



Report Evaluating the Request of the Government of the Republic of the Marshall Islands Presented to the Congress of the United States of America

Regarding Changed Circumstances Arising From U.S. Nuclear Testing in the Marshall Islands Pursuant to Article IX of the Nuclear Claims Settlement
Approved by Congress in Public Law 99-239

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Executive Summary

Background: In 1986, in section 177 of the Compact of Free Association between the United States and the Marshall Islands, the Government of the United States accepted responsibility for compensation owing to citizens of the Marshall Islands for loss or damage to property and person of the citizens of the Marshall Islands resulting from the nuclear testing programs which the United States Government conducted in the Northern Marshall Islands between June 30, 1946 and August 18, 1958, and the two governments agreed to set forth in a separate agreement provisions for the just and adequate settlement of all such claims.

The Compact and the separate agreement (the "Section 177 Settlement Agreement") entered into effect on the same day, October 21, 1986. The two governments agreed that the Section 177 Settlement Agreement, incorporated by reference into the Compact, "constitutes the full settlement of all claims, past, present, and future, of the Government, citizens and nationals of the Marshall Islands which are based upon, arise out of, or are in any way related to the Nuclear Testing Program, and which are against the United States, its agents, employees, contractors and citizens and nationals, and of all claims for equitable or any other relief in connection with such claims including any of those claims which may be pending or which may be filed in any court or other judicial or administrative forum" (Article X (1)).

As part of this full settlement, the two parties agreed that the U.S. would give the Government of the Marshall Islands \$150 million to create a nuclear claims trust fund. The U.S. Government has no role in the Tribunal's decisions regarding the distribution of the trust fund among claimants or in the administration of the trust fund.

Article IX of the Section 177 Settlement Agreement provided that "if loss or damage to property and person of the citizens of the Marshall Islands, resulting from the Nuclear Testing Program, arises or is discovered after the effective date of this Agreement, and such injuries were not and could not reasonably have been identified as of the effective date of this Agreement, and if such injuries render the provisions of this Agreement manifestly inadequate," the RMI may request that the U.S. Government provide for such injuries by submitting such a request to the U.S. Congress. Article IX explicitly states that it is understood that it does not commit the Congress to authorize and appropriate funds.

Citing Article IX of the Section 177 Settlement Agreement, the Republic of the Marshall Islands (RMI) submitted a "Changed Circumstances" request to the United States Congress in September 2000, asserting, and seeking additional compensation and remedies for, injuries and losses to the people of the Marshall Islands arising from the U.S. nuclear testing program at Eniwetok and Bikini atolls from 1946 to 1958.

Through its request, the RMI seeks over \$3 billion in additional compensation and assistance, above and beyond monies provided in the Section 177 Settlement Agreement, to pay for an enhanced national health care system, Tribunal awards for personal injury claims, loss of land use and hardship, and atoll rehabilitation, as well as new money for occupational safety, nuclear stewardship, and nuclear education.

Exposure: The facts regarding radioactive fallout do not support a request under the "changed circumstances" provision of the section 177 settlement agreement. In its request, the RMI asserts that a far wider area of the Marshall Islands than the northerly atolls and islands that are the focus of the section 177

settlement agreement was exposed to dangerous levels of radioactivity. The weight of expert scientific evidence indicates that the present impact of radioactive fallout on the Marshall Islands is limited to the more northerly atolls and islands. Although some islands may never be suitable for communities or food gathering and should remain off limits, most historically inhabited islands in the northern atolls could be resettled under specific conditions. The section 177 settlement agreement recognized that, within the northern atolls, some islands would be more habitable than others. In the section 177 settlement agreement, the Government of the Marshall Islands took responsibility for controlling the use of areas in the Marshall Islands affected by the nuclear program.

Health care: Through its request, the RMI seeks enhanced primary, secondary and tertiary health care systems, integrated with existing RMI health services, to serve the entire RMI population for fifty years. The RMI estimates operating costs at \$45 million a year for those fifty years, not including travel and housing costs, and requests \$50 million to cover estimated capital costs.

As part of the Section 177 Settlement Agreement, \$2 million per year for 15 years was provided from the trust fund to provide medical care to the populations of the four nuclear-affected atolls (Bikini, Enewetak, Rongelap, and Utrik). The Section 177 Health Care Program, originally designed for the people of the four atolls, serves 13,460 enrollees. Funding under the Section 177 Settlement Agreement ended in 2001 in accordance with the terms of that agreement. In addition, Congress mandated in the Compact of Free Association Act of 1985 continued special medical care for the remaining members of the population of Rongelap and Utrik exposed to radiation from the 1954 thermonuclear Bravo test. The U.S. Department of Energy and its predecessors have provided that special medical care continuously for 49 years. In its request, the RMI seeks an enhanced medical care system not limited to the individuals affected by the U.S. testing program. There is no basis for the RMI request for medical care for the entire RMI population under the "changed circumstances" provision of the Section 177 Settlement Agreement.

Furthermore, because the RMI request was submitted in September 2000, it does not take into account the role of the amended Compact of Free Association that took effect on May 1, 2004. Under the amended Compact, RMI Government health sector expenditures will total \$15.9 million in FY 2005 and are estimated to be \$16.5 million in FY 2006, \$16.6 million in FY 2007 and \$16.8 in FY 2008. Under the amended Compact, U.S. funds will cover approximately two-thirds of these expenditures.

Personal Injury Claims: The RMI seeks \$26.9 million to pay personal injury awards already approved by the Nuclear Claims Tribunal (NCT) in excess of the trust fund.

The U.S. Government played no role in establishment of the NCT's award eligibility criteria, which embrace persons and compensable conditions not recognized under U.S. radiation injury compensation programs. Nor has the U.S. Government played any role in fund management or the investment decisions affecting the proceeds generated by the trust fund. The mixed earnings record of the trust fund is not attributable to the U.S. nuclear testing program and does not provide a basis for a funding request under the "changed circumstances" provision of the Section 177 Settlement Agreement.

Loss of Land Use and Hardship: All losses and damage to property arose before the Section 177 Settlement Agreement entered into force. There are no losses or damage to property that "could not reasonably have been identified." The facts regarding loss and damage to property do not support a funding request under the "changed circumstances" provision of the Section 177 Settlement Agreement. The Nuclear Claims Tribunal awarded Enewetak roughly \$244 million for loss of land use and \$30 million for hardship. The Tribunal awarded Bikini approximately \$278 million for loss of land use and \$33 million for hardship. Additional claims are pending for Utrik and Rongelap. In making these awards, the Tribunal exceeded the amount of money provided through the Settlement Agreement for loss or damage to property. The United States played no role in evaluating the Bikini and Enewetak claims or in the Tribunal's judgments on them. Nor, as noted above, has the Government of the United States played any role in fund management or the investment decisions affecting the proceeds generated by the trust fund. The mixed earnings record of the trust fund is not attributable to the U.S. nuclear testing program and does not provide a basis for a funding request under the "changed circumstances" provision of the Section 177 Settlement Agreement.

Atoll Rehabilitation: The Nuclear Claims Tribunal considered strategies estimated to cost from \$217 million to \$1.4 billion for Bikini and a similar range of options for Enewetak. The Tribunal awarded \$251 million to Bikini on March 5, 2001 and \$91 million to Enewetak on April 13, 2000 "to restore [them] to a safe and productive state." In making these awards, the Tribunal exceeded the amount of money provided through the Settlement Agreement. There is no "changed circumstance" on which an additional funding request can legitimately be made under Article IX of the Section 177 Settlement Agreement.

An important element underlying the RMI request is the assertion that the United States Government has adopted stricter standards for domestic nuclear cleanup activities in the United States since the 1986 settlement agreement was reached. The current dose limit used by the U.S. Government to protect the public from all sources of radiation is 1 millisievert (mSv) per year. The sievert is a unit of radiation dose which describes the effectiveness of various types of radiation to produce biological effects. A millisievert is one thousandth of a sievert. The current U.S. dose limit has been used to guide cleanup decisions in the RMI before and after the Compact was enacted. Extensive monitoring of individuals on Marshall Islands atolls where cleanup has been effected indicates actual radiation doses are below 0.15 mSv, the value advocated by the Tribunal. RMI cleanup decisions to date have conferred a degree of protection that exceeds all existing U.S. federal agency guidelines as well as the Tribunal's desired standard.

Occupational Safety, Nuclear Stewardship and Education: In its request, the RMI contends that the Section 177 Settlement Agreement does not include important occupational safety, nuclear stewardship or nuclear education programs. These are all programs that the parties could have chosen to include in the full settlement, but they chose not to. They do not constitute "changed circumstances" on which a funding request can legitimately be made under the Section 177 Settlement Agreement. To the extent the Government of the Republic of the Marshall Islands considers these programs are needed, they should be included in the RMI budget, and they could then be considered by the Joint Economic Management and Financial Accountability Committee for possible coverage under a sector grant under the amended Compact.

Report Evaluating the Request of the Government of the Republic of the Marshall Islands Regarding Changed Circumstances Arising from U.S. Nuclear Testing

1. Legal Framework

The Compact of Free Association (the Compact), together with its related agreements, including the Agreement Between the Government of the United States and the Government of the Marshall Islands for the Implementation of Section 177 of the Compact of Free Association (the Section 177 Settlement Agreement), was signed by the governments of the United States and the Marshall Islands on June 25, 1983. The Compact, including the Section 177 Settlement Agreement which was incorporated by reference, was approved by Joint Resolution of the United States Congress on January 14, 1986 (PL99-239, 99 Stat. 1770), and the Compact and its related agreements took effect between the United States and the Republic of the Marshall Islands on October 21, 1986.

1.1 Section 177 of the Compact

As it relates to the Marshall Islands, Section 177 of the Compact of Free Association dealt with:

"loss or damage to property and person of the citizens of the Marshall Islands, . . . resulting from the nuclear testing program which the Government of the United States conducted in the Northern Marshall Islands between June 30, 1946, and August 18, 1958."

Specifically, Section 177 provided that the Government of the United States and the Government of the Marshall Islands "shall set forth in a separate agreement provisions for the just and adequate settlement of all such claims which have arisen in regard to the Marshall Islands and its citizens and which have not as yet been compensated or which in the future may arise.... This separate agreement shall come into effect simultaneously with this Compact and shall remain in effect in accordance with its own terms."

1.2 The Section 177 Settlement Agreement

1.2.1. Full Settlement of All Claims

Article X Section 1 of the Section 177 Settlement Agreement is entitled "Full Settlement of All Claims" and states:

"This Agreement constitutes the full settlement of all claims, past, present and future, of the Government, citizens and nationals of the Marshall Islands which are based upon, arise out of, or are in any way related to the Nuclear Testing Program, and which are against the United States, its agents, employees, contractors and citizens and nationals, and of all claims for equitable or any other relief in connection with such claims including any of those claims which may be pending or which may be filed in any court or other judicial or administrative forum, including the courts of the Marshall Islands and the courts of the United States and its political subdivisions."

1.2.2 Changed Circumstances

Article IX of the Section 177 Settlement Agreement is entitled "Changed Circumstances" and states:

"If loss or damage to property and person of the citizens of the Marshall Islands, resulting from the Nuclear Testing Program, arises or is discovered after the effective date of this Agreement, and such injuries were not and could not reasonably have been identified as of the effective date of this Agreement, and if such injuries render the provisions of this Agreement manifestly inadequate, the Government of the Marshall Islands may request that the Government of the United States provide for such injuries by submitting such a request to the Congress of the United States for its consideration. It is understood that this Article does not commit the Congress of the United States to authorize and appropriate funds."

Citing this provision of the Section 177 Settlement Agreement, the Government of the Republic of the Marshall Islands submitted a request to the United States Congress in September of 2000.

In March of 2002, Congress transmitted the request of the Republic of the Marshall Islands to the President for evaluation by the appropriate agencies.

This document is the Administration's evaluation of the request submitted by the Government of the Republic of the Marshall Islands and of whether the request contains the elements mutually agreed to in Article IX of the Section 177 Settlement Agreement as being necessary for submission of a request to Congress for its consideration under that Article.

In order to be the subject of a request to Congress under Article IX of the Section 177 Settlement Agreement, an injury:

1. must be loss or damage to property and person of the citizens of the Marshall Islands;
2. must result from the Nuclear Testing Program;
3. must arise or be discovered after the effective date of the Agreement (October 21, 1986);
4. must be injuries that were not and could not reasonably have been identified as of the effective date of the Agreement (October 21, 1986); and
5. such injuries must render the provisions of the Section 177 Settlement Agreement manifestly inadequate.

