BEFORE THE NUCLEAR CLAIMS TRIBUNAL
REPUBLIC OF THE MARSHALL ISLANDS

In the Matter of The People of Utrik, et al., Claimants for Compensation.	)	NCT No. 23-06103

MEMORANDUM OF DECISION AND ORDER

The People of Utrik filed a class action claim for damage to property with the Nuclear Claims Tribunal on March 27, 1998. The Tribunal has jurisdiction to hear this claim under Section 105(a) of the Marshall Islands Nuclear Claims Tribunal Act 1987, as amended ("NCTA,") which gives the Tribunal the duty and responsibility to "decide claims by and disburse compensation to the Government and citizens and nationals of the Marshall Islands under Section 123 for existing and prospective loss of damage to person or property which are based on, arise out of or are in any way related to the Nuclear Testing Program. . ."

As was done in prior cases, factual issues were narrowed through the prehearing process, stipulations and joint statements, establishing the following undisputed facts. Utrik and Taka Atolls are among the most northerly atolls in the Marshall Islands. They are low lying coral atolls. Utrik is the site of residential activity, while Taka is uninhabited and used primarily for food gathering. On March 1, 1954, the BRAVO atomic bomb was detonated at Bikini atoll, approximately 275 miles west of Utrik. The radioactive fallout subsequently blanketed the subject atolls and radioactive contamination of Utrik and Taka Atolls resulted. Approximately 72 hours

after the BRAVO explosion, the people of Utrik were evacuated to Kwajalein Atoll for observation as a result of their exposures to fallout. Later that year in May, they were returned to Utrik, where, over the period of subsequent years, they suffered a higher than normal rate of thyroid cancers and other thyroid problems, as well as other cancers, resulting from their acute and chronic exposures to radiation.[1]

I. Restoration.

The Tribunal has previously ruled in that the cost of remediation is an appropriate category of compensation for damage to property from the Nuclear Testing Program (see *In the Matter of the People of Enewetak* ("Enewetak")[2] The Tribunal adopted the U.S. EPA cleanup levels for radioactive contamination in a consolidated action, including the present claim, to address appropriate radiation protection standards for cleanup purposes.[3] As stated in the *Enewetak* decision:

> Those standards, established by the U.S. Environmental Protection Agency, are described in an EPA document entitled "Establishment of Cleanup Levels for CERCLA Sites with Radioactive Contamination," wherein it is stated:
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> > Cleanup should generally achieve a level of risk with the 10^{-4} to 10^{-6} carcinogenic risk range based on the reasonable maximum exposure for an individual. . . .

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[1]Claimants' Exhibit 21, Defender of the Fund's Exhibit M, W. Nicholas Captain, MAI, CR, The Captain Company, Randall Bell, MAI, Bell Anderson & Sanders, LLC, *Appraisal Report, Island Atolls, Utrik and Taka Atolls, Republic of the Marshall Islands, DC Class VIII, Radioactive Contamination*, (dated June 1, 2005, filed June 21, 2005) hereafter cited as "Joint Appraisal.", p. 18, pp. 40-41.

[2]MEMORANDUM OF DECISION AND ORDER, *In the Matter of the People of Enewetak, et al.,* NCT No. 23-0902, April 13, 2000, (pp. 12-16.)

[3]MEMORANDUM OF DECISION AND ORDER, filed December 21, 1998.

> If a dose assessment is conducted at the site (footnote omitted) then 15 millirem per year (mrem/yr) effective dose equivalent (EDE) should generally be the maximum dose limit for humans.[4]

This 15 mrem dose applies not just to the dose of the average resident, but to those persons experiencing high end risk or to the "reasonably maximally exposed individual"[5] and is over and above existing levels of background radiation, including a component from global fallout.

Guidance is given by the EPA for determination of the "reasonably maximally exposed individual" (RMEI):

> . . . actions at Superfund sites should be based on an estimate of the reasonable maximum exposure (RME) expected to occur under both current and future land use conditions. The reasonable maximum exposure is defined here as the highest exposure that is reasonably expected to occur at a site. . . the intent of the RME is to estimate a conservative exposure case (i.e., well above the average) that is still within the range of possible exposures.[6]

Additionally, the EPA states:

> The high end of the risk distribution is, conceptually, above the 90th percentile of the actual (either measured or estimated) distribution. The conceptual range is not meant to precisely define the limits of this descriptor, but should be used by the assessor as a target range for characterizing "high-end risk."[7]

A. Current Dose.

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[4]*Enewetak*, p. 17

[5]Ibid, p. 18.

[6]U.S. Environmental Protection Agency, Risk Assessment Guidance for Superfund Volume I Human Health Evaluation Manual (Part A) Interim Final, EPA/540/1-89/002, December 1989 (page 6-4), cited in Claimants' Exhibit 1, John Mauro, PhD CHP, Hans Behling, PhD, S. Cohen & Associates, *Final Report Regarding the Potential Radiation Doses and Health Risks to the Current and Future Population of Utrik, Taka, Bikar, and Taongi Atolls and An Evaluation of the Costs and Effectiveness of Alternative Strategies for Reducing the Doses and Risks*, (January 2002), p. 6-9.

[7]Claimants' Exhibit 1, p. 6-9.

The experts in this case have evaluated the current doses to residents of Utrik utilizing a number of different methodologies. There is a broad agreement among these various calculations that the RMEI exceeds 15 mrem.

Claimants' experts, John Mauro and Hans Behling of S. Cohen and Associates (SCA) provided two different methodologies for determining the relevant doses. SCA reviewed the methodology utilized by Lawrence Livermore National Laboratory[8] for calculation of Utrik doses and found this analysis was

> designed to quantify the uncertainty in the doses to the average individual and the variability in the individual doses. For a given diet, Robison estimates that the high-end dose at the 95th percent confidence level is about three times the population average dose. The implication is that the high-end dose for case 1 (combination diet) is about 12 mrem/yr, and the high-end dose for case 2 (the local-only diet) is about 30 mrem/yr.[9]

Additionally, SCA cites the work of the Marshall Islands Nationwide Radiological Study, which found annual doses based upon a 75% local diet to range from a low of 9 mrem/year to a high of 50 mrem a year.[10]

Using EPA guidelines for assessing the RMEI, SCA determined there were two significant variables, diet and high end contamination levels:

> Two independent sets of modeling assumptions are required in order to determine the high-end doses and health risks attributable to the RME individual:

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[8]Ibid, pp 6-1 to 6-2.

[9]Ibid, p. 6-2.

[10]Simon, S.L. and Graham, J.C., *Findings of the Nationwide Radiological Study, Republic of the Marshall Islands SUMMARY REPORT*, prepared for the Cabinet of the Government of the Republic of the Marshall Islands, 1995, cited in Claimants' Exhibit 1, p. 6-8.

> - The diet and living habits of the RME individual (which we refer to as the "exposure" scenarios)
>
> - The radionuclide concentrations in the environment and in the food items at the high-end locations on each of the islands (which we refer to as the "source" scenarios.)[11]

SCA acknowledged the potential for wide variation in diet:

> A review of the reports prepared by LLNL (Robison et al. 1994, 1999) and the National Academy of Sciences (NAS 1994) revealed that a wide variety of diets have been considered and recommended in the past for the purpose of assessing the radiation doses to the current and future populations of the Marshall Islands. Discussions with Dr. Laurence Carucci and Ms. Mary Mayfield (fn omitted) revealed that the diets of the people on the individual islands of the various atolls can be highly varied among households, vary seasonally, vary from year to year, and vary depending on the availability of imported foods.[12]

SCA analyzed doses using four different diets for the Utrik people, two "combination" diets which consisted of local and imported foods, and two "local-only" diets, which consisted entirely of foods from Utrik. The Tribunal determined in *Enewetak* that a local foods only diet was appropriate for determination of the reasonably maximally exposed individual.[13]

In evaluating the effect of high-end radionuclide concentrations on dose, SCA determined that the ratio of high end values (concentrations in soil representing the 95th percentile of the contamination distributions from soil samples taken from Utrik) to average values to be two to three. "As a result, assuming the same diet, doses at high end locations can be anticipated to be about two to three times higher than those at average locations on each island. Given the spread

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[11]Claimants' Exhibit 1, p. 6-10.

