	Majuro-Ejit
6100		---	---	5/15	Majuro-Rita
6021		1/24	Majuro-Rita	5/16	Majuro-Rita
6020		1/22	Majuro-Ejit	5/16	Majuro-Ejit
6107		1/23	Majuro-Rita	5/16	Majuro-Rita
6074		1/24	Majuro-Rita	5/17	Majuro-Rita
6078		1/23	Majuro-Ejit	---	Kili
6088		---	---	5/15	Majuro-Ejit
6090		---	---	5/15	Majuro-Ejit
6101		1/24	Majuro-Rita	5/15	Majuro-Rita
6056		1/24	Majuro-Rita	5/16	Majuro-Ejit
6057		---	---	5/21	Kili

PRIVACY ACT MATERIAL REMOVED

Table 40

Medically Registered Relocated Bikini Atoll Residents

Not Whole Body Counted Since 1978

PRIVACY ACT MATERIAL REMOVED

ID #	Age	Name	Sex	Location
6132	12		M	Kili
6049	8		M	Kili
6042	7		M	Jaluit
6013	5		M	Kili
6094	10		F	Wotje
6092	8		F	Wotje
6080	7		F	Kili
6038	6		F	Kili
6103	9		F	Maloelap
6081	9		F	Majuro, Ejit
6006	37		M	Kwajalein, Ebeye
6004	28		M	Jaluit
6033	27		M	Majuro
6018	34		M	Wotje
6068	56		M	Majuro
6072	20		M	Kili
6126	35		M	Kili
6003	22		M	Enewetak
6119	17		M	Majuro
864	51		M	Majuro, Ejit
6135	35		M	Lib
6002	65		M	Kili

PRIVACY ACT MATERIAL REMOVED

Table 40 (Cont'd)

Medically Registered Relocated Bikini Atoll Residents

Not Whole Body Counted Since 1978 (cont'd)

ID #	Age	Name	Sex	Location
6045	28		F	Kwajalein, Ebeye
6059	19		F	Kili
6124	54		F	Kili
6058	18		F	Majuro, Ejit
6036	27		F	Jaluit (Rongelap)
6061	32		F	Wotje
6050	22		F	Kili

Total Missed = 30

Table 41

Individual Dosimetry Data for Bikinians -

Explanation of Column Headings

Column	Item or Derived Quality	Measured Quantity	Comments
1	Name	-	Personal Interview
2	ID Number	-	BNL Medical Dept. & S&EP Div. Records
3	Residence Inverval	-	Personal Interviews
4	^{90}Sr and ^{90}Y Bone Marrow Dose Equivalent During and Post Residence Interval	Urine Activity Concentration	Three Compartment Model, Constant Continuous Uptake
5	^{137}Cs + ^{137m}Ba Dose Equivalent During and Post Residence Interval	Body Burden Measurements	Two Compartment Model, Monotonically Increasing Uptake
6	Net External Dose Equivalent During Residence Interval	External Exposure Rate Measurements	Assumed Living Patterns
7	Total Body Dose Equivalent	-	Sum of Columns 5 & 6
8	Total Bone Marrow Dose Equivalent During and Post Residence Interval	-	Sum of Columns 4, 5, and 6

PRIVACY ACT MATERIAL REMOVED

INDIVIDUAL DOSIMETRY DATA FOR BIKINIANS

Name	ID Number	Residence Interval a	^{90}Sr & ^{90}Y Bone Marrow Dose Equiv. During & Post Residence Int. mRem	^{137}Cs + ^{137m}Ba Dose Equiv. During & Post Residence Int. mRem	Net External Dose Equiv. During Residence Interval mRem	Total Body Dose Equiv. During & Post Residence Int. mRem	Total Bone Marrow Dose Equiv. During and Post Residence Interval mRem
	6001	7.3	130*	480	950	1400	1600
	6127	7.3	39	580	950	1500	1600
	6130	.72	49	200	94	300	300
	6076	7.3	9.9	900	430	1300	1300
	813	4.3	77*	600	560	1200	1200
	6019	5.3	190	420	690	1100	1300
	6111	.80	7.7	150	100	250	260
	6097	4.3	51*	430	520	950	1000
	6115	7.3	97	760	880	1600	1700
	6109	4.3	51*	240	520	760	810
	6091	6.3	74*	550	760	1300	1400
	6132	2.3	62	1200	300	1500	1600
	6046	2.0	27	400	240	600	700
	6061	6.3	65	630	760	1400	1500