If these five conditions are met, the Government of the Marshall Islands may request the Government of the United States to provide for such injuries by submitting such a request to the United States Congress for its consideration, in which case the settlement agreement explicitly provides that it "is understood that this Article does not commit the Congress of the United States to authorize and appropriate funds".

1.2.3. Other Elements of the Section 177 Settlement Agreement

Government of the Marshall Islands Responsible for Providing Medical and Health Care:

The Preamble to the Section 177 Settlement Agreement states that the Government of the United States and the Government of the Marshall Islands agree to the terms of the Agreement, inter alia, "[i]n fulfillment of the provisions of Section 177 of the Compact relating to the nuclear testing program" and "[i]n recognition of the authority and responsibility of the Government of the Marshall Islands to provide medical and health care to all of the people of the Marshall Islands".

In Fulfillment of U.S. Government Obligations, \$150 million to the Government of the Marshall Islands to Create An Independent Nuclear Claims Fund:

"In fulfillment" of its obligations under Section 177 of the Compact, the United States Government provided to the Marshall Islands Government \$150,000,000 to create an independent nuclear claims fund, the proceeds from which were to be distributed in accordance with the Section 177 Settlement Agreement.

Distribution for Health, Medical Surveillance, Radiological Monitoring, and for Atoll Claims for Loss or Damage to Property and Person:

Article II, Distribution of Annual Proceeds, requires disbursement to the RMI Government from the proceeds of the Fund fixed amounts for health (\$2 million annually for 15 years), medical surveillance and radiological monitoring (\$1 million annually for the Agreement's first three years); and disbursement to four atoll authorities of the following amounts in payment of claims for loss or damage to property and person: \$75 million for Bikini, \$48.75 million for Enewetak, \$37.5 million for Rongelap and \$22.5 million for Utrik. These disbursements were to be made in 60 quarterly payments over 15 years. Section 8 of this Article obliges the governments of the four atolls, in order to provide long-term means to address the consequences of the nuclear testing program, to establish individual trust funds "with all or a portion" of the proceeds received under Section 177 to "provide a perpetual source of income" for the peoples of the atolls (article II, section 8, sentence 2). The subsidiary agreement empowers the government of each of the four atolls to decide whether these funds should "be distributed, placed in trust or otherwise invested."

The \$30 million (\$2 million annually for 15 years) for health care provided under Article II, Section 1(a) and mentioned in the previous paragraph, was in addition to the amounts provided to the four atolls as their share as constituent governments of the Marshall Islands under Compact sections 216(a)(2), \$1,791,000 annually for nationwide health and medical programs, including referrals, and 221(b), \$10,000,000 annually for education and health care. Article II, section 1(d) provides for a U.S. Department of Agriculture supplemental food program.

Government of the Marshall Islands to Establish a Claims Tribunal:

Article IV of the Section 177 Settlement Agreement requires the Marshall Islands Government to establish a claims tribunal to render final determination upon all claims of the Government and people of the Marshall Islands related to the nuclear testing program and upon all disputes arising from distributions of the nuclear claims fund. Under Article II, Section 6(c), \$45.75 million is to be available "for whole or partial payment" of monetary awards, to be disbursed in annual amounts of up to \$2.25 million during the first 3 years and in annual amounts of up to \$3.25 million during the next 12 years. The overall, net personal injury compensation totaled \$63,127,000 dollars as of December 31, 1997. This represented 1,685 awards to or on behalf of 1,549 individuals.

2. Historical Background

2.1 The U.S. Nuclear Testing Program, 1946-58

The United States carried out sixty-six underwater, surface and atmospheric nuclear tests at Bikini and Enewetak atolls in the northern Marshall Islands between 1946 and 1958, and an additional shot 100 kilometers west of Bikini. The people of Bikini (population at the time 167) and Enewetak (population at the time 145) atolls were relocated to atolls outside the testing area prior to testing.

Among these tests, the world's second hydrogen bomb test, code-named Bravo, was carried out at Bikini Atoll on February 28, 1954. (The first was at Enewetak.) The energy yield of the bomb exceeded predictions, and sudden wind changes sent a cloud of radioactive debris unexpectedly over populated land areas. Consequently, radioactive debris fell on the populations of Rongelap (86 people at the time) and Utrik (167 people at the time) for 2-3 days before these inhabitants were evacuated to Kwajalein Atoll for medical care.

Appendix A provides a complete list of all 67 U.S. nuclear tests conducted in the Marshall Islands.

2.2 Explanation of Atoll Populations

Local atoll governments are responsible for maintaining census records for their respective atolls and qualifying individuals as "persons of the atoll." Criteria for qualification as a "person of the atoll" vary by jurisdiction, but in general relate to traditional and historical factors based on blood lineage, land rights, marriage and extended family.

Below is a comparison of actual populations of the atolls in 1954 and "persons of the atolls" as of June 1996, according to local atoll governments:

1954 1996

Bikini 167 2,191

Enewetak 145 1,561
 Rongelap 86 4,384
 Utrik 167 2,783

Total 565 10,919

2.3 U.S. Compensation and Assistance

U.S. compensation and assistance to the RMI for nuclear testing totaled approximately \$238,273,000 for the people of Bikini atoll; \$146,167,300 for the people of Enewetak atoll; \$93,301,000 for the people of Rongelap atoll; and \$44,190,000 for the people of Utrik atoll.

Among major components of this compensation and assistance:

- The Department of the Interior made nuclear claims compensation payments totaling \$183,750,000 to Bikini, Enewetak, Rongelap and Utrik atolls.
- The Department of Energy and its predecessor agencies have provided radiation-related health care for the Rongelap and Utrik survivors of the 1954 thermonuclear Bravo test, and radiological environmental characterization and monitoring of the four nuclear-affected atolls for fiscal years 1954 - 2002 totaling \$137,395,000.
- The U.S. Congress appropriated \$20,000,000 in fiscal year 1977 military construction funds for the clean-up and rehabilitation of Enewetak atoll and directed the Department of Defense to draw upon other needed resources, without reimbursement for materials, equipment and support forces.

Appendix B provides a detailed accounting of U.S. nuclear testing-related compensation and assistance, including funds from the 177 Settlement Agreement, presented in 2003 dollars.

2.3.1 Bikini

The Congress appropriated \$90,000,000 over a five-year period for the clean-up and resettlement of Bikini, which was added to \$20,000,000 appropriated in 1985. The Congress based its further appropriation on section 103(l) of the Compact Act. Moreover, the Congress designed and intended this appropriation, in the words of the then Ranking Minority Member of the Committee on Energy and Natural Resources, Senator James A. McClure, on the floor of the Senate on September 8, 1988:

...to fulfill both the moral and legal commitment of the U.S. Government to the people of Bikini contained in section 103(l) of the Compact Act... and in article VI of the Compact Section 177 Agreement... and ... to provide for the full and final settlement of all claims arising from the Nuclear Testing Program. ... There are those who may incorrectly argue that this appropriation is made outside of the Section 177 Agreement and therefore Congress did not intend for Section 177 to provide a final settlement. The opposite is true. ... It is intended that these funds will be deposited in the existing resettlement trust fund - of approximately \$20 million - and that the terms of that trust will be modified to provide that the corpus and income from the trust may be used for the rehabilitation and resettlement of Bikini Atoll and that up to \$2 million per year may be used for projects on Kili and Ejit. Following rehabilitation and resettlement, these funds will no longer be available to Kili and Ejit, and any funds remaining in the trust, not identified for future needs, shall be deposited in the U.S. Treasury. It is anticipated that these future needs... will include: first, maintenance of the resettlement infrastructure until the Bikinians are prepared to assume that task; second, training the Bikinians for the operations and maintenance of the infrastructure; ... Once this objective is reasonably met, then all funds in the trust shall revert to the United States. The people of Bikini will then need to rely on other funds, such as the other \$75 million provided pursuant to [the Section 177 Settlement Agreement, article II, section 2], ... In the context of the Section 177 Agreement the Bikinians will have accepted this trust arrangement as full and final discharge of all United States obligations... related to their relocation from Bikini... and no further appropriations will be required in order, finally, to have fulfilled the United States commitments to the Bikini people, except as provided under article IX of the Section 177 Agreement.

From the inception of Congressional funding of the separate Resettlement Trust Fund for the People of Bikini, the U.S. Government has had as its full-fledged partner the people and local government of Bikini. As the then- Chairman of the Committee on Energy and Natural Resources, the Honorable J. Bennett Johnston, said on the floor of the Senate on September 8, 1988:

The work of the Bikini Atoll Rehabilitation Committee (BARC)... provided the information needed to quantify the obligation of the United States Government to clean up and resettle Bikini. It was from the BARC information that this \$90 million appropriation was developed. ... [L]anguage was specifically included in the statute to rebut any indication that enactment of the Compact did not constitute a full and final settlement and a complete and absolute bar to either continued or further litigation. The analysis... set forth in the record at the time of passage is clear: ... '[A]dditional ex gratia ' - and I want to emphasize the words ' ex gratia ' - 'assistance will be available in the future if circumstances warrant and this provision in no manner lessens the concern which we have for the population of the affected atolls.' ... These funds are provided to the Bikinians so that they, and not the United States Government, will be responsible for the management and the decisions involved in returning to their homeland. ... It is the responsibility of the people of Bikini to... expend these funds so that they meet the objectives of rehabilitation and resettlement and provide for limited future needs. ... All decisions and responsibilities for rehabilitation and resettlement of Bikini rest with the people of Bikini.

While having a limited, on-island presence in their home atoll -- about 25 persons -- principally connected with a commercial dive program owned by the atoll government, most Bikinians live in Majuro Atoll, including Ejit Island (about 1,000), or elsewhere in the Marshall Islands (about 1,100), principally Ebeye and Kili Islands and Lae Atoll.

A September 1996 International Atomic Energy Agency report on radiological conditions at Bikini concluded that:

- (1) Bikini Island should not be permanently resettled under the present radiological conditions without remedial measures if inhabitants were going to eat entirely locally produced foodstuffs;
- (2) the diet of the peoples of the Marshall Islands, including the people of Bikini, contained and would continue to contain a substantial proportion of radionuclide-free, imported food;
- (3) provided certain remedial measures were taken, especially continued potassium fertilization, Bikini Island could be permanently reinhabited; and
- (4) should such remedial steps be taken, radiation doses for people living on Bikini Island would be acceptable in terms of international standards and their health would be adequately protected against radiation exposure due to the atoll's residual radioactive materials.

2.3.2 Enewetak

This atoll was the site of forty-three of the sixty-seven nuclear tests conducted by the U.S. Government in the northern Marshall Islands from 1946 to 1958. Five islands were partially or completely destroyed; the remaining islands in the atoll's northern half, including Enjebi and Runit, were contaminated by radioactivity. The atoll's southern islands of Enewetak and Medren were mostly covered by concrete and asphalt as they were used for various facilities required by the nuclear testing program. As a result, the entire atoll was devastated and nearly all vegetation destroyed.

In order to permit the people of Enewetak to begin their return home, from 1977 to 1980, the U.S. Government undertook a resettlement program which included clean-up of some affected islands and revegetation. Radiation-contaminated soil from this clean-up was placed in a nuclear test-created crater on the north of Runit Island and the crater was capped by a concrete dome.

Section 103(k) of the Compact Act and the subsidiary agreement implementing it established an ex gratia trust fund for the Enewetak community from Enjebi and credited to the fund the amount of \$7,500,000, which the U.S. Government transferred to the Marshall Islands Government. Under article I, section 4, of this subsidiary agreement, if the people of Enewetak from Enjebi resettle their island by October 21, 2011, the people will receive from the fund such amounts as will be necessary to re-establish their community and to replant their island appropriately. However, under section 5, if they do not resettle by this date, then the fund manager will distribute the fund to the people for their resettlement at some other location. Whichever route the people of Enewetak from Enjebi take, prior to and during the distribution of the fund's corpus, they may receive at least quarterly the interest earned by the fund (section 6).

The Enewetak resettlement program has included revegetating portions of the atoll. Crops of coconut, pandanus, breadfruit, taro, bananas and lime have been planted since 1979. The planting continues as a part of the Department of the Interior-funded Enewetak Food and Agriculture Program, the funding level of which has been approximately \$1,091,000 annually since fiscal year 1986. Due to a growing population, the crops are not the only food source for the people of Enewetak; they also import food. The situation is exacerbated by having less than one-third of the atoll's land useable for food production. For as long as the people of Enewetak need substantial amounts of off-island food, as recommended by the U.S. Department of Energy-Lawrence Livermore Laboratory's environmental assessment program, there will be a need for some supplemental support in this area, such as that provided by the United States Department of Agriculture's food program, and the Department of the Interior-funded agricultural program. This need will remain constant even if local food production increases significantly above current levels.