[12]Ibid, p. 6-10.

[13]*Enewetak*, p. 18.

of data, we elected to use a factor of 2.5 above the mean to represent the high-end doses."[14]

Utilizing the local foods only National Academy of Science model diet, SCA determined "Subtracting the dose contribution from background Cs-137 and adding in the dose from external exposure and inhalation, **the high-end dose for Utrik Island in the year 2001 is about 32 mrem/yr.** Hence, the derived doses are about a factor of two above the EPA and NCT acceptance criterion of 15 mrem/yr EDE above background."[15] (Emphasis in original.)

Claimants' expert Franke[16] utilized two different methodologies for calculating the relevant doses in 2005. First, he calculated the dose based upon the methodology adopted by the Rongelap Resettlement Project[17] for determining the safety of the people of Rongelap upon the resettlement of their atoll. Utilizing a number of dietary models, Franke found the calculated doses for all but one of the diets exceeded 15 mrem at the 90th percentile. The exception was based on a diet with only a 17% level of local foods. At the 95th percentile, the two local foods only diets yielded combined external and internal doses of 35 and 36 mrem/year for adult females and 38 and 43 mrem/year for adult males.[18] The two local food only diets differed primarily in the mix of local foods included.

Franke also calculated historical Cs-137 internal doses based upon historical whole body

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[14]Claimants' Exhibit 1, p. 6-19.

[15]Ibid, p. 6-26

[16]Claimants' Exhibit 3, Bernd Franke, *Review of Radiation Exposures of Utrik Atoll Residents*, June 2002.

[17]This methodology was adopted pursuant to a Memorandum of Understanding between the U.S. Departments of Energy and Interior, the Republic of the Marshall Islands, and the Rongelap Local Government, February 1992, Claimants Exhibit 3, p. 3.

[18]Claimants' Exhibit 3, Tables 3-7, 3-8, p. 15.

counting data. Although offered primarily to support a determination of historical doses, Franke's calculations included present and future doses. Franke based his calculations on extrapolations from whole body counting findings in 1974 and 1977 when maximum values for makes and females, respectively, were recorded. Franke then calculated two values for males and females over 15 years of age: a mean and a maximum value, corrected for radioactive decay. Franke explained the basis for use of this methodology:

> The maximum observations of Cs-137 body burdens among Utrik Island residents in the years 1974 and 1977 are considered to represent "the reasonably maximally exposed individuals", or RMEI. The values are taken as a reference point for other years in which no measurements have been taken in the past. They also represent a reasonable basis for estimating the radiation exposures in the future.

This methodology has the advantage of using data which directly indicates the level of internal doses from ingested radionuclides on Utrik. However, Franke acknowledged potential problems. The methodology assumes the data is accurate, which Franke noted, assumes correct calibration of equipment. Moreover, it "appears that data for either body weight or age were entered incorrectly in a number of cases."[19] The methodology assumes the body burden measured by whole body counting is representative for the entire year in question. Franke offered an illustration which "shows that the assumption of equilibrium conditions may overestimate the actual annual dose by a factor of ~1.5. Since the opposite may also be true (i.e. whole body counting at a low of the Cs-137 body burden), the actual dose may also be underestimated by a factor of ~1.5."[20] Finally, it assumes the sample of those monitored is representative of population, or population sub-group. Franke stated: "The data illustrates the

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[19]Ibid, p. 17.

[20]Ibid, p. 19.

significant difference among individuals in a given year, most likely due to different diet patterns and the origin of local food items within the atoll and/or island."[21] Franke determined based on the whole body counting methodology, the maximum credible internal dose from Cs-137 for adult males in 2001 was 39 mrem/year and for adult females was 46 mrem/year.

The Defender of the Fund's expert, Hank Collins from Chew and Associates (CAI,) offered two different determinations of the current dose, utilizing a similar methodology in both, but different dietary assumptions, thus yielding differing conclusions. Mean annual doses to the people of Utrik "were derived from BNL 51257 (Lessard et al. 1980), based on the estimated total dose from 1954 to 1980 and the radioactive decay coefficients and . . . [environmental/ dietary depletion coefficient] values."[22] (P. 7-100) As of 2001, CAI determined a mean internal dose of 2.7 mrem/year and external of 0.8 mrem/year. From this total of 3.5 mrem, CAI calculated the RMEI using two factors. First, Collins determined the "upper end" dose based on the statistical distribution of doses based on work by the Lawrence Livermore National Laboratory: "LLNL looked at the statistical distribution of *in vivo* whole body count results from Utrik and estimated that the 95th percentile, corresponding to an appropriate level for the RME, was about 2.1 times the mean value."[23] Additionally, a dietary correction factor was included to account for the difference between the base line diet and a 100% local diet which was the basis for the RME calculation. The base-line diet used by Collins in his written report consisted of

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[21]Ibid, p. 18.

[22]Defender of the Fund's Exhibit A, (Henry Collins, MD, CHP and Ronald Kathren, PE, CHP, M.H. Chew & Associates, Inc., *Final Report on Radiological Evaluation of Utrik, Bikar, Bokak and Taka Atolls, Republic of the Marshall Islands, Since March 1, 1954*, (June 2002), p. 7-100.

[23]Ibid.

17% local foods, so the dietary factor to adjust to a 100% diet was 100/17% or 5.85. This resulted in a determination of an RMEI in 2001 for Utrik of 34 mrem/year. [24]

In contrast to his written testimony, Collins testified before the Tribunal that he had determined the local diet did not consist of 17% local foods as was assumed in the base line diet. Rather, based on his personal observation and discussions with the Defender's anthropologist, he determined the appropriate level of local foods in the diet of Utrik people was 40% and consequently the dietary correction factor used in his written report was too high and that the appropriate RMEI for Utrik Island in 2001 should be 13 mrem/year, which is below the applicable standard of 15 mrem/year.

The Tribunal does not find this dietary reassessment to be credible. In the CAI written report, it is stated: "The Ujelang Mixed Diet (Imports Available), as discussed Appendix F, was considered to be the most realistic representation of the actual Utrik diet . . ." [25] The report goes on to note

> The primary diet model used for dose estimates was commissioned by the Micronesian Legal Services Corporation in 1984. Marshallese were trained to gather information about what the community of Ujelang recalled eating over the previous 24 hours using standard size containers – 12 ounce cups and other common sizes to assist in estimating portion size. The results of this survey showed that the mean Marshallese diet consisted of 3208 kcal/day energy consumption, with 17% from locally grown food items. [26]

The report further states that several independent assessments of diet have confirmed that "current consumption of local food provides no more than 20% of caloric intake (Robison, 1994,

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[24]Ibid, p. 7-116.

[25]Ibid, p. 7-8.

[26]Ibid.