PRIVACY ACT MATERIAL REMOVED

PRIVACY ACT MATERIAL REMOVED

INDIVIDUAL DOSIMETRY DATA FOR BIKINIANS (Cont'd)

Name	ID Number	Residence Interval Yr	^{90}Sr & ^{90}Y Bone Marrow Dose Equiv. During & Post Residence Int. mRem	^{137}Cs + ^{137m}Ba Dose Equiv. During & Post Residence Int. mRem	Net External Dose Equiv. During Residence Interval mRem	Total Body Dose Equiv. During & Post Residence Int. mRem	Total Bone Marrow Dose Equiv. During and Post Residence Interval mRem
	6066	3.3	59*	400	430	830	890
	6070	10.3	185*	870	1300	2200	2400
	6118	6.3	42	420	820	1200	1300
	6117	6.3	110*	610	820	1400	1500
	6128	7.3	130*	810	950	1800	1900
	6122	10.3	86	380	1200	1600	1700
	6015	1.7	31*	650	220	870	900
	6030	3.3	39*	1200	400	1600	1600
	6129	4.3	51*	330	520	850	900
	6027	3.3	39*	760	400	1200	1200
	6010	7.3	86*	1100	900	2000	2100
	6105	3.3	39*	1100	400	1500	1500
	6033	8.3	150*	900	1100	2000	2100
	6007	.88	15	190	110	300	310
	6008	4.3	77*	850	560	1400	1500

PRIVACY ACT MATERIAL REMOVED

PRIVACY ACT MATERIAL REMOVED

INDIVIDUAL DOSIMETRY DATA FOR BIKINIANS (Cont'd)

Name	ID Number	Residence Interval (Y)	^{90}Sr & ^{90}Y Bone Marrow Dose Equiv. During & Post Residence Int. mRem	^{137}Cs + ^{137m}Ba Dose Equiv. During & Post Residence Int. mRem	Net External Dose Equiv. During Residence Interval mRem	Total Body Dose Equiv. During & Post Residence Int. mRem	Total Bone Marrow Dose Equiv. During and Post Residence Interval mRem
	6071	1.0	18*	220	130	350	370
	863	4.3	120	620	600	1200	1300
	6086	8.3	240	990	1100	2100	2300
	6069	8.3	150*	580	1100	1700	1900
	6073	7.3	130*	490	950	1400	1600
	6072	1.0	18*	330	130	460	480
	6119	7.3	130*	730	950	1700	1800
	864	7.3	130*	960	950	1900	2000
	966	7.3	130*	1400	950	2300	2500
	6059	1.3	15*	240	160	400	410
	6124	.88	10*	180	110	390	400
	6058	5.3	61*	550	600	1200	1300
	6036	.64	7.6*	260	77	340	340
	6110	8.3	98*	450	1000	1400	1500
	6051	5.3	63*	520	600	1200	1200

PRIVACY ACT MATERIAL REMOVED

PRIVACY ACT MATERIAL REMOVED

INDIVIDUAL DOSIMETRY DATA FOR BIKINIANS (Cont'd)