2.3.3 Rongelap

In 1994, the National Research Council issued its report on "Radiological Assessments for the Resettlement of Rongelap in the Republic of the Marshall Islands." On the basis of its review, the committee made the following recommendations:

- (1) a local-food-only diet [should be] limited to food gathered on the southern islands of Rongelap Atoll.
- (2) the returning population [should] restrict the quantities of some local foods in their diet. A modest supplementary food program would help the returning Rongelap people to obtain the necessary quantities of imported food.
- (3) the upper layer of soil [should be removed] from the village and on each houseplot [and] ...a layer of crushed coral [added] around the houses and to common areas of congregation throughout the village.
- (4) the application of potassium chloride as fertilizer, and for remediation of agricultural areas.

A \$45 million agreement to assist the people of Rongelap with resettlement was signed on September 19, 1996. After years of studies and negotiations involving the Departments of the Interior and Energy, independent scientists, Congressional committees and representatives of the Rongelap people, the Congress set forth the general parameters for a final settlement in section 118(d) of Public Law 104-134 (April 26, 1996). In August 1996, after nearly three years of negotiations with Rongelap Atoll Local Government representatives, the Department of the Interior reached a settlement that the September 1996 agreement embodies. The agreement's terms constitute, in accordance with section 118(d) of Public Law 104-134, "a full and final settlement of all obligations of the United States to assist in the resettlement of Rongelap Atoll" pursuant to section 103(i) of the Compact Act. The agreement requires the building of sufficient homes after construction of dock, water, electric, school, and local government facilities; property will be surveyed, and cemeteries located.

The agreement provided \$39,740,000 for the resettlement of Rongelap Island, the fund then having \$18,127,000 available. The balance of \$19,530,000 was provided by the Department of the Interior through a reprogramming of surplus appropriations authorized by the Congress. The remaining amount, \$1,983,000, was included in the fiscal year 1997 Department of the Interior appropriations. The balance of the settlement funding was derived from interest earnings on the trust fund. The agreement further provided that \$8,000,000 be available as grants from the Department of the Interior and that the balance be placed in the trust fund.

Of the approximately 86 persons on Rongelap Island and surrounding islands in 1954, forty-five were still alive in September 2002. Compared to the people of Enewetak and Utrik, the people of Rongelap are less likely to live in their home islands, with about 800 Rongelapese in Majuro Atoll and 1400 on islands in Kwajalein Atoll. However, the people and government of Rongelap have expressed their commitment to rehabilitate and resettle their home island. On June 25, 1998, Rongelap Atoll Local Government and its contractor, Pacific International, Inc., signed a master contract for Phase I of Rongelap Island's resettlement. Phase I includes establishment of a base camp, the construction of essential infrastructure and completion of the remediation recommendations of the independent scientific management team.

Substantial progress has been made, including construction of: a paved runway and terminal building; expanded dock, dock apron and warehouses; desalination plant, with water now available throughout the island; buildings to house a whole body counter (to detect internal deposition of cesium-137), bio-assay monitoring equipment and a dispensary, which are now operating; barracks to house twenty resident contract workers and guest quarters being used to support a nascent ecotourism industry; a sewage treatment facility that is now operating; and a community center and town hall. The village church has been rehabilitated and potassium treatment remediation for agricultural areas has been instituted. The road system is being expanded with additional roads being paved, which further prevents plutonium contamination.

2.3.4 Utrik

The 167 residents of Utrik were evacuated in 1954 to Kwajalein for medical examinations and surveillance at the U.S. military hospital there. Within months, they were returned to Utrik. The people of Utrik today number around 2,783, of whom about 1,200 live in Utrik Atoll. Of the remaining 1,800, approximately 1,250 live in Majuro Atoll and 450 on Ebeye Island. About 100 Utrikese live in Honolulu or the mainland United States.

The Compact Act did not include an authorization for resettlement for the people of Utrik. Other than monitoring of environmental conditions on their islands, the people of Utrik have the least significant rehabilitation problems and have achieved the highest level of resettlement among the four nuclear-affected atolls.

1. The Nuclear Claims Fund

In fulfillment of its obligations under Section 177 of the Compact, the United States Government provided to the Government of the Marshall Islands \$150,000,000 to create an independent nuclear claims fund, the proceeds from which were to be distributed in accordance with the Section 177 Settlement Agreement. Section 177 Settlement Agreement provisions governing distributions from the fund are described in section 1.2 above.

2.3.6 The Nuclear Claims Tribunal

The Section 177 Settlement Agreement mandated establishment of the RMI Nuclear Claims Tribunal (NCT). The RMI parliament created the NCT in 1988. The NCT has jurisdiction "to render final determination upon all claims past, present and future" related to the US nuclear testing program (177 Settlement Agreement, Article IV, section 1(a)). The NCT consists of three judges, including the Chairperson, a Defender of the Fund, a Public Advocate and eleven other staff members.

The United States has played no role in evaluating claims presented to the NCT, nor in the Tribunal's judgments on them. The 177 Settlement Agreement provided a lump sum settlement of \$150 million. Beyond the broad divisions by Atoll, it did not specify how the Tribunal was to divide the proceeds it received among individual claimants. The Section 177 Agreement provides only that "[i]n determining any legal issue, the Claims Tribunal may have reference to the laws of the Marshall Islands, including traditional law, to international law and, in the absence of domestic or international law, to the laws of the United States."

The NCT has somewhat patterned its approach to personal injury claims after similar U.S. statutory programs for U.S. civilian and military personnel deemed harmed by the U.S. testing program. For example, the NCT awards compensation from \$125,000 for leukemia, ovarian cancer, etc., to \$12,500 for benign tumors. In the United States, there are three programs that compensate persons affected by radiation produced by the government during nuclear testing or weapons production. For example, "Downwinders" in the United States with leukemia received \$50,000 from the Department of Justice, while U.S. onsite participants who observed weapons tests received \$75,000 for leukemia.

Although the scientific community has thus far not proven transference of nuclear effects to the second generation in humans, the NCT provides biological children of a mother who was physically present at the time of the testing 50% of amounts offered first generation claimants.

Although the Section 177 Settlement Agreement and scientific data recognize the four populated northern atolls as having been affected by the testing program, the settlement agreement and the scientific data do not support such a finding for the mid atolls or other areas of the Marshall Islands. Nevertheless, the NCT awards damages to persons from throughout the Marshall Islands.

Appendices C and D provide an overview of the criteria and award amounts in RMI and U.S. radiation compensation programs.

3. Exposure of Marshallese to ionizing radiation and the health effects: The state of scientific knowledge

3.1.1 Extent of radioactive contamination across the northern atolls and islands in 1978

From July through November 1978, Tipton and Meibaum, under a U.S. Government contract, conducted an aerial radiological survey of eleven atolls and two islands within the northern Marshall Islands. Contamination from all tests, measured from the level of radioactive cesium-137 in the soil on parts of Bikini, northern Rongelap, Rongerik, Ailinginae and Utrik Atolls were consistent with what might be expected from the Bravo fallout pattern. Contamination levels on Ailuk, Likiep, Watho and Ujelang Atolls and at Mejit and Jemo islands were consistent with cesium-137 activity, due to worldwide fallout, observed within the United States and at other locations in the central Pacific including Majuro, Ponape, Truk, Palau, and Guam. These latter four atolls and two islands, therefore,

did not appear to have received any significant direct contamination from the Bravo event or the other tests conducted at Bikini and Enewetak Atolls.

3.1.2 The Nationwide Radiological Survey

The Nationwide Radiological Survey (NWRS) of the Marshall Islands, completed in 1994, is the only comprehensive radiological study of the RMI. It includes a detailed analysis of 432 of the RMI's approximately 1,200 islands. In addition to the NWRS and Tipton-Meibaum studies, other radiological examinations of the Marshall Islands include, for the past twenty years under a congressionally mandated environmental monitoring program, periodic detailed assessments of the four nuclear-affected atolls performed by the U.S. Department of Energy.

The Government of the RMI commissioned the NWRS, with funding provided by the U.S. Department of the Interior under the Compact of Free Association. The RMI Government also appointed an international scientific advisory panel to provide guidance to NWRS investigators, monitor the integrity of their work, and advise the RMI Government on the conduct and results of the survey. The NWRS survey team established a radiological laboratory in Majuro to support their study.

The NWRS mission was fourfold:

- to map the geographic extent of radioactivity throughout RMI;
- to assess radiological conditions on Bikini, Enewetak, Rongelap, and Utrik atolls;
- to advise on the risks associated with radiation exposure;
- to educate the Marshallese public about any residual presence and possible risks of nuclear testing-related radiation.

NWRS assessments proceeded from the following:

- The most significant long-term source of environmental radioactivity is radioactive cesium located in the top 12 inches of soil and ingested by consuming local food crops that take up the cesium from the soil.
- Radioactive cesium becomes non-radioactive over time. By 2002, more than 70 percent of the amount originally deposited as a result of nuclear testing was no longer radioactive.

The NWRS examined surface soil for plutonium and similar substances that could still be harmful if ingested or inhaled in sufficient quantity. In order to estimate the amount of radiation to which different groups of potentially affected Marshallese may have been exposed, the NWRS carefully examined and factored into its assessments the housing, work, and diet attributes of different groups of Marshallese throughout the potentially affected area, as well as how these attributes may have changed over time.

With this information, the NWRS was able to estimate total exposure from the end of the U.S. nuclear testing program in 1958 through 1994 and an annual dose for 1994. The NWRS report provided estimates for the annual dose at each location along with natural background and global fallout levels.

The NWRS calculated total dose from external and internal sources of whole body exposure to radioactive cesium and summed these to estimate the total dose that could be received in a year. The dose is expressed in sieverts (Sv), a unit which accounts for the effectiveness of various types of radiation to produce biological effects. The Sv replaced the more familiar rem unit and is 100 times larger, meaning that 1 Sv equals 100 rem. A whole body dose below 1 mSv (one thousandth of a Sv or 100 mrem) per year was used to identify islands suitable for resettled communities or for food gathering. Where the total dose exceeded 1 mSv per year above natural background levels, environmental cleanup or protective agricultural practices would be required to make these areas habitable or suitable for food gathering.

NWRS dose estimates need to be considered in the context of all sources of radiation in the environment. The total environmental radiation in the Marshall Islands is the sum of local nuclear fallout, natural background radiation, manmade sources, and global nuclear fallout. The natural background annual radiation dose in the northern Marshall Islands is about 2.4 mSv, of which 2 mSv is from eating fish. (In comparison, the U.S. average annual dose is about 3.0 mSv, of which 2 mSv per year is from radon. Radon is virtually absent in atoll environments.)

NWRS estimated that the range of the total annual dose from worldwide nuclear fallout in the Marshall Islands is 0.01-0.05 mSv. The NWRS summary report Figure 9 (below) shows the annual exposure level for each surveyed location against the natural background dose and global fallout dose. In Figure 9, the estimated annual dose is based on a traditional Marshallese diet comprising 75% local foods and 25% rice. The total dose could be much lower in many locations if the community adhered to a contemporary diet that included no more than 20% local foods.

Conclusions of the NWRS Survey

NWRS concluded that the level of fallout radioactivity increases with increasing latitude. In the RMI's southernmost atolls and islands, from 4 to 9 degrees N, just south of Kwajalein Atoll, fallout levels were nearly constant and about the same as fallout from global nuclear weapons testing. Relatively little fallout radioactivity reached as far south as Kwajalein Atoll. From 9 to 10.5 degrees N, the mid-level atolls, the NWRS determined that the residual radioactivity does "not pose any measurable health hazard." Mid-level atolls are: Ailuk, Jemo, Kwajalein, Likiep, Mejit, Ujelang, Wotho, and Wotje. North of the mid-level atolls, the levels of radioactivity increased rapidly to the latitude of Bikini Atoll. The northernmost atolls are: Bikini, Ailinginae, Enewetak, Rongelap, Rongerik, and Utrik. NWRS concluded that some of the islands on Bikini, Enewetak and Rongelap Atolls would require limited remediation to support a traditional Marshallese lifestyle.

NWRS conducted a special, Department of the Interior-funded study of Rongelap to validate the recommended remedial actions needed for resettlement and to support a traditional lifestyle on contaminated atolls and islands. In 1994, independent Rongelap Island assessments were reported by NWRS, U.S. National Research Council, DOE Lawrence Livermore National Laboratory, and an independent advisor from the United Kingdom. All of the independent assessments stressed the importance of minimizing radiation exposures and damage to the environment. All agreed that limited soil removal and potassium fertilization were appropriate measures to minimize damage to the environment.