1997; Simon, 1995)."[27] The report concludes: "The extensive *in vivo* whole body count results indicate the Ujelang diet adequately characterizes the dietary intake of radionuclides of the Marshallese population on Utrik as well as Rongelap, and thus that model was selected to calculate the doses to the Utrik population."[28] The Tribunal gives greater weight to the Ujelang model diet that Defender's expert acknowledged as having been scientifically derived and confirmed by subsequent studies in his own report filed with the Tribunal than to one derived from the casual personal observations of the expert.

Indeed, the appraisal report filed jointly by the Defender of the Fund and claimants states: "Today, Utrik and Taka Atolls are largely contaminated by radioactivity in excess of the 15-millirem US Government standard,"[29] contradicting the revised conclusions of Collins.

Although each of the methodologies used for calculation of current doses has shortcomings and incorporates certain assumptions to address data shortcomings, the fact that all but one of these calculations (DOF expert's presentation at hearing) persuasively indicates to the Tribunal that a reasonably maximally exposed individual on Utrik would receive a dose considerably in excess of the 15 mrem limit.

While these values exceed the applicable remediation standard, it must also be acknowledged that these doses are small relative to the doses received by the people of Utrik from other sources. Even without the results of the nuclear testing program, people in the Marshall Islands would be exposed to a certain amount of "background" radiation. Some of this

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[27]Ibid.

[28]Ibid, at p. 7-9.

[29]Joint Appraisal, p. 18.

comes from cosmic rays, some from naturally occurring radiation in the environment and foods. It is estimated that the annual dose to people in the Marshall Islands from this natural radiation is about 140 mrem.[30] The average annual background exposure to people in the U.S. is about 360 mrem,[31] over twice that of the Marshall Islands. The EPA limit, adopted by the Tribunal, is obviously only a fraction of the annual natural exposures to people of the Marshall Islands and U.S. The 15 mrem limit itself is designed to be very protective of human health and corresponds to an increase in risk of cancer to about 3.3 cases in a population of 10,000.

Based upon the findings of the experts for both the Claimants and the Defender, radiological conditions in Utrik today are unlikely to cause significant harm to current community members. As described above, the most significant component of the radiation dose currently received by residents of Utrik is from local grown food. This is primarily the result of the uptake of residual cesium-137 in the soil, which is accumulated in plant life and either ingested by residents, or by animals that are subsequently consumed by the people. The high end dose is based upon an assumption of a diet composed entirely of local foods taken from radiological high-end locations. Studies referenced by both the Claimants' and Defender's experts indicate that the current diet pattern for the average member of the community is heavily dependent upon imported foods and consequently there is little danger of exceeding the 15 mrem limit by the average member of the community. Indeed, Claimants' experts estimate that "the current levels of radionuclide contamination on Utrik Atoll will result in less than one additional

[30]Defender's Exhibit A, at p. 6-2.

[31]Joint Appraisal, p. 17.

cancer over the next 1,000 years."[32]

Nonetheless, estimates of exposures to high end risk individuals exceed the EPA/Tribunal standard. Citizens of the Marshall Islands are entitled to no less protection than those in the US which caused the risk to which they are exposed and some remediation effort is warranted. Beyond the scientific analysis, it is clear from the discussion below in relation to consequential damages that the people of Utrik reasonably believe their land to be contaminated and the need to address this concern forms a complimentary reason for remediation of the affected lands.

B. Remediation costs.

Claimants and the Defender offer a number of alternative remediation strategies ranging from doing nothing to removing large quantities of soil and disposing of it off-island. These options range in cost from $0 to $116 million. Options considered by the parties include the following: do nothing; removal of contaminated soil (with and without replacement and soil restoration); potassium treatment to reduce the introduction of radioactive cesium into the food chain by blocking its uptake by local plants; application of zeolite to bind the cesium in the soil; soil turn-over to reduce the access of cesium to food crops; institutional controls; soil-flushing; phytoremediation; and combinations of these various alternatives. Both parties recommended a remediation strategy incorporating potassium treatment, with other options discarded on the basis of cost, effectiveness, environmental damage, or community acceptance.

The potassium treatment option is premised on the principle that potassium is an important soil element for plant growth. As described by Claimants' experts, "total potassium in

[32]Claimants Exhibit 1, p. ES-11.

atoll soil is low. In potassium-deficient media, cesium acts as a replacement for potassium. Conversely, when potassium is present in large concentrations, plants selectively absorb potassium and discriminate against cesium."[33] Cesium-137 is the most significant radionuclide, contributing virtually all of the radioactive dose in Utrik at the present time. Periodic potassium treatments to the soil can reduce the uptake of cesium by a factor of about ten.[34] Neither Claimants' nor Defender of the Fund's experts found areas relevant to this action to be contaminated in concentrations in excess of levels where the potassium treatment would be effective. The Tribunal recognized these treatments to be effective and awarded costs for such remediation in both the *Enewetak* and *Bikini*[35] cases.

As described by Claimants' experts in their written report:

Major cost elements for potassium soil treatments include the following:

- Periodic clearing of land of underbrush prior to potassium applications
- Purchase and periodic application of potassium/potassium fertilizer
- Soil management that ensures proper dosage of potassium/potassium fertilizer
- A comprehensive surveillance program involving soil and crop sample analyses and bioassay (i.e., whole body counting) of human subjects.[36]

The total cost of this alternative is $7,371,000.

The Defender of the Fund's expert proposed a similar program. Although in his report the cost of the potassium option was $1.6 million, in his testimony on direct examination before the

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[33]Ibid, p. 9-27.

[34]Claimants' Exhibit 1, p. 8-24; Defender's Exhibit A, p. 2-6.

[35]MEMORANDUM OF DECISION AND ORDER In the Matter of the People of Bikini, et al. NCT No. 23-4134, March 5, 2001.

[36] Claimants' Exhibit 1, p. 10-9.

Tribunal (January 22, 2002), Dr. Collins amended his estimated costs to be "in the ball park of five million dollars." This amended cost estimate included costs for whole body counting ("at least half a million dollars"), about $2 million for a sampling and sampling counting program, and another $1.7 million, "perhaps something higher, for the potassium spreading itself."

The primary difference in costs between the parties is the provision by Claimants for professional personnel to provide soil management to insure the soil treatments are effective and do not result in contamination of ground and lagoon water sources. Significantly, the need for such management is asserted by claimants to be on the basis of the dangers presented by nitrates. "Nitrates, due to their high solubility and the porous nature of atoll soil, present the greatest concern for groundwater and surface-water contamination."[37] However, potassium is the primary substance of interest because of its quality of inhibiting plant absorption of radioactive cesium. Claimants' experts suggest that "a complete fertilizer includes nitrogen and phosphorus"[38] and that such soil nutrients are required for "optimum crop production."[39] However, while such treatment was warranted in the Enewetak and Bikini cases because a significant component of the remediation program was soil removal and the need to rebuild the soil to a productive state, there is no soil scraping proposed for Utrik and consequently no need, on a compensatory basis, for adding additional soil nutrients, such as nitrogen. As a result, the dangers presented by adding nitrates to the soil are eliminated by the absence of need to compensate for soil removal as a remedial measure. While these professional soil management costs were appropriate in Enewetak

[37]Ibid., p. 9-30.

[38]Ibid., p. 9-28.

[39]Ibid..

and Bikini, here, where there is no soil removal, and thus no need for rehabilitating the soil, inclusion of these costs is not warranted on a compensatory basis. Claimants are awarded $5 million for clean-up costs.