Name	ID Number	Residence Interval (C)	^{90}Sr & ^{90}Y Bone Marrow Dose Equiv. During & Post Residence Int. mRem	^{137}Cs + ^{137m}Ba Dose Equiv. During & Post Residence Int. mRem	Net External Dose Equiv. During Residence Interval mRem	Total Body Dose Equiv. During & Post Residence Int. mRem	Total Bone Marrow Dose Equiv. During and Post Residence Interval mRem
	6092	6.3	74*	1600	800	2400	2400
	6080	.88	10*	200	110	310	320
	6038	2.3	27*	1100	280	1400	1400
	6103	3.3	39*	1200	400	1600	1600
	6028	5.3	61*	1200	600	1800	1900
	6044	5.3	61*	1600	600	2200	2300
	6062	4.3	51*	540	520	1100	1100
	6034	7.3	86*	880	900	1800	1900
	865	7.3	86*	430	900	1300	1400
	6050	2.3	27*	410	300	710	740
	6009	4.3	77*	1600	600	2200	2300
	6049	2.3	41*	1600	300	1900	1900
	6042	.55	10*	510	72	580	590
	6014	1.6	29*	1300	210	1500	1500
	6012	7.3	130*	1500	950	2400	2600
	6016	7.3	130*	1500	950	2400	2600

PRIVACY ACT MATERIAL REMOVED

PRIVACY ACT MATERIAL REMOVED

INDIVIDUAL DOSIMETRY DATA FOR BIKINIANS (Cont'd)

Name	ID Number	Residence Interval Cr	^{90}Sr & ^{90}Y Bone Marrow Dose Equiv. During & Post Residence Int. mRem	^{137}Cs + ^{137m}Ba Dose Equiv. During & Post Residence Int. mRem	Net External Dose Equiv. During Residence Interval mRem	Total Body Dose Equiv. During & Post Residence Int. mRem	Total Bone Marrow Dose Equiv. During and Post Residence Interval mRem
	6013	2.3	41*	1300	300	1600	1600
	6094	6.3	74*	1300	800	2100	2200
	6005	1.8	12	470	230	700	710
	6135	1.3	11	330	170	500	510
	6125	9.3	45	890	1200	2100	2100
	6067	7.3	54	780	950	1700	1800
	6002	2.3	7.7	370	300	670	680
	6006	1.0	9.5	260	230	490	500
	6112	1.3	12	260	160	420	430
	6035	6.3	140	600	760	1400	1500
	6113	4.3	19	360	520	880	900
	6060	2.3	27*	510	280	790	820
	6032	3.3	39*	860	400	1400	1400
	6123	4.3	50*	480	520	1000	1100
	6098	3.3	39*	320	400	720	760

PRIVACY ACT MATERIAL REMOVED

PRIVACY ACT MATERIAL REMOVED

INDIVIDUAL DOSIMETRY DATA FOR BIKINIANS (Cont'd)

Name	ID Number	Residence Interval Yr	^{90}Sr & ^{90}Y Bone Marrow Dose Equiv. During & Post Residence Int. mRem	^{137}Cs + ^{137m}Ba Dose Equiv. During & Post Residence Int. mRem	Net External Dose Equiv. During Residence Interval mRem	Total Body Dose Equiv. During & Post Residence Int. mRem	Total Bone Marrow Dose Equiv. During and Post Residence Interval mRem
	6065	4.3	130	390	520	910	1000
	6004	.55	10*	130	72	200	210
	6018	6.3	150	1100	820	1900	2100
	6126	2.3	45	1100	300	1400	1400
	6003	8.3	250	580	1100	1700	1900
	6114	1.0	12*	170	120	290	300
	6096	3.3	46	680	430	1100	1100
	80	1.0	18*	200	130	330	350
	6017	8.3	330	1200	1100	2300	2700
	6045	1.0	9.0	150	120	270	280
	6108	4.3	43	210	520	730	770
	6063	4.3	19	620	520	1100	1100
	525	1.0	5.6	350	120	470	480
	934	6.3	120	1300	760	2100	2200
	6068	6.3	60	630	820	1500	1600
	6106	3.3	39*	750	400	1100	1200

PRIVACY ACT MATERIAL REMOVED

PRIVACY ACT MATERIAL REMOVED

INDIVIDUAL DOSIMETRY DATA FOR BIKINIANS (Cont'd)

Name	ID Number	Residence Interval	^{90}Sr & ^{90}Y Bone Marrow Dose Equiv. During & Post Residence Int. mRem	^{137}Cs + ^{137m}Ba Dose Equiv. During & Post Residence Int. mRem	Net External Dose Equiv. During Residence Interval mRem	Total Body Dose Equiv. During & Post Residence Int. mRem	Total Bone Marrow Dose Equiv. During and Post Residence Interval mRem
	6025	3.3	39*	900	400	1300	1300
	6064	7.3	86*	400	900	1300	1400
	6023	4.3	77*	990	560	1500	1600
	6131	6.3	110*	950	820	1800	1900
	6011	6.3	170	550	820	1400	1600
	6081	.97	12*	490	120	610	620
	6133	7.3	130*	1900	950	2800	3000
	6048	.55	6.5*	590	72	660	670

*These values were derived from average male or average female daily activity ingestion rates for Sr-90.