Although, as noted above, a traditional Marshallese diet consists of 75% local foods and 25% imported rice and a contemporary diet includes no more than 20% local foods, scientific advisors to the Nuclear Claims Tribunal have urged adoption of radiation dose limits based on a diet of 100% local foods and a high caloric intake. All Rongelap assessors agreed that it was unlikely people would revert to a traditional diet. Traditional foods were, at the time of the survey, about 20% of the typical diet. This is due in part to the availability of commodities provided by the U.S. Department of Agriculture.

NWRS measurements of fallout radioactivity are in close agreement with U.S. Department of Energy estimates above 1 micro Roentgen per hour. The Roentgen is a unit of radiation exposure in air, as opposed to exposure in body tissues, and is reported for specific intervals in time. A micro Roentgen is one millionth of a Roentgen. Below 1 micro Roentgen per hour, the DOE estimates were generally higher than NWRS estimates.

The U.S. Departments of State and Energy, in 1999 testimony before the House Resources Committee, affirmed the suitability of Bikini, Enewetak, Rongelap, and Utrik islands for resettlement under the specific conditions recommended by NWRS. The U.S. National Academy of Sciences affirmed that conclusion for Rongelap, as did the International Atomic Energy Agency for Bikini.

The NWRS Scientific Advisory Panel in 1994 concluded that the study had been comprehensive, sound and successful. The panelists stated that then-current levels of radioactive contamination of the territory of the Marshall Islands "pose no risk of adverse health effects to the present generation of Marshallese", and assessed "the risk of hereditary diseases to the future generations of Marshallese to be no greater than the background risk of such diseases characteristic of any human population." The panelists acknowledged that remedial actions would be required for specific atolls and islands if they were to be inhabited or used for food gathering.

In Resolution 151, the RMI Legislature, the Nitijela, formally declared that the RMI Government "does not accept" the NWRS findings as "valid or accurate" on the stated grounds (among others) of incompleteness, lack of credibility of some of the report's authors, and disagreement with the NWRS conclusions. The NWRS Scientific Advisory Panel responded to Resolution 151 in a Letter to the Editor of the Marshall Islands Journal defending NWRS as comprehensive and scientifically sound.

The NWRS findings are reported in a scientifically peer-reviewed article in Health Physics (July 1997), the official journal of the Health Physics Society, and the full report has been available on the internet for many years. The Executive Summary of the NWRS Report is reprinted in Appendix E.

3.1.3 Exposure to radioactive iodine

In addition to assessing the health effects of radioactive cesium, it is also important to consider the acute, short-term impact of radioactive iodine on the thyroid gland of people present on specific atolls and islands at particular times. For this reason, the NWRS was supplemented with a specific thyroid disease study that is discussed in section 3.2 below. However, it is not necessary to consider the impact of radioactive iodine in order to reach conclusions about the habitability of specific RMI locations or their suitability for food gathering because virtually all of the radioactive iodines convert to a non radioactive form, disappearing naturally within a few days to weeks.

3.1.4 Exposure to radioactive "tracer" materials

RMI officials have expressed concern that materials included in weapons tests to evaluate yields and physical processes in the devices, so-called tracer materials, pose a health risk. Information about tracers and their fate was not available to the NWRS. In 2001, the Lawrence Livermore National Laboratory completed an analysis of possible toxic chemical levels associated with U.S. weapons tests. The analysis found that none of the radioactive or toxic chemicals, including thallium, were introduced into the atoll environment in amounts large enough to pose any public health risk.

3.1.5 Contemporary observations on actual exposures

In support of planned resettlement by the Rongelap community and at the request of Enewetak's and Utrik's resettled communities, the U.S. Department of Energy has for decades been analyzing the urine of construction and agricultural workers exposed to plutonium in soil dust and of island residents exposed to radioactive cesium by ingesting locally grown foods. In recent years, Marshallese technicians trained at the Lawrence Livermore National Laboratory have been performing radioactive cesium monitoring using non invasive DOE-provided whole body counting equipment installed at Enewetak and Rongelap islands and, beginning in July 2003, the RMI capital of Majuro. Plutonium bioassay measurements performed by Lawrence Livermore are based on the most accurate, costly, and advanced mass spectrometry accelerator technology, enabling detection of levels far below those possible using methods commercially available.

The annual observed dose for plutonium and cesium combined is less than 0.1 mSv (0.001 mrem). This dose level is less than the 15 mSv per year (0.15 mrem) NCT standard. Urine test results to date show that the estimated 70-year cumulative dose, the lifetime dose, from plutonium is less than 0.1 mSv (10 mrem), and the vast majority of the cesium doses are less than .01 mSv (1 mrem) per year. When measurements of radioactive cesium exceeded 1 mrem, it generally was attributable to individual food-gathering practices on the more northerly, uninhabited nuclear-contaminated islands.

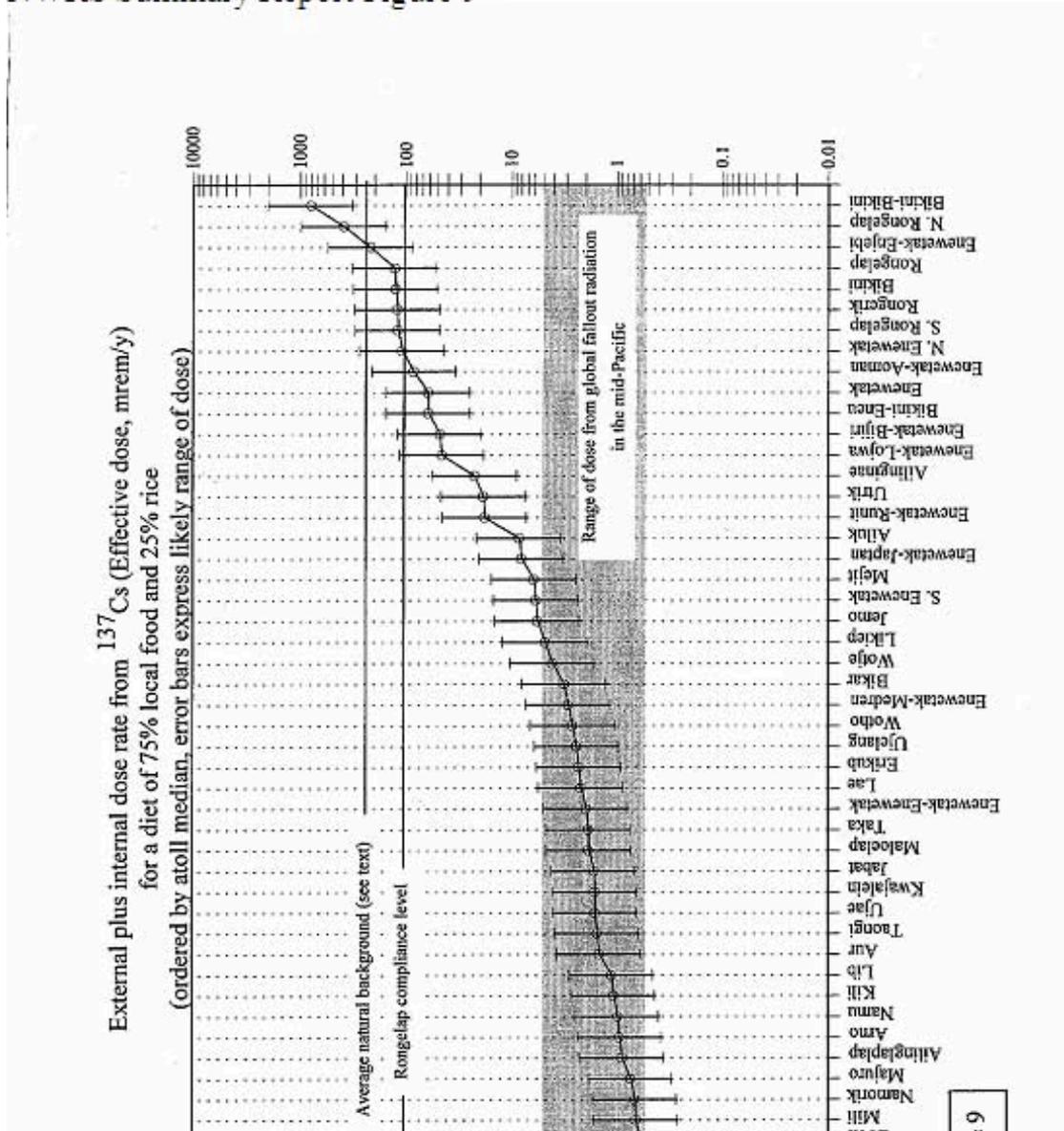
All of the DOE/Lawrence Livermore cesium and plutonium test results are routinely provided to the tested individuals and (on a de-identified basis) to the RMI and Enewetak and Rongelap local government communities. The data are also publicly available (on a de-identified basis to protect individual privacy) on Lawrence Livermore National Laboratory's website (<http://en-env.llnl.gov/mi/>).

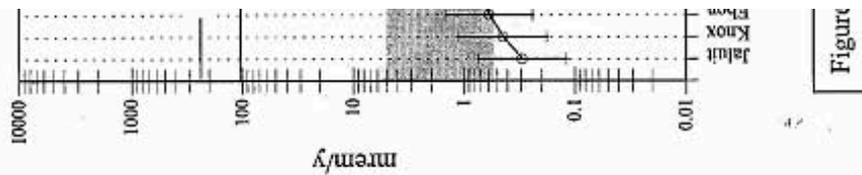
3.2 Marshall Islanders and thyroid cancer

The fallout of radioactive iodine resulted in acute exposure of people residing on Rongelap and Utrik at the time of the February 28, 1954, test designated Castle Bravo. Fallout occurred over a matter of hours; all exposed individuals were relocated within 48 hours after the test, and almost all of the radioactive materials were nonradioactive within 2 months. The effects of the thyroid exposure on affected individuals appears to have peaked in the 1970s. Recently, a group of scientists who conducted the Marshall Islands thyroid disease study (MITDS) as an outgrowth of NWRS reported on their observations from 1991 through 2000. In general, Marshallese have low rates for problems of the thyroid gland other than cancer.

NWRS Summary Report Figure 9 [below]:

NWRS Summary Report Figure 9





MITDS physicians examined about 7,200 Marshallese and found 68 thyroid cancers. These were distributed among three groups of people: those alive at the time of the thermonuclear Bravo test, those born after Bravo but before the 1958 end of the U.S. nuclear testing program, and those born after weapons tests ended. Overall, the proportion of thyroid cancers in each age group increased with age, as expected. Among those alive at the time of Bravo the rate was 1.5%; among people born after Bravo but before the end of testing the rate was 0.6%; and the rate was 0.5% for people born after testing. This indicated that the natural rate of thyroid cancer was about 0.5%. Those alive at the time of Bravo had a rate three times larger than the normal Marshallese rate.

Given the higher rate among those alive at the time of Bravo, the scientists wanted to know if the rates depended on where people lived relative to Bikini Atoll. If there were a clear decline in the cancer rate with distance from Bikini, then it could be used as evidence that fallout from Bravo was the reason. If there were no clear decline with distance, then there may be other factors common to the Marshallese that might explain the high thyroid cancer rate. The distance analysis included about 3,500 people. The thyroid cancer rate was not clearly associated with distance from Bikini. The MITDS group proposed to continue the study with medical examination of the people born between 1950 to 1958 (born after Bravo but before the end of testing) every two years.

3.3 The Health Effects of Ionizing Radiation

The RMI contends that the risk from exposure to one unit of low-level ionizing radiation continuously over a lifetime to the entire body was assessed to be nine times greater in 1989 than the radiation protection community assessed it to be in 1972. They also suggest that the original average dose estimates may have been too low by one half. Therefore, the RMI asserts, the harm would be much greater than thought when the Compact was signed. The RMI bases its underestimation claim on major changes in the lifetime risk estimate for a unit of ionizing radiation, and the "incremental" changes seen in radiation protection standards over time.

The RMI attributes the "major changes in lifetime risk estimates" to the National Research Council, Committee on the Biological Effects of Ionizing Radiation (BEIR V) report in 1990. This report was preceded by BEIR I and BEIR III in 1972 and 1980, respectively. The RMI cites a U.S. Department of Energy publication "Closing the Circle on the Splitting of the Atom" that contained a table portraying the evolution of health protection standards for nuclear workers with an entry for 1990: "The National Academy of Sciences BEIR V report asserts that radiation is almost nine times as damaging as estimated in BEIR I." The BEIR V report does not make any such statement.