II. Loss of Use.

The people of Utrik are entitled to damages for the period of time their use of their property was impaired as a result of radioactive contamination from the nuclear testing program. In determining exposures to individuals in excess of 15 mrem/year above background are unsafe, thus interfering with claimants' use of their property, the Tribunal is guided by U.S. precedent. Under the Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (CERCLA), cleanup remedies are required to "at a minimum. . . assure protection of human health and the environment." CERCLA §121(d)(1). The U.S. Environmental Protection Agency implemented this statutory mandate through the National Oil and Hazardous Substances Pollution Contingency Plan (NCP.) EPA states:

> The NCP provides that, for carcinogens, preliminary remediation goals should generally be set at levels that represent an upper-bound lifetime cancer risk to an individual of between 10^{-4} to 10^{-6}. 40 CFR § 300.430(e)(2) (I)(A)(1). This regulatory level was set based on EPA's conclusion that the CERCLA protectiveness mandate is complied with "when the amount of exposure is reduced so that the risk posed by contaminants is very small, i.e., at an acceptable level. EPA's risk range of 10^{-4} to 10^{-6} represents EPA's opinion on what are generally acceptable levels." 55 Fed. Reg. at 8716 (March 8, 1990). EPA's adoption of this risk range was sustained in judicial review of the NCP. State of Ohio v. EPA, 997 F.2d 1520, 1533 (D.C. Cir. 1993)[40]

This risk, furthermore, is not an average risk, but rather is "based on the reasonable maximum

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[40]U.S. Environmental Protection Agency, *Establishment of Cleanup Levels for CERCLA Sites with Radioactive Contamination,* OSWER No. 9200.4-18, Attachment B, August 20, 1997, p. 3.

exposure for an individual."[41] For radioactively contaminated sites,

> 15 millirem per year (mrem/yr) effective dose equivalent (EDE) should generally be the maximum dose limit for humans. This level equates to approximately 3 x 10^{-4} increased lifetime risk and is consistent with levels generally considered protective in other governmental actions, particularly regulations and guidance developed by EPA in other radiation control programs.[42]

This 15 mrem/year limit was adopted by the Tribunal as the applicable standard for determination of contamination of the Utrik lands for the purpose of assessing loss or damage to property in its January 4, 2004 MEMORANDUM DECISION AND ORDER in this claim.

The Tribunal finds that the lands of Utrik were contaminated so as to result in exposures in excess of 15 mrem/year to the reasonably maximally exposed individual for the relevant periods of this claim. As discussed above in the restoration section, current doses to the RMEI would exceed 15 mrem/year by a factor of about 2. The reports of the experts all agree that such doses exceeded current levels in the past since BRAVO.[43] Consequently, the period of impaired use dates from the BRAVO detonation in 1954 until 2003, the last year covered by the appraisals.

A. Lands contaminated above the 15 mrem level are unmarketable.

Claimant's expert, Randall Bell asserted: "The land, as contaminated, had no value as

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[41]OSWER No. 9200.4-18, p. 4.

[42]Ibid., p. 5.

[43]Even in the absence of evidence that the lands in question exceeded applicable standards for radiation contamination, claimants may recover damages for a diminution in property value based upon the public perception that the lands were contaminated at an unsafe level, particularly if there is a reasonable basis for that perception. See cases cited in *San Diego Gas & Electric Co. v. Daley*, 205 Cal.App.3d 1334 (1988) 253 Cal.Rptr. 144. See also *Cook v. Rockwell International Corp.*, (Colo. 2003) 273 F. Supp.2d 1175. Indeed, in a partial condemnation action, the Supreme Court of New Mexico in *City of Sante Fe v. Komis*, 114 N.M. 659 (1992) 845 P.2d 753 affirmed an award of compensation for diminution of property values based on the public fear of the effect of simply transporting radioactive waste material on adjoining property.

Res/Ag land. In other words, as the land exceeds the 15-millirem standard, it is not suitable for Res/Ag use and thus would not have value for a Res/Ag use."[44] He stated further, "Both the market data and the precedents set within the United States and other Marshall Island atolls indicate that one should not effectively pay for the right to occupy contaminated land."[45]

Claimant's other appraisal expert, James Hallstrom, explained the reasons property contaminated by radiation is unmarketable:

> To be salable residential/agricultural property, the subject must, at the very least, be able to provide safe drinking water and soil conditions where food can be grown. Other benefits that can be identified are predicated on these fundamental rights, without which the use potentials of the property are dramatically altered. Given the subject's remote location and lack of infrastructure, it is highly unlikely that the property would even be rented for periodic visits requiring that food and water be brought in. . . .[46]

This is supported by research of the market: "The results of our research efforts are consistent with those of Captain and Bell as they uncovered no sales or listings of properties contaminated with radioactive material."[47] Hallstrom noted the particular sensitivity of the market to radioactively contaminated properties:

> The heightened apprehension towards radioactive contamination, compared to other hazardous forms, is discussed in Erikson and Lifton's [footnote omitted] study and is relevant in understanding the perception of buyers and sellers in the marketplace. The public perceives radiation, unlike other toxic materials, as invisible, yet able to invade the body without an apparent time frame.

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[44]Joint Appraisal, p. 61.

[45]Ibid, p. 63.

[46]Claimants' Exhibit 30, James E. Hallstrom, Jr., MAI, CRE, The Hallstrom Group, Inc., *Appraisal Report of the Aggregate Loss in Use Value in UTRIK AND TAKA ATOLLS March 1, 1954 through December 31, 2003*, (February 22, 2006), p. 30.

[47]Ibid, p. 29.

> Accordingly, there "is a considerable body of evidence in the behavioral and social sciences that radiation in particular has a very special capacity to nourish dread in people everywhere."[48]

He concluded, "In reality, it appears that there is no market value for land contaminated by radiation."[49]

Defender's expert, Nick Captain suggested "Sophisticated investors would be willing to pay discounted prices for contaminated land with full knowledge that safe occupancy may not occur for 100 years or longer."[50] Apart from the question of whether a "sophisticated investor" would be in the market for rural agricultural/residential land in the Marshall Islands, this ignores the methodology utilized by the appraisers in their joint appraisal, which is based upon annual rental values, not purchase in fee simple, where the eventual attainment of safe levels of exposures from radiation would potentially be relevant.

Apart from the scientific determination that the land is contaminated above certain standards, it is clear that the people of Utrik historically and currently believe the land is contaminated. This belief is well documented by experts of both claimants and the Defender of the Fund and by the testimony and statements of the people of Utrik. Claimants' experts Erikson and Lifton report

> the people of Utrik, almost to a person, assume that the environmental envelope surrounding them - the land they live on, the food they eat, the water they drink and cook in, even the air they breathe - is poisoned and unsafe for human life. Many people continue to live on the island despite that dire assumption (and many others plan to return one day) because they feel that they cannot be long parted

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[48]Ibid, p. 30.

[49]Ibid, p. 31.

[50]Joint Appraisal, p. 66.

> from their homeland without damage to their spirit and have no other place to go in any event.[51]

Defender's expert, Dr. Fallon found "They all expressed concern about the land and the contamination of the land, the animals, and the food supply on the island. They equate the word 'contamination' with poison and they feel that their bodies have been poisoned from eating the food and from being exposed to the radiation."[52] Dr. Pollock noted "Fear of the residual Fall out on their land and in the plants that they eat was a message I received from all informants."[53]

This is not a recent phenomenon. In a letter to the U.S. Energy and Research and Development Authority in 1976, the Utrik community complained "At present, the people of Utirik have much fear of the radiation that came from the bomb."[54] Glenn Alcalay, Claimants' expert, testified before Congress in 1977

> The people of Utirik generally believe that they are living in a still-radioactive environment, despite the individual physicians' and ERDA/Brookhaven's claims to the contrary. This lack of trust stems from the doctors telling the people that "everything is alright now" in juxtaposition with an increase number of radiation-related diseases in recent years.[55]

In light of the levels of contamination of the subject lands, the Tribunal finds such lands were unmarketable for their intended use for the period of time at issue here.