PRIVACY ACT MATERIAL REMOVED

Table 42

1978 ^{137}Cs Body Burden of Bikinians Ordered by Family Group

Rank	Medical ID	WATO	Status of Family Member	Body Burden kBq
1	6018	unknown	H	220.0
	6061		W	82.0
	6094		C(F)	75.0
	6092		C(F)	83.0
2	966		H	210.0
	934		W	200.0
	6016		C(M)	53.0
	6044		C(F)	43.0
3	6017		H	210.0
	6034		W	140.0
	6009		C(M)	47.0
4	6070	unknown	H	150.0
	6035		W	100.0
5	6033	unknown	H	140.0
	6058		W	77.0
6	6126	unknown	H	120.0
	6050		W	50.0
	6132		C(M)	68.0
	6038		C(F)	37.0
	6049		C(M)	63.0
	6013		C(M)	37.0
7	864		H	110.0
	865		W	49.0
	6119		C(M)	79.0
	6133		C(M)	78.0
	6028		C(F)	47.0
	6091		C(F)	43.0
	6090		C( )	
8	6068		H	110.0
	6112		W	65.0
	6118		C(M)	23.0
9	6117		H	99.0
	6063		W	56.0
10	6125		H	93.0
	6062		W	53.0

Table 42 (Cont'd)

PRIVACY ACT MATERIAL REMOVED

Rank	Medical ID	WATO	Status of Family Member	Body Burden kBq
11	6003		H	90.0
	6097		W	47.0
12	863		H	87.0
	6113		W	38.0
	6025		C(F)	38.0
13	6073		H	80.0
	6051		W	53.0
14	6005		H	77.0
	6046		W	78.0
	6014		C(M)	56.0
15	6008	unknown	H	72.0
	6108		W	27.0
	6027		C(F)	43.0
16	6128		H	69.0
	6131		C(M)	63.0
	6011		C(M)	31.0
17	6072	unknown	H	65.0
	6059		W	32.0
18	6001	unknown	H	64.0
	6122		W	49.0
	6076		C(M)	130.0
19	6071	unknown	H	64.0
	6111		W	49.0
	6081		C(F)	38.0
20	813		H	62.0
	6065		W	39.0
21	6007	unknown	H	55.0
	6114		W	30.0
	6080		C(F)	20.0
22	6130		H	54.0
	6098		W	33.0
23	6006	unknown	H	54.0

PRIVACY ACT MATERIAL REMOVED

Table 42 (Cont'd)

Rank	Medical ID	WATO	Status of Family Member	Body Burden kBq
24	6004	unknown	H	49.0
	6036		W	57.0
	6042		C(M)	39.0
25	6069		H	43.0
	6064		W	34.0
	6103		C(F)	52.0
26	80		H	42.0
	525		W	87.0
	6048		C(F)	76.0
	6012		C(M)	47.0
27	6019		H	38.0
	6123		W	52.0
	6065		C(F)	39.0
	6023		C(M)	47.0
28	6066		H	30.0
	6060		W	51.0
29	6110		W	56.0
	6127		C(M)	27.0
	6010		C(F)	52.0