Estimates are an expression of complex mathematical models used to explain observed facts, and these models are continuously refined. For example, today scientists would not use the model thought best in 1972. There have been major changes in thinking about biology and the mathematical models used to mirror the observations in radiation-exposed people. Therefore, the estimated lifetime risk from a given amount of ionizing radiation has changed. BEIR V analysts concluded that their new estimate would actually represent about a two-fold to four-fold increase since the 1980 BEIR III report. BEIR III analysts estimated that the risk in 1980 was about half the 1972 estimate. There are neither published data nor official comments to support the RMI assertion of a nine-fold change in risk from BEIR I to BEIR V. BEIR V estimates are about three-fold increase of cancer other than leukemia and perhaps four-fold for leukemia compared with BEIR III.

The RMI also asserts that the large decline in the public protection standard for ionizing radiation, occurring over the 30-year period since BEIR I, is an indicator of growing knowledge of the greatly increased danger of ionizing radiation. The decline in the standard has been from 5 mSv to 1 mSv per year rather than from 5 mSv to 0.15 mSv as given by RMI, and the decrease from 1.7 mSv (used to guide cleanup in the Marshall Islands) to 1 mSv is 40%. The RMI compares public protection standards to proposed 1994 EPA cleanup guidelines for sites formerly used for nuclear research and development. This comparison is inappropriate and yields an incorrect calculation of the magnitude of change in standards and the risk of exposure to ionizing radiation.

RMI has asked whether the true external whole body dose to Marshallese was twice what was thought due to "flaws in the dose estimation done by the Department of Energy." Although it is impossible ever to know the true external whole body doses to individuals, average doses can be estimated retrospectively with a reasonably high degree of confidence. The following table compares estimates made by independent experts of external dose for Marshallese exposed to Bravo test fallout, with emphasis on Rongelap.

Table 1. Comparison of Whole-Body Dose (rad) from BRAVO fallout by various reports and investigators.

	Sondhaus and Bond (1955)	Breslin and Cassidy (1955)	JCAE (1957)	Peterson (1981)	Lessard et al. (1985)	Behling et al. (2000)
Location						
Rongelap	175	180 R	170	110	190	410
Alinginae	69	60 R	75	24	110	215

The estimates by Breslin and Cassidy are either in roentgen (R) or dose to air (r); estimates in whole body dose (rad) would be approximately 0.88 times the reported values.

Behling and his co-authors estimated an average dose about twice that of the other investigators. This is the basis for the RMI's question as to whether or not external doses could be twice those previously reported. In his 2000 report, Behling started with the estimates made by Sondhaus and Bond in 1955, and increased them by making new assumptions about types of radioactivity, durations of exposure, and people's location relative to fallout. Estimates of average external dose by various investigators for the Rongelap population were in the range of 170 to 190 rad with the exception of Peterson who estimated 110 rad, Breslin and Cassidy that can be interpreted to be about 130 rad, and Behling et al. who estimated 410 rad (4.1 Gy). The weight of expert opinion remains in favor of an average external dose about one half those estimated by Behling.

4. Summary of the Request from the Republic of the Marshall Islands

In its "changed circumstances" request, the RMI seeks the following:

Personal Injury Claims	
1. Funds to meet unpaid claims already approved by the Nuclear Claims Tribunal in excess of the amounts provided for this purpose	\$26.9 million

through the trust fund	
Medical	
2. \$50 million capital for infrastructure and \$45 million per year for 50 years for a "section 177 health program" for those exposed to radiation AND awardees of personal injury claims.	\$2,300.0 million
Property -- Loss of Use	
3. Enewetak award already decided by the NCT for loss of use (\$244 million) and hardship (\$33,814,500), plus interest at 7%.	\$277.8 million
4. Bikini atoll award already decided by the NCT for loss of use (\$278 million) and hardship (\$33,814,500) plus interest at 7%.	\$311.8Million
5. Utrik atoll claim in preparation.	
6. Rongelap/Rongerik atoll claim under review by NCT.	
Property – Rehabilitation	
7. Enewetak award already decided by the NCT for rehabilitation above the \$10 million trust fund already provided (plus interest at 7%).	\$107.8 million
8. Bikini atoll application pending before the NCT.	\$251.5 million
9. Utrik atoll claim in preparation.	
10. Rongelap/Rongerik atoll claim in preparation.	>\$100 million
Occupational Safety	
11. Request a program for workers involved in remediation/cleanup projects.	
Medical Surveillance/Monitoring	
12. Request a radiation exposure monitoring and surveillance program for at least 50 years for the entire RMI.	
Community Education and Development	
13. Requests a program to educate RMI citizens in radiation-related fields and build capacity to undertake research about the "consequences of the U.S. nuclear testing program."	
Nuclear Stewardship	
14. Requests a program for communities to safely contain radiation near waste storage areas.	

5. Health Care

Health care services for the Marshall Islands population include:

-- The RMI Ministry of Health provides health care for the general Marshallese population of approximately 55,000 through two major hospitals and 58 dispensaries serving the outer atolls. The RMI spends approximately 33% of its annual health care budget on off-island medical referrals. The RMI's per capita health expenditure is USD \$147 a year.

-- The Section 177 Health Care Program, mandated by Congress to provide health care for the people of the atolls of Bikini, Enewetak, Rongelap, and Utrik affected by consequences of the nuclear testing program, their descendants and others identified as having been so affected, currently serves 13,460 enrollees. The per capita annual expenditure is about USD \$65.

-- The Department of Energy's Special Medical Program was mandated by Congress in 1954 to provide medical surveillance and care for radiation-related illnesses among the people of Rongelap and Utrik atolls exposed to fallout from nuclear test Bravo in 1954. DOE patients are also in the more limited 177 Health Care Program. In FY02, the per patient annual health expenditure was USD \$12,000.

Through its "changed circumstances" request, the RMI now seeks U.S.-standard primary, secondary and tertiary health care systems, integrated with existing RMI health services, to serve the entire RMI population for fifty years. The RMI estimates operating costs at \$43,102,644 a year, not including travel and housing costs. This equals approximately \$780 per Marshallese per year. In addition, the RMI requests \$50,000,000 to cover estimated capital costs.

The RMI request does not address the role of the amended Compact of Free Association in which support for the RMI health sector is designated a high priority for use of U.S. assistance. RMI Government health sector expenditures, which are heavily subsidized by the health sector grant under the amended Compact, will total \$15.9 million in FY 2005 and are estimated to be \$16.5 million in FY 2006, \$16.6 million in FY 2007 and \$16.8 million in FY 2008.

5.1 The Republic of the Marshall Islands Health Sector

The World Health Organization provides the following health indicators for the Marshall Islands in 2000. For comparison, corresponding indicators are provided for the Federated States of Micronesia, also a U.S. freely associated state; Samoa, another Pacific island country with approximately the RMI'S level of per capita income; and the United States.

	RMI	FSM	Samoa	U.S.
Life expectancy at birth (years)				
Total population	62.7	66.5	68.2	77.3
Males	61.1	64.9	66.8	74.6
Females	64.6	68.1	69.7	79.8
Child mortality (per 1000) (probability of dying under age five)				
Males	48	63	27	9
Females	37	51	21	7
Adult mortality (per 1000) (probability of dying between 15 and 59)				
Males	340	211	235	140
Females	286	176	203	83
Life expectancy lost due to poor health (%)				
Males	11.7	12.2	11.3	9.9
Females	13.8	14.2	13.5	10.7
Health Expenditure				
Total as % of GDP	9.8	7.8	5.8	13.9
Per capita (US\$)	190	172	74	4887

The RMI health care system is administered and subsidized by the Marshallese Government through the Ministry of Health. The Minister of Health is an elected member of the Nitijela or RMI parliament. Within the Ministry, the Secretary of Health oversees the day-to-day operations of four major departments: Primary Health Care, Kwajalein Atoll Health Care, Majuro Hospital, and Administration and Finance.

RMI has two major hospitals, located in the major urban centers of Majuro and Ebeye. Built in 1986, the Majuro Hospital has 103 inpatient beds, an emergency room, and a dental clinic. The structure itself is largely constructed with specially coated cardboard paneling. The Ministry of Health believes the hospital's functional life will soon end and would like to replace it as soon as possible. A new Ebeye Hospital opened in 2002, to replace the 25-inpatient bed facility that was in serious disrepair.

The outer island atolls are served by 58 dispensaries. Currently, each is run by a health assistant, who usually is high school educated with basic health training. These dispensaries are linked to Majuro Hospital by short-wave radio. Patients who cannot be treated locally on the outer island atolls are referred to the Ebeye or Majuro hospital. Those who cannot be treated there are referred for treatment overseas in Honolulu or the Philippines. Some also are sent to the USAKA hospital on Kwajalein. The RMI spends approximately 33% of its annual health budget on off-island medical referrals.

Funding for Ministry of Health operations comes from Compact money, the RMI Government's general fund, U.S. funds for primary health care and public health, and other grants. User fees are charged for health services, but the fee is nominal, \$5 per visit for outpatient services, and \$5 per day for inpatients. These user fees generate approximately 1% of the RMI's health budget.

The RMI's universal health care system (the Marshall Islands Health Plan) is a social security type system that insures and provides for every Marshallese resident. The Social Security Act of 1990 required employees to contribute 8.5% of their salary, with 3.5% going to the health insurance fund and 5% to a retirement fund. The Act required employers to match these contributions. These rates later were increased to 9.5%, with 2.5% going to the health fund and 7% going to the retirement fund. The health insurance fund is used to pay for medical supplies for the Ebeye and Majuro hospitals and outer island dispensaries, and referrals to Honolulu, the Philippines and USAKA.

5.2 The Section 177 Health Care Program

Article II, Section 1(a) of the Section 177 Subsidiary Agreement directed that the Fund Manager disburse \$2,000,000 annually to the Marshall Islands Government to fund the Four-Atoll Healthcare Program. Over the first 15 years of the Compact, the Federal funds allocated under this subsection were to total \$30,000,000, with a \$4,000,000 extension until October 1, 2003. These funds were in addition to the amounts provided to the four atolls as their share as constituent atoll governments of the Republic of the Marshall Islands under Compact sections 216(a)(2), \$1,791,000 annually for nationwide health and medical programs, including referrals, and 221(b), \$10,000,000 annually for education and health care. These latter monies have been a major funding source for health care services provided by the RMI Ministry of Health, described in section 5.3 below.

The Section 177 Health Care Program has been managed since 1987 by Trinity Health International, a Michigan-based nonprofit health care organization. The 177 Program employs 15 staff in the Marshall Islands, including a Marshallese citizen Administrator, a U.S. citizen Assistant Administrator and Chief Financial Officer, two non-Marshallese physicians and nine health assistants. Four of the health assistants are stationed, respectively, on the atolls of Enewetak and Utrik and on the islands of Kili and Mejjatto. In Honolulu, the 177 Program operates an office that coordinates tertiary care referrals and conducts utilization reviews of all active cases. One Marshallese employee staffs the office.

Through the 177 Program, Trinity provides primary care, including immunizations, to persons directly affected by the nuclear testing program and their descendants at clinics built in the early 1990's on Majuro, Ejit, Mejjatto, Kili, Enewetak and Utrik. Trinity conducts quarterly missions to each of the four nuclear-affected atolls, recording over 24,960 patient encounters from 1987 to 2002. During the same period, Trinity recorded over 67,600 patient encounters in Majuro. Trinity also conducts specialized missions to each of the outer atoll clinics, to provide ophthalmology, ENT, pediatric, urology, women's health, audiology, dental and other services to persons directly affected by the nuclear testing program and their descendants.

Since assuming responsibility for the 177 Program, Trinity has continued to develop its infrastructure and human resources. In addition to construction of its six clinics noted above, this has included:

- between the late 1980's and 2001, installation and upgrading of a radio communication system linking Majuro with each of the outer atolls;
- in 2002, new generators purchased and installed on Mejjatto, Enewetak and Utrik;
- training provided to health assistants on Majuro and each of the outer atolls to improve assessment and treatment skills;
- development and training of Majuro-based personnel to operate a computer database to track patients and strategic health and planning information;
- establishment of a medical resources library at the program's Majuro clinic and, in conjunction with the RMI's Majuro Hospital, a pharmaceutical formulary.

According to a July 2002 Trinity Health International report on the 177 Program, new births and marriages have produced a five-fold increase in enrollment between 1990 and 2002, from 2,828 to 13,460. An enrollment audit was initiated in 2002. By the time Trinity's report was released, two atolls had been audited and 684 ineligible or deceased enrollees removed from the program's rolls. The enrollment of ineligible persons remains a concern.