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[51]Claimants' Exhibit 14, Kai Erickson, Ph.D. and Robert Jay Lifton, M.D., *Sociocultural and Psychological Impacts of the Bravo Nuclear Test on the People of Utrik*, (28 June 2002), p. 10.

[52]Defender of the Fund's Exhibit K, p. 7.

[53]Defender of the Fund's Exhibit J, p. 7.

[54]Claimants' Exhibit 13, Glenn H. Alcalay, *Utrik Atoll: The Sociocultural Impact of Living in a Radioactive Environment*, (June 28, 2002), Appendix D.

[55]Claimant's Exhibit 13, Appendix F.

B. Methodology.

The people of Utrik are entitled to compensation for the damages to their property resulting from its contamination by radioactive elements from the U.S. nuclear testing program. The amount of compensation for such contamination is based upon the decline in rental value of the property on an annual basis.[56] As noted above, lands contaminated above the 15 mrem standard are unmarketable. Consequently, the value of the loss to claimants may be calculated by multiplying the relevant annual rental value times the affected acreage, subject to appropriate adjustments, and summing up the annual amount for the affected years.

1. Determination of annual rental rates.

The Tribunal has recognized the difficulty in applying American appraisal techniques to a Marshallese system of customary land tenure that is collective in nature, does not allow foreign ownership, and, until recently, did not include the concept of market value.[57] Claimants' appraiser Hallstrom notes:

> In evaluating the rights to be appraised, several unique factors have been considered as we apply traditional American-based valuation theories to cultural land ownership patterns in the Marshall Islands. Traditionally, Marshallese do not sell land rights which are acquired by birthright. Hence, there has been an absence of a real estate market, and while the Marshallese customary system of land tenure has not only precluded the development of a normal market, it fosters an attitude about land which does not include the concept of market value. Only recently there have been outright sales of interest in real estate to other Marshallese; ownership

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[56]See, e.g., *Pryor v. Willoughby,* 36 S.W.3d 829 (Tenn.App. 2000), "In such a situation, a plaintiff is not being compensated for not receiving rents that she would otherwise have been able to collect, but because she was unable to use or enjoy her property in a manner commensurate with its pre-nuisance value. It therefore follows that property owners cannot be disqualified from an award of damages measured by the decrease in the rental value of their property, simply because they continue to live on it despite the nuisance." 36 S.W.3d 829, 832.

[57]*Enewetak*, pp. 6-7, *Bikini*, p. 14.

by foreigners continues to be forbidden by law.[58]

Nonetheless, as time has gone by, "the transfer of use rights or possessory interests in land for money has gained a measure of social acceptance and from these transfers the appraisers developed a data base of comparable transactions."[59] Consequently, the annual rental rate may be determined by reference to such data base along with appropriate statistical modeling.

a. Highest and Best Use.

In determining the appropriate database for determination of annual rental rates, reference must be made to the highest and best use of the properties. In both the *Enewetak* and *Bikini* claims, the Tribunal determined the highest and best use to be residential/agricultural. The subject Utrik properties are not distinguished from the Enewetak and Bikini lands in relevant past, current and anticipated future use. As stated by Hallstrom: "Interviews with the Client, Senator Hiroshi Yamamura, and residents of the subject atolls depicted a lifestyle and uses of natural resources that were similar to those described in the Bikini and Enewetak appraisals."[60] In the joint report filed by the parties, it is suggested that subject properties were converted to a governmental/military use.

> On one hand, the properties have historically had a Res/Ag use. On the other hand, the use of the atoll was arguably converted to a government/military use at sometime prior to the detonation of the Bravo nuclear test, which resulted in an airborne plume of radioactive fallout that blanketed most of the atoll and exposed it to radioactive levels in excess of the 15 millirem standard.[footnote omitted] In other words, Utrik and Taka Atolls were utilized by the US Government for

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[58]Claimants' Exhibit 30, p. 7.

[59]*Enewetak*, p. 7.

[60]Claimants' Exhibit 30, p. 8.

nuclear testing and the storage of radioactive waste.[61]

Hallstrom concludes, however, "While future uses may include some limited eco-tourism and other types of commercialization, clearly the primary (and assumed) highest and best use by the Utrikese would be residential and agriculture."[62] The Tribunal finds the arguments in favor of a residential/agricultural highest and best use to be persuasive. The fact of contamination from the nuclear testing at a remote site did not convert Utrik to a governmental use. It continued to be used by the people of Utrik, albeit in impaired state, for the same residential and agricultural purposes for which it had been traditionally used. The purpose of compensation is to place the injured party in as good a position as the party would have been in the absence of the injury. In the absence of the contamination by the nuclear testing program, the use of the Utrik lands would be for residential and agricultural purposes. To assume a higher economic use based upon the injury itself, would not further the goal of compensation, but would rather result in a windfall to the injured party.

b. Influence of the "government rate."

An important determinant of land prices in the Marshall Islands is the so-called "government rate." The joint appraisal notes:

> There is wide support for a slow increase in land values up until the 1970s when land values increased substantially. The government's influence cannot be discounted as the Nitijela passed a bill in 1968 establishing a minimum land rent based on $1,307 per acre per year. The increase in land values during the 1970s was a direct result of increased Trust Territory activity and an increasing military presence in the region. Other contributing factors include the general inflation of U.S. currency and the establishment of regular air service to the region in 1968.

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[61]Joint Appraisal, p. 42.

[62]Claimants' Exhibit 30, p. 8.

> Increasing land values continued until the adoption of the government rate of $2,500 per acre, per year by 1979. Following the implementation of the government rate, it is widely acknowledged that this market mechanism significantly affected land prices in the Marshall Islands as most transactions were indexed to the government rate. [63]

Hallstrom reports, "Further evidence of the fairness of the government rate is the customary practice, even in wholly private leases, of referring to the government rate as the benchmark by which future renegotiated rates would be compared for reopening revisions."[64]

c. Effect of highest and best use determination on value.

In any case, the question of governmental versus residential/agricultural highest and best use is largely irrelevant for the purposes of valuation. Both reports agree in large part that transactional values for either governmental or residential/agricultural uses are similar in rural areas of the Marshall Islands. The joint appraisal reports:

> The influence of the government rate on transaction prices cannot be overstated. Since the implementation of the government rate, many land lease transactions are based on this published rate. Further, many leases provide for rent reviews at five year intervals based on changes in the established rate.
>
> It is noted that numerous government-rate leases are included within our transaction database. These transactions are reasonable and appropriate considering the wide public acceptance of the government rate and its incorporation as a benchmark in numerous private and government transactions.[65]

Indeed, despite determining a government/military highest and best use, the Joint Appraisal reports, "the data base of land leases utilized in the valuation section of this report largely shows

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[63]Joint Appraisal, p. 53.

[64]Ibid, p. 17.