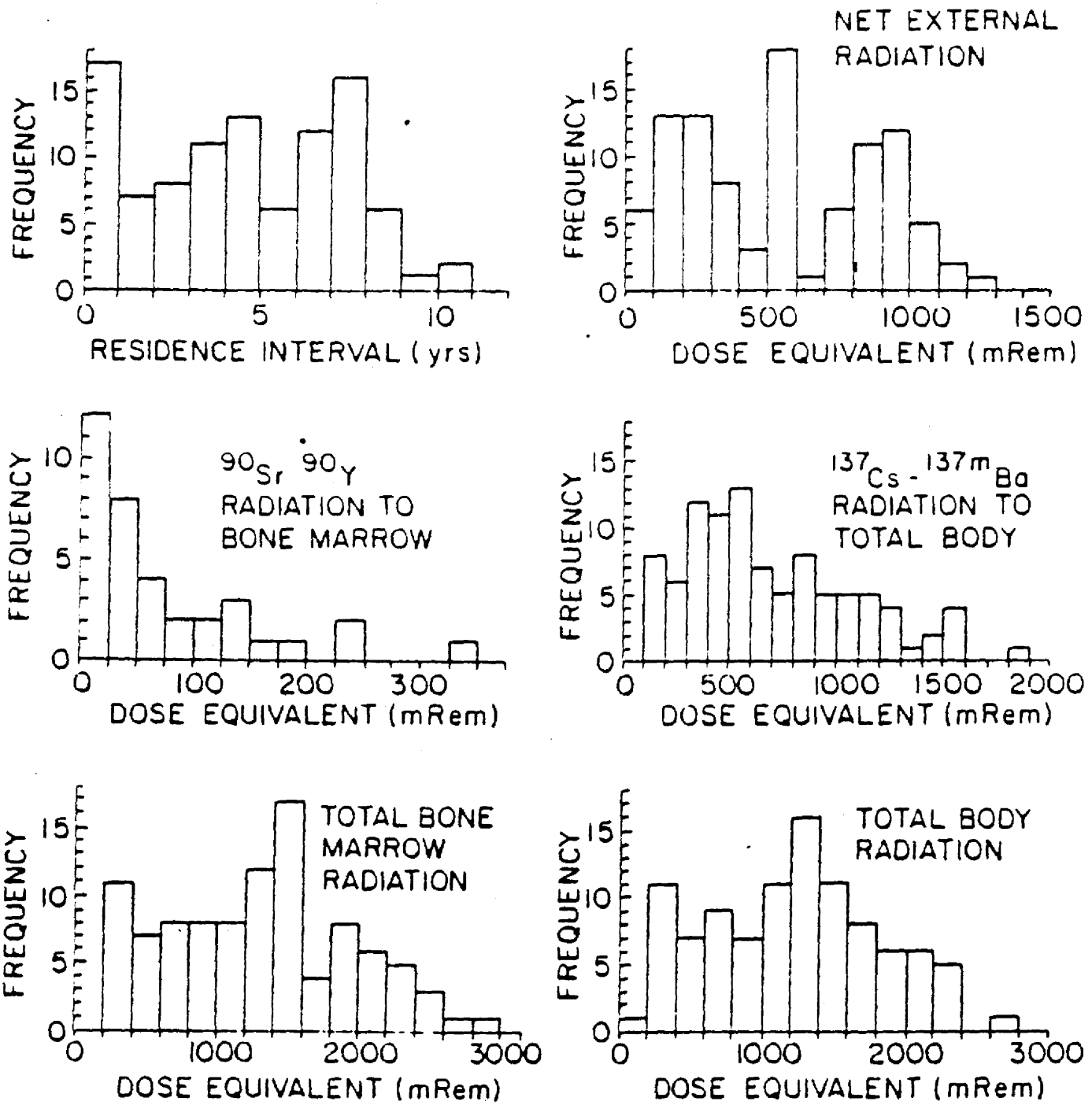

Fig. I. TOTAL MALE AND FEMALE DISTRIBUTION OF DOSE EQUIVALENT (DURING AND POST RESIDENCE) OR RESIDENCE INTERVAL FOR INHABITANTS OF BIKINI ISLAND, BIKINI ATOLL