In its July 2000 report, Trinity emphasizes that "the Section 177 Program is fully integrated in the RMI healthcare system and has an impact not only on the population it serves but on services of the Ministry of Health and other healthcare providers." For instance, the 177 Program:

- employs the outer atoll dispensary staff that performs much of the RMI's public health care work;
- deploys physicians to the Majuro Hospital who provide training programs and direct patient care benefiting all Marshallese patients;
- maintains outer atoll clinic dispensaries, communications links with Majuro, and generators that support provision of health care to entire outer atoll communities;
- pays the Majuro Hospital \$250,200 a year for secondary care for services to the 177 Program caseload, augmenting total hospital resources serving the Marshallese population as a whole;
- through its U.S. management firm, has obtained donations of equipment and volunteer physicians for the Majuro Hospital, as well as critical parts for equipment repairs;
- pays travel and per diem for family planning and community health coordinators who participate in 177 Program missions, and treats all residents of the affected atolls, whether 177-eligible or not.

5.3 The Department of Energy Special Medical Program

The Department of Energy has administered the Congressionally-mandated Marshall Islands Special Medical Program for the Bravo-exposed populations of Rongelap and Utrik Atolls continuously for the past 49 years. The Compact of Free Association Act of 1985 extended continuing special medical care for surviving special medical program patients. The Compact Act provided:

Notwithstanding any other provision of law, upon the request of the Government of the Marshall Islands, the President (either through an appropriate department or agency of the United States or by contract with a United States firm) shall continue to provide special medical care and logistical support thereto for the remaining 174 members of the population of Rongelap and Utrik who were exposed to radiation resulting from the 1954 United States thermonuclear "Bravo" test, pursuant to Public Laws 95-134 and 96-205.

This program continues through section 103(f)(1) of the Compact of Free Association Amendments Act of 2003, PL 108-188.

Participation in the special medical care program is voluntary. At the end of FY2003, 196 individuals are enrolled in the program. One hundred eleven of these are the remaining survivors of the original 253 people and 12 unborn children present on Rongelap and Utrik Islands at the time of the 1954 Bravo test. There are also 85 Marshallese volunteers, of approximately the same age and gender distribution as the Bravo-exposed patients, not present at Rongelap or Utrik at the time of the Bravo test. The volunteers serve as a normal reference group for establishing typical patterns of illness and disease among the Rongelap and Utrik people. Although the additional volunteers were previously provided only an annual medical examination and local on-island treatment or referral to the Section 177 Health Care Program, today the entire DOE patient population receives the same medical care services.

The DOE medical program administers annual cancer-oriented comprehensive health examinations as the most effective means of fulfilling its congressional mandate. Advice is provided on decreasing risk factors for cancer.

Results of these examinations indicate that the DOE patient population of the special medical program caseload, including survivors and volunteers, is at greater risk of developing certain endocrine problems, such as thyroid disease, than the general population. For exposed individuals, specialists administer annual thyroid function blood tests and thyroid examinations.

Referrals to Majuro, Kwajalein, and Honolulu are the responsibility of a DOE-funded logistics contractor in Honolulu. DOE patients who require tertiary medical services not available in the RMI are transported to Honolulu, Hawaii and treated at the Straub Clinic. When patients with general medical problems not associated with Bravo-related radiation exposure are identified among DOE patients, they are referred to the 177 Health Care Program. DOE assists in providing emergency care for patients with any life-threatening condition. Emergency care is coordinated with the 177 Health Care Program and RMI national health care program.

From 1954 to June 1998, Brookhaven National Laboratory supported the Special Medical Program. The Brookhaven program was a ship-based medical examination program. The ship visited the Rongelap and Utrik Islands twice a year through 1995. Physicians examined the exposed population and conducted a general sick-call for the island residents. Brookhaven sponsored resident physicians in the Marshall Islands for a one or two year appointment. The resident physician program ended in 1986, when the Compact of Free Association Act was enacted. From 1995 to 1998, Brookhaven operated a land-based medical program.

Since 1998, medical services under DOE's Special Medical Care Program have been delivered by Honolulu-based Pacific Health Research Institute (PHRI) and based on year-round, on-island primary and secondary care to survivors and volunteers residing in the RMI and annual physical examinations to patients living in Hawaii and the continental United States. PHRI clinics are located on Kwajalein Island and in Majuro, where local Marshallese physicians and nurse supervisory personnel can see patients daily. A full-time Chief of Clinical Operations oversees the program from Majuro. Program managers coordinate closely with the 177 Health Care Program and the RMI national health care system to leverage assets and ensure continuity of patient care. Physicians at Honolulu's Straub Clinic and Hospital, Kaiser-Permanente, Wahiawa General Hospital, and the University of Hawaii School of Medicine support the work of the program's Marshallese physicians and nurses.

6. Personal Injury Claims

6.1. The Nuclear Claims Tribunal

The Section 177 Settlement Agreement provided a lump sum settlement and the governments agreed on division of the proceeds from the settlement among various purposes. The Section 177 Settlement Agreement does not prescribe criteria on which the Nuclear Claims Tribunal is to base compensation awards, and the NCT is not required to adhere to standards that would be applied under U.S. law. Among others, the NCT has made awards for the following categories of claims:

- The NCT awards damages to persons from throughout the Marshall Islands, assuming the effects of the U.S. nuclear testing to have gone beyond the four populated northern atolls that are the subject of the Section 177 Settlement Agreement.
- The scientific community has not found transference of nuclear effects to the second generation in humans. However, the Tribunal has awarded the biological children of a mother who was physically present at the time of the testing 50% of amounts offered first generation claimants.
- The NCT has awarded some amount less than \$2 million for other conditions not recognized by the United States as radiogenic but deemed radiogenic by the Tribunal; those conditions include benign salivary and parathyroid gland tumors, hyperparathyroidism, hypothyroidism for individuals not on Rongelap in March 1954, and unexplained "bone marrow failure."

Most U.S. radiation-related compensation programs require proof of a minimal level of exposure at a particular age relative to the date of diagnosis to qualify for compensation. The four northerly RMI atolls are those that were exposed and affected by the U.S. testing program. There is no similar basis for recognizing the claims of children of exposed parents or those of individuals located south of ten degrees north latitude at the time of testing.

Part of the RMI request is for \$26.9 million to pay personal injury awards already approved by the Tribunal in excess of the trust fund. The United States Government has played no role in the management of the fund, nor in the investment decisions affecting the proceeds generated by the Trust Fund. The mixed earnings record of the Trust Fund is not attributable to the U.S. nuclear testing program and does not provide a basis for a "changed circumstances" funding request under the Article IX of the Section 177 Settlement Agreement.

7. Loss of Land Use and Hardship

7.1 Nuclear Claims Tribunal Awards

Loss of Land Use: In its loss of use judgments, the Tribunal reasoned that, because the United States never intended to permanently preclude Bikinians or Enewetakese from returning to their home atolls, this constituted a "temporary taking". The Tribunal relied on expert appraisal witnesses to arrive at fair rental values of the land for the periods of denied use, and offset compensation previously paid to claimants.

The Nuclear Claims Tribunal made loss of land use awards to Enewetak of \$244 million on April 13, 2000 and \$278 million to Bikini on March 5, 2001.

Hardship: In its Enewetak judgment, the NCT explained its reasoning in evaluating hardship claims:

These damages, which were suffered on a community wide basis differ from those typically addressed in the personal injury program, which are basically radiogenic diseases ... The injuries at issue here are those arising out of relocation to Ujelang and the hardships endured there by the people because of its remoteness and lack of adequate resources ... The damages are a consequence of the loss of their land and their relocation attendant to that loss ... The Tribunal will adopt the approach suggested by claimants for quantification of these damages, by paying an annual amount for each person on Ujelang for each of thirty three years between 1947 and 1980 the years the people of Enewetak were on Ujelang.

On this basis, the NCT determined that the damages for hardship during the relocation to Ujelang amounted to \$30,084,500. Applying the same procedure to relocation of Bikinians to Rongerik and Kili, the NCT made a hardship award of \$33,814,500 to Bikini.

7.1 Comment

All losses and damage to property arose before the Section 177 Settlement Agreement entered into force. The Section 177 Settlement Agreement recognizes that there would be an indefinite period during which some of the affected atolls and islands would be uninhabitable or unusable and that in some cases the land would never be useable. The loss of land use and hardship claims deemed compensable by the NCT do not involve losses or damage to property that "could not reasonably have been identified." The facts regarding loss and damage to property do not support a funding request under the "changed circumstances" provision of the Section 177 Settlement Agreement.

In making its awards, the Tribunal exceeded the amount of money provided through the settlement agreement for loss or damage to property. The Government of the United States played no role in fund management or the investment decisions affecting the proceeds generated by the Trust Fund. The mixed earnings record of the Trust Fund is not attributable to the nuclear program and does not provide a basis for a funding request under Article IX of the Section 177 Settlement Agreement.

8. Atoll Rehabilitation

8.1 Nuclear Claims Tribunal Awards

The NCT accepted the position of the IAEA that "... policies and criteria for radiation protection of populations outside national borders from releases of radioactive substances should be at least as stringent as those for the population within the country of release." The NCT adopted current U.S. standards and considered numerous alternative strategies and approaches to how these standards could be met. These included removal of contaminated soil, application of potassium to reduce plant intake of cesium and phytoremediation, the use of plants to uptake the radioactive contaminants from the soil, and soil washing.

The NCT considered strategies costing from \$217.7 million to \$1.4 billion for Bikini and a similar range of options for Enewetak. The NCT awarded \$251,500,000 to Bikini on March 5, 2001, and \$91,710,000 to Enewetak on April 13, 2000, "to restore [them] to a safe and productive state."

8.2 Cleanup Standards

There are multiple U.S. federal standards applied to various cleanups that cover a wide range of doses but in general, they tend to control doses to as far below the 1 mSv per year limit as is practical. However, the International Commission on Radiological Protection (ICRP-82) and the International Nuclear Safety Advisory Group (INSAG) to the International Atomic Energy Agency have established basic principles of radiation protection and safety on which their policy on intervention, the Basic Safety Standard, is based.

Decisions on whether to intervene, and how, depend on the circumstances of individual cases. Quantitative criteria used in determining whether and when an intervention should be undertaken are called intervention levels or action levels.

There are no agreed international guidelines on intervention levels for chronic exposure to radioactive residues from events such as nuclear weapons testing. However, guidance established in the Basic Safety Standard for other situations indicates intervention levels that might be appropriate in the aftermath of nuclear weapons testing.

Intervention levels are determined based on the expected dose to be avoided by a specific remedial action such as soil scraping, topping with crushed coral, or potassium fertilization of food crops. Internationally agreed guidance on generic levels applicable to any intervention situation, especially for chronic exposure situations, has been established by the IAEA.

Intervention can be expected in almost all cases where doses approach levels at which the likelihood of deleterious health effects is very high. Intervention would be unlikely when the annual effective dose does not exceed about 10 mSv in any year. An annual dose of less than 1 mSv is generally accepted as the dose limit for the public.

Doses from natural background radiation provide a useful reference for comparison. In general, people receive a background dose from natural radiation sources in the range of 1 to 20 mSv, in certain locations 100 mSv. Most people receive a few mSv per year and annual doses of 10 mSv are unusual, but doses in excess of 100 mSv do occur in some places. The Marshall Islands natural background dose is 2.4 mSv. About 2 mSv of the 2.4 mSv natural background dose is acquired by eating fresh fish.

In situations such as those in the Northern Marshall Islands, generic guidance for rehabilitation of areas of chronic exposure is available. An annual effective dose of up to 10 mSv (1 rem) can be used as a robust and pragmatic action level in areas of chronic exposure. Doses below this level require careful consideration. However, areas where such levels are observed generally would be declared safe without further remediation.

A process of balancing human and environmental protection determines the form, scale and duration of the intervention. Provided that the principles set out in the Basic Safety Standards have been applied, a situation in which chronic exposures produce dose rates of less than 10 mSv per year would normally be acceptable but may not be practical due to public perceptions.

1. Radiological remediation and current radiological condition of the Four Atolls

Radiation protection principles have always been applied in making cleanup decisions for the northern Marshall Islands -- Bikini, Enewetak, Rongelap and Utrik atolls. A brief history of cleanup activities and current radiation exposure levels are provided below. Radiation exposure differs from radiation dose in that exposure does not include information about the effectiveness of the radiation to cause biological effects.

Bikini Island: Following a 1967 IAEA radiological survey that determined that Bikini and Eneu Islands could be readied for reoccupation, President Lyndon Johnson announced that Bikini Atoll was safe for habitation. About 500 tons of radioactively contaminated debris had been removed. Agricultural areas of Bikini and Eneu Islands were prepared for use and coconut trees, pandanus and breadfruit were planted in 1969. Additional radiological surveys were conducted in the 1960's and 1970's. House building commenced following the cleanup, with some Bikini families moving back to Bikini Island by 1970. A 1975 survey sampled local food crops that had by then produced enough fruit to analyze. Dose predictions based on sample data showed that, when food crops matured, the resulting whole body dose would exceed then-existing U.S. federal guidelines. In August 1978, Trust Territory officials moved the people to Kili Island, where many remain. Further remedial actions have been taken on Bikini and Eneu Islands. The outer islands, Nam, Enidrik, Aerokoj, and Aomen, had small communities or were food-gathering locations. Aside from Bikini and Eneu, only Nam would be suitable for a resettled community and only after remediation. Most of the small islands lack

resources, such as water supplies and infrastructure.