[65]Ibid, p. 39.

that similar rates paid for Res/Ag properties as for other uses"[66] and the "database utilized contains both Government/Military uses comparables, as well as those for Res/Ag and other uses."[67]

Similarly, the Hallstrom database, determined with reference to a residential/agricultural highest and best use, contains both residential/agricultural transactions and governmental transactions, noting "We have observed that in the rural areas of the Marshall Islands, land rents at the same rate regardless of its location, and/or whether it is used for residential or other purposes."[68] Hallstrom explains:

> This appraisal report makes use of many government lease transactions in arriving at our estimate of value. Such leases are a significant part of all recorded transactions in the islands and derive legitimacy in the fact that they reflect consummation of agreements wherein lessors have accepted payment. Further evidence of the fairness of the government rate is the customary practice, even in wholly private leases, of referring to the government rate as the benchmark by which future renegotiated rates would be compared for reopening revisions.[69]

Because of the significant influence of the government rate on the market, it is appropriate to consider government leases as part of the data base for derivation of annual lease rates for a private residential agricultural use.

Professor Woodard, who conducted the statistical analysis for the Joint Appraisal, explains the significance of apparent differences in governmental (G) and private (P) transaction values. He first notes that "Utrik estimates based only on G differ very little from estimates made on all

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[66]Ibid, p. 43.

[67]Ibid, p. 43.

[68]Claimants' Exhibit 30, p. 17.

[69]Ibid, p. 18.

transactions (GP) in the pre-1970 (early) and post-1990 (late) periods."[70] However, he finds that although there is a difference in estimated values between government and private values during period of 1970 to 1990, these differences "are due to the lack of G data in that period, a condition which causes the estimating procedure to generate what are essentially simple interpolations between 1970 and 1990 rents."[71] Statistically, these differences are not very meaningful, in that a "formal significance test of the difference between G and GP would be very difficult and have very little meaning due to the lack of G data in the middle period."[72]

The reason for this seeming variation in government and private values during this middle period as relates primarily to the absence of data. "In general, the G estimates are of much poorer quality, as verified by the very broad 95% confidence limits. The appearance of generally higher middle G estimates is most likely an artifact of missing data. The middle G estimates are almost surely unusable. Estimates based only on P differ greatly from G in the middle period, but again this is likely an artifact of missing G data."[73] However, this is also a function of the developing market in the Marshall Islands, as Dr. Woodard notes that data relating to private transactions "exists for a shorter time span, beginning in 1967 and ending in 1999."[74]

More importantly, "The fact that early and late period estimates are very similar for G and P is a strong indication that there are no systematic G-P differences: where there is sufficient data

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[70]Joint Appraisal, Addenda, Dr. Woodard Report, p. 4.

[71]Ibid..

[72]Ibid..

[73]Ibid..

[74]Ibid..

to make comparisons, the average government and private rents are much the same."[75]

Dr. Woodard's conclusion that there are no systematic differences in government and private transaction values supports the Hallstrom inclusion of governmental transactions in his database for determination of annual rental values for a residential/agricultural highest and best use. Despite the differing highest and best use determinations, the conclusion as to damages under both the Joint Appraisal (assuming a governmental highest and best use) and the Hallstrom report (assuming a rural residential/agricultural highest and best use) are remarkably similar, the primary difference being Hallstrom's use of a yearly, rather than five year, escalation in annual rents.[76]

2. Interest factor.

Annual rental payments were adjusted in both appraisals to account for the present value of the past unpaid compensation, using long term bond rates. It is noted in the Joint Appraisal that "the interest component is a significant portion of our overall conclusion considering that no rent payments have been made since 1954."[77]

3. Offsets.

The values determined by the appraisers incorporated items of prior compensation which have been shown to have been received by the people of Utrik. This prior compensation includes a 1974 AEC grant of $18,212 paid in equal payments of $116.00 to the 157 exposed Utrik individuals; $1,000 payments to individuals who resided on Utrik Atoll on March 1, 1954 for a

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[75]Ibid, p. 4.

[76]Claimants' Exhibit 30, p. 27.

[77]Joint Appraisal, p. 56.

total of $168,000 made in 1979; and annual payments of $1.5 million made over 15 years from 1987 to 2001 for a total of $22.5 million to the Utrik Local Distribution Authority pursuant Article II, Section 5 of the Section 177 Agreement.

Additionally, the parties stipulated "the amount of $78, 922.80 per year plus interest is to be set off against the loss of use valuation damages in the accumulated total of $916,001.68 for Utrik and Taka Atolls for the period 1992 through 2003."[78]

4. Value in use.

Despite the unmarketability of the Utrik lands because of radioactive contamination, consideration must be given to whether these lands had some value in use to the people of Utrik. Value in use has been defined as the "value a specific property has to a specific person or specific firm as opposed to the value to persons or the market in general."[79] The Defender of the Fund's expert suggests:

> Clearly the people of Utrik have suffered as a result of the radioactive contamination of their atoll. However, the people physically occupied the land during the vast majority of the period of loss in use. During the period of loss in use, the people did receive benefits associated with physical occupancy. From a real estate valuation perspective, these benefits are associated with the bundle of rights and have value. The issue of an offset due to physical occupancy, in my opinion, must be addressed in order to provide a true loss in use value conclusion. The argument that no offset for physical occupancy is justified in the Utrik case appears to contradict the Marshall Islands Constitutional requirement (and the standard real estate valuation relationship between use and value) to consider the "…benefits that such land rights provide." For these reasons and others, while the use value of Utrik land for subsistence purposes was diminished by the contamination of land from radioactive fallout, the use value for "benefits" derived

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[78]STIPULATION FOR SET OFF AGAINST LOSS OF USE DAMAGES RE: PRIOR COMPENSATION - FOOD COMMODITIES ASSISTANCE, filed May 16, 2006.

[79]Claimants' Exhibit 30, p. 35, quoting The Appraisal Institute's The Dictionary of Real Estate Appraisal, 4th Ed., Electronic Version.

from non-subsistence uses of the land has a value that can be described in dollars.[80] However, Captain was unable to establish a value for such use, stating "such a dollar value estimate for an offset due to physical occupancy is beyond the scope of this assignment."[81] He acknowledged further that the market did not reflect such values in that "there remains a lack of data for offsets associated with the physical occupation of contaminated land."[82]

Claimants' experts respond that there is no economic value to the right to live and subsist on contaminated land. The very reasons that make the land unmarketable for residential/ agricultural purposes argue against it having any value for that use.

U.S. courts have addressed the question of value in use for contaminated properties. In *Schmidt v. Utah State Tax Commission*, the court addressed the valuation of contaminated residential property for tax purposes. In upholding the tax commission's determination, the court described the commission's methodology:

> Since the Commission determined that the property had "value-in-use,"[fn omitted] it came up with an alternative methodology. The Commission treated the land and the home separately. It did this because the building itself was not contaminated and the harm to the value of the overall property was due to the contamination in the soil. It therefore set the value of the land at zero and the value of the building at $398,166, a figure reached by using the standard replacement cost new less depreciation method. The result was a valuation for the house and land of $398,166.[83]

While this methodology potentially provides an approach to determine "value-in-use" for

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[80]Joint Appraisal, p. 68.

[81]Joint Appraisal, p. 68.

[82]Joint Appraisal, p. 68.