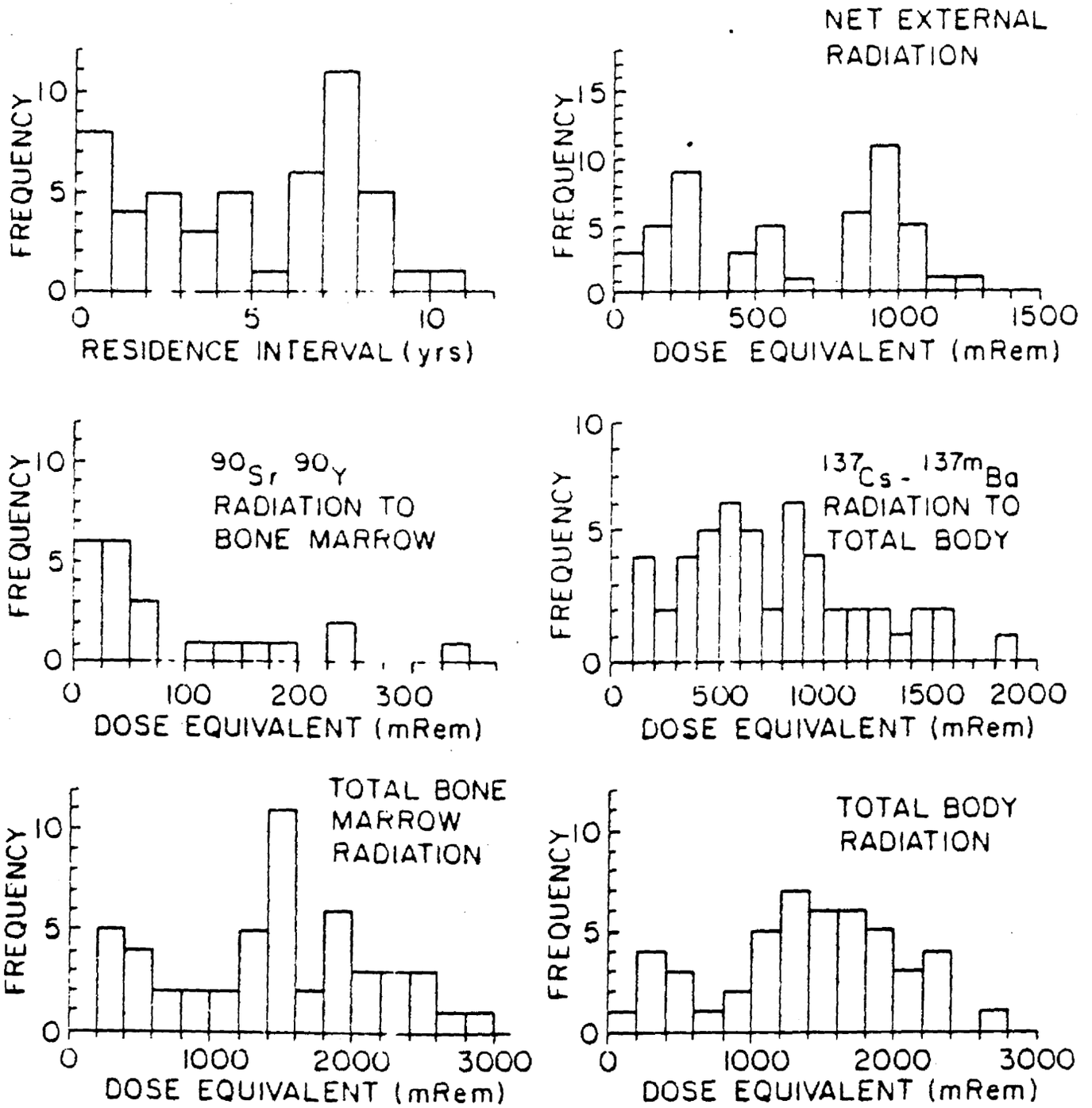

Fig. 2 TOTAL MALE DISTRIBUTION OF DOSE EQUIVALENT (DURING AND POST RESIDENCE) OR RESIDENCE INTERVAL FOR INHABITANTS OF BIKINI ISLAND, BIKINI ATOLL