The Bikini Atoll Rehabilitation Committee in 1984 set an action level of 1.7 mSv per year based on U.S. Federal Radiation Protection Standards. The Committee reported that Eneu Island could be used without restriction; Bikini Island could be settled provided that settlers consumed only imported foods and drank cistern water for 80 years (until 2064). A 1994 radiation dose assessment reported that the estimated maximum annual dose at Bikini Island would be 4 mSv if Bikinians were to resettle in 1999, take no remedial measures, and continue to use imported foods. This annual dose could be reduced to 0.4 mSv with limited soil scraping of the top 16 inches in housing and village areas, crop fertilization, and adding some imported foods to the diet. The IAEA in 1998 reported directly to the Bikini people that Bikini Island was suitable for permanent resettlement if the remedial actions used on Rongelap Island were applied on Bikini. An ongoing limited environmental monitoring program was recommended.

Enewetak: In its 1967 radiological survey, the Atomic Energy Commission stated that Bikini and Eneu Islands could be readied, and President Lyndon Johnson announced that Bikini Atoll was safe for habitation. A 1973 radiological assessment concluded that living patterns in the northern half of the atoll, including Enjebi Island, would result in exposures exceeding U.S. federal guidelines. The southern half, including Enewetak Island, was determined to be safe for habitation and agriculture. A three-year cleanup began in 1977 that included removing about 6,000 cubic yards of radioactively contaminated debris, such as plutonium-contaminated soil, from Enjebi and various other islands. Contaminated soil was placed in a concrete structure on Runit Island where it remains quarantined.

The standard for cleanup was based on a maximum plutonium contamination of the soil at a concentration of 400 pCi per gram of soil. (A pico Curie, one-trillionth of a Curie, is the usual measure of the number of nuclear disintegrations per second in a specific quantity of material.) Conservatively, this level was equivalent to the current maximum permissible exposure in air. It was customary to set the levels at 10 percent of maximum (40 pCi per gram of soil) to provide a wide margin of safety. Below this level, no soil removal was deemed required. Later, when 1977 EPA guidelines were issued, the upper limit for agricultural use was set at 80 pCi per gram of soil and 160 pCi per gram of soil for food gathering land. The EPA guidance was roughly equivalent to a lifetime risk of approximately 14 cancer deaths per 100,000 persons exposed or to a probability of one cancer every twenty-one hundred years assuming that the population size of Enewetak Island remained constant.

As the cleanup concluded, 116 homes had been built to accommodate the returning population. Shortly thereafter, about 100 people returned to Ujelang because of shortages of locally grown food. Resettlement would require an ample supply of coconuts for drinking and efforts to plant trees on northern islands strictly for a source of water in periods of drought; planting of about 22,000 trees began in 1979.

From resettlement in 1980 through 1996, the average dose to the population was 0.015 mSv per year; others could receive up to 0.05 mSv by eating mostly local foods. The Nationwide Radiological Survey in 1994 found that the annual dose from radioactive cesium in the soil was 0.06 mSv.

Enewetak Island residents have available on-island monitoring of internal depositions of radioactive cesium, through whole body counting at the Enewetak Health Physics Laboratory established by the U.S. Department of Energy. For 2001, the average dose from radioactive cesium via food sources was less than 0.001 mSv per year, compared to a natural background annual dose of 1.4 mSv. Therefore, the typical total radiation dose is below 0.15 mSv per year. The Enewetak people have made no decision about resettling the other traditional residential islands such as Enjebi, Japtan, and Medren.

In 1999, a scientist representing Enewetak Atoll testified before Congress that, if all the islands of the atoll were resettled in 2000, with no further remedial actions, nine people would experience a serious health problem over the next 1,000 years.

Rongelap: Rongelap atoll resettlement plans were based on an action level of 1 mSv per year from exposure to soil and diet, not including natural background, both for persons consuming a traditional Rongelap diet and those consuming local and imported traditional foods. The natural background annual radiation dose is about 2.4 mSv. The Rongelap resettlement action level was originally 1 mSv predicated on U.S. federal radiation exposure guidance at that time. It was determined that the actual exposure would be less than the resettlement action level.

Following radiological surveys, soil was removed in areas with high doses, and crushed coral topping was applied in the village and service areas. A potassium fertilizer regime was initiated to achieve a new lower dose standard for Rongelap of 0.01 mSv for the service and village areas.

There is a whole body counting facility on Rongelap Island. For the year 2001, among those counted, the average dose was 0.006 mSv. For the three-year period 1999-2001, the measured average annual dose for resettlement workers on Rongelap, from radioactive cesium via all food sources, was less than 0.001 mSv. The intake of plutonium and other similar long-lived substances in soil was measured among the construction and agricultural workers who have the greatest potential for intake of dust. No worker had an internal exposure greater than global fallout from nuclear testing. Because there is no large permanent population on Rongelap Island at this time, it is not possible to estimate what the actual range of dose would be for people with different dietary preferences, but it would be below 0.15 mSv. Radiological conditions on other islands of Rongelap Atoll vary and, depending on projected uses, different action levels apply.

Utrik: Radiological conditions dictated no formal environmental remediation of Utrik Atoll. The NWRS estimated in 1994 that the total annual dose from radioactive cesium in the soil and radiation from diet and soil would be about 0.20 mSv, assuming a traditional diet on each of the islands. A 1999 Lawrence Livermore National Laboratory dose assessment found that the maximum annual dose rate from all environmental sources, with a diet including imported foods, would be 0.038 mSv. Eating mostly local foods would result in a dose of about 0.098 mSv. Whole body counting for the Utrik people is now available, with the installation of a whole body counting facility in Majuro in July 2003. This facility will permit Utrikese to monitor their internal cesium levels, and to confirm that their traditional and contemporary food choices are safe.

8.4 Comment

An important element underlying the RMI request for Atoll Rehabilitation is the assertion that the United States Government has adopted stricter standards for domestic nuclear cleanup activities in the United States since the 1986 settlement agreement was reached. The current dose limit used by the U.S. Government to protect the public from all sources of radiation is 1 mSv per year. The current dose limit has been used to guide cleanup decisions in the RMI before and after the Compact was enacted. Extensive monitoring of individuals on atolls where cleanup has been effected indicates actual doses are below the NCT standard of 0.15 mSv per year. Cleanup decisions to date have conferred a degree of protection that exceeds all existing U.S. federal agency guidelines as well as the Tribunal's desired standard. There is no "changed circumstance" on which a funding request can legitimately be made under Article IX of the Section 177 Settlement Agreement.

9. Occupational Safety

In its request, the Republic of the Marshall Islands states that "Section 177 does not include an occupational safety program for Marshallese and other workers involved in environmental remediation or cleanup programs. As a result, Marshallese and other workers are exposed to occupational sources of radiation. Medical screening of past and present radiation workers is greatly needed to reduce the risk of further illness and claims." These are programs that the parties could have chosen to include in the full settlement, but they chose not to. The desirability of such programs does not constitute "changed circumstances" on which a funding request can legitimately be made under the Section 177 Settlement Agreement. To the extent the Government of the Republic of the Marshall Islands considers these programs are needed, they should be included in the RMI budget, and they could then be considered by the Joint Economic Management and Financial Accountability Committee for possible coverage under a sector grant under the amended Compact.

10. Nuclear Stewardship

10.1 RMI Request

In its request, the Republic of the Marshall Islands states that "Section 177 does not provide programs for communities to develop strategies for safely containing radiation and living near radioactive waste storage areas."

10.2 Runit Dome

The 43 nuclear tests conducted at Enewetak Atoll by the United States between 1948 and 1958 produced close-in fallout that contaminated the islands and lagoon of the atoll with radioactive fission and activation products, and unfissioned nuclear fuel. In 1972, the U.S. Government announced that it would conduct a cleanup and restoration operation to return the atoll to the Enewetak people. The radiological cleanup was conducted between 1977 and 1980 and focused on reducing the concentration of transuranium elements in soils on some of the islands that might eventually be used for residence or for subsistence agriculture. The cleanup plan called for relocating soil and some other contaminated debris to Runit Island on the eastern perimeter of the Atoll. Some of the contaminated soil was mixed with cement and the mixture placed below the water level in the Cactus Crater formed by a nuclear explosion in 1958. The remainder of the contaminated material was mixed with concrete and placed above ground over the crater in the shape of a dome. A concrete cap was constructed over the dome of soil.

Concern has been expressed by the people of Enewetak over the possible aquatic impacts from the radionuclides entombed in the crater. A National Academy of

Sciences committee examined the dome and concluded that the containment structure and its contents present no credible health hazard to the people of Enewetak, either now or in the future. The committee suggested that "at least part of the radioactivity contained in the structure is available for transport to the groundwater and subsequently to the lagoon and it is important to determine whether this pathway may be a significant one." Therefore, a surveillance program was started in 1980, in conjunction with other research efforts, to study the radionuclides in samples of fish, groundwater, and lagoon seawater. Data collected support the finding of the National Academy committee that any fear that this structure contains amounts of activity whose release would cause damage to the environment that will result in greater effect on human health is unfounded. Indeed, research has shown that the land area adjacent to the dome has a different radiological "signature" than is found in the dome. This suggests that there had been no seepage from the dome up to the time samples were collected in 2000.

10.3 Comment

Kurt Campbell, Deputy Assistant Secretary of Defense, testified before the House Resources Committee on May 11, 1999:

...As part of the U.S. Government's acceptance of responsibility 'for compensation owing to citizens of the Marshall Islands...for loss or damage ... resulting from the nuclear testing program...conducted...between June 30, 1946, and August 18, 1958,' the Department of Defense participated in the clean up of Enewetak Atoll. Contaminated matter was deposited in Cactus Crater on Runit Island, and the Army Corps of Engineers constructed a concrete dome over the crater for containment. Pursuant to the terms of the Compact of Free Association, the Republic of the Marshall Islands bears full responsibility for maintaining and monitoring the dome and Runit Island.

Appearing at the same session, Allen Stayman, Director of the Office of Insular Affairs at the Department of the Interior, testified:

...Perhaps the most significant, bilateral issue outstanding is the condition of Runit Island, a responsibility that the Enewetak Government claims still rests with the U.S. Departments of Defense or Energy. The Federal position is that, although either or both Federal departments have occasionally sent personnel to inspect the condition of the Runit dome, this has been ex gratia. As article VII, sentence one, of the Section 177 Subsidiary Agreement states:

'The Government of the United States is relieved of and has no responsibility for, and the Government of the Marshall Islands, . . . shall have and exercise responsibility for, controlling the utilization of areas in the Marshall Islands affected by the Nuclear Testing Program.'

This remains the Administration's position.

The parties could have chosen to include long-term stewardship programs, including monitoring, in the full settlement, but they chose not to. The Administration agrees that such programs might be desirable. At a June 14, 2001 meeting, the Departments of Energy and the Interior agreed with the RMI on the "need [for] long-term stewardship programs for sites in the RMI with long-lived wastes, including monitoring of the Runit dome to ensure its integrity." However, the desirability of such programs does not constitute "changed circumstances" on which a funding request can legitimately be made under the Section 177 Settlement Agreement. The Government of the Republic of the Marshall Islands could include such programs in the RMI budget and they could then be considered by the Joint Economic Management and Financial Accountability Committee for possible coverage under a sector grant under the amended Compact.

11. Nuclear Education

In its request, the Republic of the Marshall Islands states that Compact Section 177 provides no means to educate Marshallese citizens in radiation-related fields or to build local capacity to undertake research, archive relevant information, or educate the public about the consequences of the U.S. Nuclear Testing Program in the Marshall Islands.

The parties could have chosen to include nuclear education in the full settlement, but they chose not to. The Administration agrees that nuclear education is desirable. However, the desirability of such education does not constitute a "changed circumstance" on which a funding request can legitimately be made under the Section 177 Settlement Agreement. The Government of the Republic of the Marshall Islands could include nuclear education in the RMI budget and it could then be considered by the Joint Economic Management and Financial Accountability Committee for possible coverage under a sector grant under the amended Compact.