[83]*Schmidt v. Utah State Tax Commission*, 980 P.2d 690 (Utah 1999).

residential usage of the land, it would not measurably affect the valuations submitted in this case, as neither appraisal included the value of structures on the subject property. Hallstrom stated the Utrik property was analyzed "as unimproved land, void of all structures and infrastructure improvements such as roads, water lines, wells, sewer system, electricity, water and drainage systems (if any)."[84]

U.S. cases suggest there are other elements to value in use which should be considered as well. In *E.I. Du Pont v. Douglas County Board*, 75 P.3d 1129 (Colo.App. 2003), another tax case, the property at issue was the contaminated site of a former explosives plant. Despite finding the property was unmarketable and that the cost to remediate the property would exceed the value of the remediated property, the site was found to have value in use as grazing land resulting in a positive value of $315,000. Likewise, in *Sterling v. Veliscol Chemical Corp*, 855 F.2d 1188 (6th Cir., 1988), the court affirmed the district court's finding "that the value of all property within one mile of Velsicol's landfill, the 'contaminated zone,' had been rendered valueless except for $275 per acre for timber bearing potential"[85] and that timber bearing potential represented the value in use of the property.

In the case of Utrik, the people of Utrik have engaged in copra production over the years which represented a significant part of their income. This copra production represents a value in use which must be offset from the diminished value of the lands based on market value. Based upon annual estimated copra revenues and accrued interest, the total value of this use was

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[84]Claimants' Exhibit 30, p. 9.

[85]*Sterling v. Veliscol Chemical Corp*, 855 F.2d 1188 (6th Cir., 1988), p. 1212.

$8,023,099.41 for the years 1954 - 2003.[86]

5. Acreage.

While the relative levels of contamination in Utrik vary from location to location, the people of Utrik did not know and could not have known historically what areas were safe and what areas were of radiological concern and consequently, because of the "checkerboard" pattern of contamination, are entitled to damages to property for the entire Utrik Atoll. Consequently, the entire area is considered. Utrik Atoll has a land area of 720.8 cares, while Taka Atoll is 132.2 acres for a total of 853 acres.[87]

Based on the forgoing, and adopting the valuation determined by Claimants' appraiser James Hallstrom in Claimants' Exhibit 30 based upon a residential/agricultural highest and best use, the Tribunal finds the use of the land of the people of Utrik was impaired by the radioactive contamination from the nuclear testing program and such impairment resulted in damages in the amount of $266,000,000. In addition to the offsets incorporated into that amount, the value of food commodities assistance in the amount of $916,001.68 and the value in use for copra production in the amount of $8,023,099.41 must be subtracted for a total of $257,060,898.91.

III Consequential Damages.

A. Legal Framework.

The people of Utrik have requested compensation for damages which were a consequence of the harm to their property arising out of the Nuclear Testing Program. The Tribunal has

[86]Claimants' Submission Re: Value of Copra Crop of Utrik from 1954-2003, filed April 24, 2006.

[87]Joint Appraisal, p. 7, Claimants' Exhibit 30, p. 4.

previously recognized this class of damages in the class action claims of *Enewetak* and *Bikini*. In those cases, the Tribunal adopted as a framework for analysis §929 of the Restatement (Second) Torts, Harm to Land from Past Invasions. Subsection 1(c) speaks to this issue, allowing compensation for "discomfort and annoyance."

The scope of such discomfort and annoyance is suggested by the application of this section of the Restatement in the case of *Ayers v. Township of Jackson*, 525 A.2d 289 (Sup. Ct. N.J. 1987.) In that case, damages were allowed for emotional distress, deterioration in the quality of life, and medical monitoring where plaintiffs' water supply had been tainted by toxic chemicals. In *Enewetak*, the Tribunal adopted an approach to quantification of these damages which paid an annual amount for each person on Ujelang during the period of hardship. The annual amount was adjusted to reflect what the Tribunal considered to be the relative severity of hardship. The Tribunal recognized two levels of compensation, $3,000 and $4,500, depending on the harm suffered by the affected population. In assigning these rates of compensation, the Tribunal stated

> In determining the amount of compensation for these sufferings, the Tribunal has considered not only the cases cited by counsel, but also the Tribunal's personal injury program. Under that program, the maximum award for a claimant is $125,000 for serious medical conditions most likely to lead to death. In order to be fair and consistent to all personal injury claimants, an individual should not receive hardship damages which exceed this amount.[88]

In *Enewetak*, the Tribunal found that the period from 1956 to 1972 was that of the greater suffering. The Tribunal followed this approach in *Bikini* paying $4,500 per person per year for the period on Rongerik (1946-1947) and $3,000 per person per year for the period on Kili up until 1982 (1949-1982.)

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[88] *Enewetak*, pp. 32-33.

In distinguishing between the periods of greater and lesser hardship, the Tribunal cited the following factors in *Enewetak*:

> famine and hunger, near starvation and death from illness, food shortage and the limitations of the environment on Ujelang (fishing/collecting), the polio epidemic, the measles epidemic, the rat infestation, the time of the strike, and easing of suffering during the 1970s but with continued homesickness and desire to return to Enewetak.[89]

In *Bikini*, the Tribunal distinguished between the period on Rongerik from the time on Kili:

> With the exception of their sojourn at Kwajalein, the Bikinians experienced serious subsistence problems most years since their initial relocation. Their ordeal at Rongerik was one of basic survival. At Kili, food shortages routinely occurred during the annual period of rough seas.[90]

The Tribunal acknowledged in those cases that physical hardship was only one aspect of the consequential damages suffered by claimants.

B. Emotional Distress Suffered by the Utrik People.

Claimants rely primarily upon the emotional distress they suffered as a result of their living on lands contaminated by the nuclear testing program as the basis for their claim of consequential damages. This distress has been amply documented by the the people of Utrik and by the conclusions of the experts for both the claimants and the Defender of the Fund.

Representative members of the Utrik community provided insights through both oral testimony before the Tribunal and interviews recorded by the expert witnesses in this claim. According to Aplos Kios:

> After the fallout, the people on Utrik began to understand that Utrik was contaminated from radiation as a result of the testing, and they were

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[89]Ibid, p. 28.

[90]*Bikini*, p. 42.

> uncomfortable and scared as they were told not to eat local foods, such as pigs, chickens, papaya, coconuts, pandanus and especially arrowroot.[91]

Thomas Torren told interviewers:

> I have heard from sources, who are very knowledgeable about radiation, that the radiation caused by the testing does not disappear overnight but remains on for a period of time. The people who have lived on Utrik for a long time live in fear because they do not know what the future holds for them.[92]

Kel Joel stated:

> Also, at this time, many women had problems with childbearing, and many women had several cases of "jibun" ["miscarriage"] and "mij in lotok" ["stillbirth']. My eldest son Emto has had thyroid surgery, and my youngest son Winton – who was born one year after Bravo – has been operated on twice for thyroid cancer. These problems did not exist during the Japanese period. There is much fear and anxiety among the Utrik people at the present time.[93]

The findings of the expert witnesses of both claimants and the Defender of the Fund support the testimony and reports of the people of Utrik. Erickson and Lifton found that the people of Utrik

> almost to a person, assume that their bodies have been invaded by potentially lethal doses of radiation, and that those traces of "poison" continue to reside inside them, ready to do vast harm not only to themselves but to the children they bring into the world. This feeling is so deep and so strong that it reaches far beyond what clinical specialists normally have in mind when they refer to "post-traumatic stress disorder" or "depression" or other pathological states of mind. . . It is a dread they can never escape that they and their families are essentially doomed.[94]

Interviews of members of the Utrik community by Dr. Fallon, one of the experts retained by the

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[91]Claimants' Exhibit 13, p. 23.

[92]Ibid, p. 23.

[93]Ibid. p. 26.

[94]Claimants' Exhibit 14, p. 6.