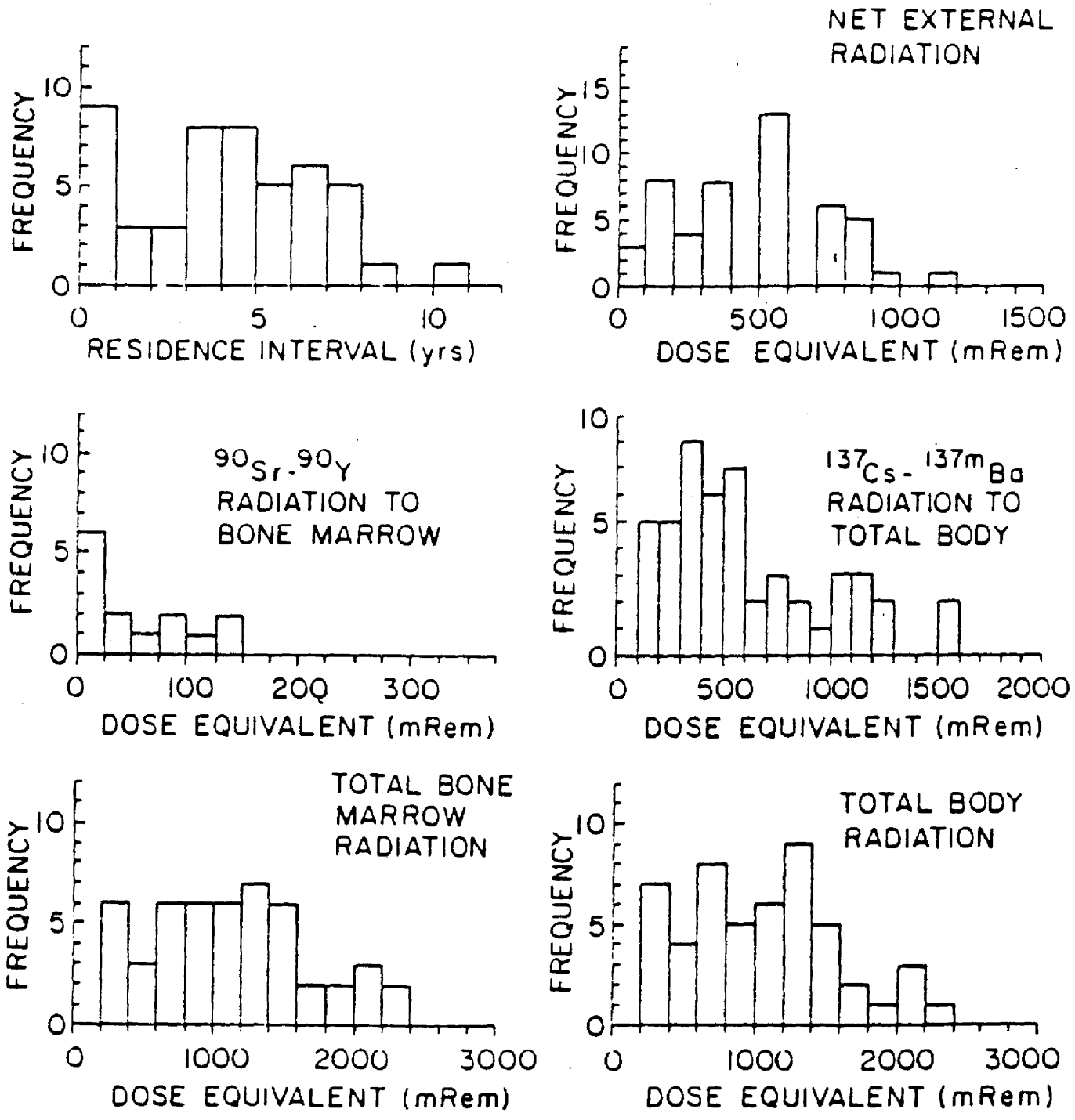

Fig. 3. TOTAL FEMALE DISTRIBUTION OF DOSE EQUIVALENT (DURING AND POST RESIDENCE) OR RESIDENCE INTERVAL FOR INHABITANTS OF BIKINI ISLAND, BIKINI ATOLL