Defender of the Fund, revealed that

> all have similar concerns about the effect of the radiation and the bomb on them and their island. They expressed concern that virtually all the illnesses they had were caused by the effects of the radiation. They all felt that prior to the bomb their lives had been good, but since the bomb, every illness that they had developed or contracted was ascribed to the radiation. . . . they all expressed worries about their health, their children and the future.[95]

Although Claimants' experts suggest the mental distress of the people of Utrik is "far beyond what clinical specialists normally have in mind when they refer to 'post traumatic stress syndrome' or 'depression' or other pathological states of mind,"[96] Defender's experts determined there "are no diagnosable psychiatric conditions that can be offered consistent with the criteria of DSMIV or ICD10 (the standard manuals used for psychiatric diagnosis.)"[97] Further, they note that although the members of the Utrik community interviewed "express worry and concern and some fears, they usually have no difficulty sleeping, their appetites are good and they do not show clinical signs or symptoms of depression or anxiety or post-traumatic stress disorder."[98]

Nonetheless, the absence of a specific diagnosable psychiatric condition does not bar claimants from compensation for emotional distress. The Tribunal did not so hold in either *Enewetak* or *Bikini*. In *Sterling v. Veliscol*, 855 F.2d 1188 (CA6, 1988) the appeals court upheld the district court's award of damages for emotional distress stating:

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[95]Defender of the Fund's Exhibit K, Robert Sadoff, April Fallon and Eugene Rosa, *A Brief Report on the Effects of the U.S. Nuclear Testing Program on the Community of Utrik Atoll from 1954 to the Present* (June 27, 2002), p. 7.

[96]Claimants' Exhibit 14, p. 5-6.

[97]Defender of the Fund's Exhibit K, p. 8.

[98]Ibid, pp. 7-8.

> In the instant case, the plaintiffs' fear clearly constitutes a present injury. Each plaintiff produced evidence that they personally suffered from a reasonable fear of contracting cancer or some other disease in the future as a result of ingesting Veliscol's chemicals. Consistent with the extensive line of authority in both Tennessee and other jurisdictions, we cannot say that the district court erred in awarding the five representative plaintiffs damages for their reasonable fear of increased risk of cancer and other diseases.[99]

The district court had determined:

> Veliscol's conduct caused chemical contaminants to come in contact with or invade each particular plaintiff's body, and impacted upon his or her body. Because those contaminants were of such a nature as to cause the reported symptoms and cellular damage, and adverse biological change, (however slight), the Court considers that this ingestion, inhalation or contact caused emotional distress in each plaintiff.
>
> Moreover, plaintiffs are entitled to recover for fear, distress, or emotional injury because that fear or distress reasonably and naturally flowed or resulted from the disclosure of the nature and possible effects of those chemical contaminants. The Court has considered the nature, extent or duration of such fear of distress, since any award must compensate plaintiffs for any distress experienced since the disclosure of the contaminants in the water up to the present time, and even into the future, because the Court finds the medical and scientific evidence provided justifies the conclusion that such fear and apprehension has continued after disclosure and/or will continue into the future. 647 F.Supp. at 320-21 (citations omitted).[100]

In the present case, Claimants have ingested and come into contact with foods and other substances contaminated by the nuclear testing program which caused adverse biological change and suffered well documented emotional distress as a result.

Professors Kai Erickson and Robert Lifton, expert witnesses for claimants, concluded this response of the people was well justified:

> The Americans killed every chicken and pig on the island and warned its inhabitants not to eat the local food or drink the local water. They knew then that their bodies and the land they lived on was contaminated in some dark and lasting

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[99]*Sterling v. Veliscol*, 855 F.2d 1188 (CA6 1988), p. 1206.

[100]Ibid, footnote 23, p. 1206.

> way, and they knew, too, that they were forever different as a result. They knew it because they could feel it and see it in themselves. But they also knew it because so many of the people they came into contact with during the emergency and the years to follow treated them as if that were the case.[101]

Defender's expert, Nancy Pollock found similarly:

> I am arguing that the people's fears of contamination and its effects on both human bodies and the land have been exacerbated by all the scientific interest. . . . the vast range of scientific interests has fueled the peoples' fears of contamination. Those fears were cogently expressed to us, and can no longer be passed over. They are as real as the scientific findings of dose rates, medical statistics, or dietary analysis.[102]

Experts for both claimants and the Defender of the Fund determined that the emotional distress suffered by the people of Utrik was consistent with other communities who experienced adverse exposures to radiation. Erikson and Lifton reported their findings "correspond closely to the human reactions recorded in other radiological emergencies such as Hiroshima, Chernobyl, and even Three Mile Island."[103] Sadoff, Fallon and Rosa stated:

> Dr. Rosa has conducted empirical research on perceptions of nuclear risk. His and others' findings indicate that with many groups, nuclear items are some of the most dreaded risks. While his sample does not include the Marshallese people, the dread and anxiety experienced by the Utrikese people would be consistent with other national groups including Americans and Japanese.[104]

Erikson and Lifton went on to note:

> Radiation exposure anywhere, to any group of people from any cultural background, results in a psychological constellation we are calling invisible

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[101]Claimants' Exhibit 14, p. 5.

[102]Defender of the Fund's Exhibit J, Nancy J. Pollock, *UTRIK CLAIM, Position Paper for the Defender of the Fund*, p. 9.

[103]Claimants' Exhibit 14, p.6.

[104]Ibid, p. 8.

> contamination: a profound fear of a bodily poison that is permanent, lethal, and endless in its effects over generations of descendants. To the sense of dread at being subject to annihilation from within is added a sense of guilt as carriers of a poison that could kill one's children or grandchildren – and finally an amorphous but deeply troubling sense of individual and collective defilement.[105]

Consequently, the emotional distress of the people of Utrik resulting from their exposures to radiation from the nuclear testing program was justified and reasonable.

C. Methodology for Calculation of Consequential Damages.

In CLAIMANTS' REPLY TO THE DEFENDER'S OPENING BRIEF ON CONSEQUENTIAL DAMAGES, Appendix A Proposed Valuation of the Consequential Damages Suffered by the People of Utrik (filed December 1, 2005), Claimants propose utilizing the methodology for determination of consequential damages adopted by the Tribunal in both *Enewetak* and *Bikini*. As discussed above, that methodology incorporates an annual determination of damages based upon the population residing on Utrik in each year times a per capita amount of compensation due each person as a result of the damages he or she suffered during that year.

While the mental suffering of the Utrik claimants was significant, it does not rise to the level of the physical suffering experienced by the Enewetak and Bikini peoples during the early periods of their relocations respectively to Ujelang and Rongerik. Consequently, the annual per capita rate of compensation is determined to be the lower rate of $3,000 for each year in question. The Tribunal adopts the annual population numbers offered by claimants in their Proposed Valuation and finds the consequential damages suffered by claimants to be $45,295,500.00.

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[105]Ibid, p. 18.

IV. Conclusion.

The Tribunal has determined the amount of compensation due to the claimants in this case is $307,356,398.91. This includes $257,060,898.91 for the value of past loss of use of Utrik and Taka Atolls as a result of their contamination from the nuclear testing program. It further includes $5,000,000 to restore Utrik to a safe condition. Finally, it includes $45,295,500.00 for the consequential damages resulting from living in a contaminated environment.

ORDER

Based on this decision, it is hereby ORDERED that a hearing shall be set for post-judgment proceedings, including a determination of annual funding pursuant to 42 MIRC 123(17)(b)(iii)(B).

Dated this 15th day of December, 2006 at Majuro, Marshall Islands.

/s/

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JAMES H. PLASMAN
CHAIRMAN

/s/

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GREGORY J. DANZ
MEMBER