Appendix A – Chronology of U.S. Nuclear Testing in the Marshall Islands

No.	Date	Site	Type	Yield (kt.)	Operation	Test
1	6/30/1946	Bikini	Airdrop	21.0	CROSSROADS	ABLE
2	7/24/1946	Bikini	Underwater	21.0	CROSSROADS	BAKER
3	4/14/1948	Enewetak	Tower	37.0	SANDSTONE	XRAY
4	4/30/1948	Enewetak	Tower	49.0	SANDSTONE	YOKE
5	5/14/1948	Enewetak	Tower	18.0	SANDSTONE	ZEBRA
6	4/7/1951	Enewetak	Tower	81.0	GREENHOUSE	DOG
7	4/20/1951	Enewetak	Tower	47.0	GREENHOUSE	EASY
8	5/8/1951	Enewetak	Tower	225.0	GREENHOUSE	GEORGE
9	5/24/1951	Enewetak	Tower	45.5	GREENHOUSE	ITEM
10	10/31/1952	Enewetak	Surface	10400.0	IVY	MIKE
11	11/15/1952	Enewetak	Air Drop	500.0	IVY	KING
12	2/28/1954	Bikini	Surface	15000.0	CASTLE	BRAVO
13	3/26/1954	Bikini	Barge	11000.0	CASTLE	ROMEO
14	4/6/1954	Bikini	Surface	110.0	CASTLE	KOON
15	4/25/1954	Bikini	Barge	6900.0	CASTLE	UNION
16	5/4/1954	Bikini	Barge	13500.0	CASTLE	YANKEE
17	5/13/1954	Enewetak	Barge	1690.0	CASTLE	NECTAR
18	5/2/1956	Bikini	Air Drop	3800.0	REDWING	CHEROKE
19	5/4/1956	Enewetak	Surface	40.0	REDWING	LACROSSE
20	5/27/1956	Bikini	Surface	3500.0	REDWING	ZUNI
21	5/27/1956	Enewetak	Tower	0.2	REDWING	YUMA
22	5/30/1956	Enewetak	Tower	14.9	REDWING	ERIE
23	6/6/1956	Enewetak	Surface	13.7	REDWING	SEMINOLE
24	6/11/1956	Bikini	Barge	365.0	REDWING	FLATHEAD

25	6/11/1956	Enewetak	Tower	8.0	REDWING	BLACKFOOT
26	6/13/1956	Enewetak	Tower	1.5	REDWING	KICKPOO
27	6/16/1956	Enewetak	Air Drop	1.7	REDWING	OSAGE
28	6/21/1956	Enewetak	Tower	15.2	REDWING	INCA
29	6/25/1956	Bikini	Barge	1100.0	REDWING	DAKOTA
30	7/2/1956	Enewetak	Tower	360.0	REDWING	MOHAWK
31	7/8/1956	Enewetak	Barge	1850.0	REDWING	APACHE
32	7/10/1956	Bikini	Barge	4500.0	REDWING	NAVAJO
33	7/20/1956	Bikini	Barge	5000.0	REDWING	TEWA
34	7/21/1956	Enewetak	Barge	250.0	REDWING	HURON
35	4/28/1958	Near Enewetak	Balloon	1.7	HARDTACK	YUCCA
36	5/5/1958	Enewetak	Surface	18.0	HARDTACK	CACTUS
37	5/11/1958	Bikini	Barge	1360.0	HARDTACK	FIR
38	5/11/1958	Enewetak	Barge	81.0	HARDTACK	BUTTERNUT
39	5/12/1958	Enewetak	Surface	1370.0	HARDTACK	KOA
40	5/16/1958	Enewetak	Underwater	9.0	HARDTACK	WAHOO
41	5/20/1958	Enewetak	Barge	5.9	HARDTACK	HOLLY
42	5/21/1958	Bikini	Barge	25.1	HARDTACK	NUTMEG
43	5/26/1958	Enewetak	Barge	330.0	HARDTACK	YELLOWWD
44	5/26/1958	Enewetak	Barge	57.0	HARDTACK	MAGNOLIA
45	5/30/1958	Enewetak	Barge	11.6	HARDTACK	TOBACCO
46	5/31/1958	Bikini	Barge	92.0	HARDTACK	SYCAMORE
47	6/2/1958	Enewetak	Barge	15.0	HARDTACK	ROSE
48	6/8/1958	Enewetak	Underwater	8.0	HARDTACK	UMBRELLA
49	6/10/1958	Bikini	Barge	213.0	HARDTACK	MAPLE
50	6/14/1958	Bikini	Barge	319.0	HARDTACK	ASPEN
51	6/14/1958	Enewetak	Barge	1450.0	HARDTACK	WALNUT
52	6/18/1958	Enewetak	Barge	11.0	HARDTACK	LINDEN
53	6/27/1958	Bikini	Barge	412.0	HARDTACK	REDWOOD
54	6/27/1958	Enewetak	Barge	880.0	HARDTACK	ELDER
55	6/28/1958	Enewetak	Barge	8900.0	HARDTACK	OAK
56	6/29/1958	Bikini	Barge	14.0	HARDTACK	HICKORY
57	7/1/1958	Enewetak	Barge	5.2	HARDTACK	SEQUOIA
58	7/2/1958	Bikini	Barge	220.0	HARDTACK	CEDAR
59	7/5/1958	Enewetak	Barge	397.0	HARDTACK	DOGWOOD
60	7/12/1958	Bikini	Barge	9300.0	HARDTACK	POPLAR
61	7/14/1958	Enewetak	Barge	Low	HARDTACK	SCAEVOLA
62	7/1/1958	Enewetak	Barge	255.0	HARDTACK	PISONIA
63	7/22/1958	Bikini	Barge	65.0	HARDTACK	JUNIPER
64	7/22/1958	Enewetak	Barge	202.0	HARDTACK	OLIVE
65	7/26/1958	Enewetak	Barge	2000.0	HARDTACK	PINE
66	8/6/1958	Enewetak	Surface	Fizz	HARDTACK	QUINCE
67	8/18/1958	Enewetak	Surface	0.02	HARDTACK	FIG

Sources: U.S. Department of Energy, United States Nuclear Tests: July 1945 through September 1992. Document No. DOE/NV-209 (Rev. 14), December 1994. RMI Nuclear Claims Tribunal. Annual Report to the Nitijela for the Calendar Year 1996. Majuro: 1997. for the Calendar Year 1996. Majuro: 1997.

Appendix B: Estimates of U.S. Nuclear Testing-Related Assistance and Compensation

Total: \$531,931,000

(Total estimated '03 funds: \$837,390,000 - based on U.S. Department of Commerce, Bureau of Labor Statistics' Inflation Calculator. Inflation calculations are low/conservative due to use of final year of funding for calculation of multi-year program/payout entries.)

Bikini Projects

Year Amount USG Source/Purpose

1964 \$2,000,000 Defense/Settlement for use of Bikini

1954-02 \$37,342,450 Radiological

monitoring

1970-75 \$2,881,000 Interior/Rehabilitation and Resettlement

1975 \$3,000,000 Interior (P.L.94-34)/Establish Trust Fund

1978 Interior (P.L.95-348)
\$6,000,000 /Resettlement-Kili
\$3,000,000 /Addition to trust fund

1978 \$35,000 Interior/Feeding program

1979-84 \$1,754,000 Agriculture/Surplus food program²

1980 \$1,400,000 Interior (P.L. 97-257)/ex gratia payment

1981 \$400,000 Energy/Health plan for treatment of radiation exposure

1982 \$20,600,000 Interior (P.L. 97-527)/Bikini Resettlement Trust Fund

1982 \$400,000 Interior/Bikini Atoll Rehabilitation Committee

1984 \$264,000 Interior/Bikini Atoll Rehabilitation Committee

1984 \$1,000,000 Energy (P.L. 97-257) Four Atoll Health Program

1985-94 Agriculture/Surplus food program

1985 \$1,914,000 Interior/Bikini Atoll Rehabilitation Committee

1986 \$1,664,000 Interior/Bikini Atoll Rehabilitation Committee

1987 \$75,000,000 Interior (P.L. 99-239)/Nuclear Claims Compensation

1988 \$2,300,000 Interior/Bikini Conception Plan

1989 \$5,000,000 Interior (P.L. 100-466)/Bikini Resettlement Trust Fund

1990 \$22,000,000 Interior (P.L. 100-466)/Bikini Resettlement Trust Fund

1991 \$21,000,000 Interior (P.L. 100-466)/Bikini Resettlement Trust Fund

1992 \$21,000,000 Interior (P.L. 100-466)/Bikini Resettlement Trust Fund

1993 \$21,000,000 Interior (P.L. 100-466)/Bikini Resettlement Trust Fund

Total \$238,273,000 (\$399,610,000 in '03 funds)

Enewetak Projects

Year Amount USG Source/Purpose

1956 \$175,000 Interior/TTPI/Enewetak atoll use rights

1969 \$1,020,000 Interior/Funds transfer to TTPI for the people of Enewetak

1954-02 \$24,828,300 Radiological monitoring

1970-94 Agriculture/Surplus Commodity Food Program

1977 \$20,000,000 Defense/DNA (P.L.94-367)/Radiological Clean-up and Rehabilitation Project

1978 \$12,400,000 Interior/TTPI/Enewetak
Rehabilitation and Resettlement
Program

1980 \$1,475,000 Interior/TTPI/Enewetak
Rehabilitation and Resettlement
Program

1980 \$3,820,000 Interior/TTPI/Enewetak
Agriculture/Support

1981 \$1,345,000 Interior/TTPI/Enewetak
Agriculture/Support

1982 \$818,000 Interior/TTPI/Enewetak
Agriculture/Support

1983 \$800,000 Interior/TTPI/Enewetak
Agriculture/Support

1984 \$800,000 Interior/TTPI/Enewetak
Agriculture/Support

1984 \$1,000,000 Energy (P.L. 97-257)/Four Atoll
Health Program

1985 \$882,000 Interior/TTPI/Enewetak
Agriculture/Support

1986 \$818,000 Interior/TTPI/Enewetak
Agriculture/Support

1986 \$818,000 Interior/TTPI/Enewetak
Agriculture/Support

1986 \$48,750,000 Interior (P.L. 99-239)/Nuclear
Claims Compensation⁷

1986 \$2,750,000 Interior (P.L. 99-349)/Enjebi
Resettlement Community Trust Fund

1987 \$2,250,000 Interior (P.L. 99-591) Enjebi
Resettlement Community Trust Fund

1987 \$900,000 Interior/Enewetak
Agriculture/Support

1988 \$2,500,000 Interior (P.L. 99-349)/Enjebi
Resettlement Community Trust Fund

1988 \$1,100,000 Interior/Enewetak
Agriculture/Support

1989 \$1,100,000 Interior/Enewetak
Agriculture/Support

1989 \$2,500,000 Interior (P.L. 99-591)/Enjebi
Resettlement Community Trust Fund

1990 \$1,100,000 Interior/Enewetak
Agriculture/Support

1991 \$1,094,000 Interior/Enewetak
Agriculture/Support

1992 \$1,094,000 Interior/Enewetak
Agriculture/Support

1993 \$1,091,000 Interior/Enewetak
Agriculture/Support

1994 \$1,091,000 Interior/Enewetak
Agriculture/Support

1995 \$1,089,000 Interior/Enewetak
Agriculture/Support

1996 \$1,091,000 Interior/Enewetak
Agriculture/Support

1997 \$1,091,000 Interior/Enewetak
Agriculture/Support

1998 \$1,191,000 Interior/Enewetak
Agriculture/Support

1999 \$1,576,000 Interior/Enewetak
Agriculture/Support

2000 \$1,191,000 Interior/Enewetak
Agriculture/Support

2001 \$1,388,000 Interior/Enewetak
Agriculture/Support

Total \$146,167,000 (\$273,370,000 in '03 funds)

Rongelap Projects

Section 103(i) of the Compact of Free Association Act of 1985 acknowledges the U.S. Government's responsibility to "restore Rongelap island ... so that it can be safely inhabited." Moreover, in this section of the Compact Act, the Congress authorized "[s]uch sums as are necessary ... as to steps needed to restore the habitability of Rongelap Island ... to be made available to the Government of the Marshall Islands."

Year Amount USG Source/Purpose

Trust Fund

1954-02 55,174,000 Radiological and health monitoring.

1992 1,975,000 This figure includes \$493,700 from the FY 1992 Department of the Interior and Related Agencies Appropriations Act (PL 102-154) to be spent for improving the living conditions of the Rongalapese on Mejjatto.

1993 1,983,000

1994 1,983,000

1995 783,000 Interior/In addition to the \$1,200,000 appropriated in FY 1995 (PL 102-332) so that the Rongelap Atoll Local Government (RALGov) Council could hire a competent counsel, an experienced city manager to put RALGov's Administration in order, especially its financial records, and build democratic institutions.

1995 5,000,000 Defense

Total \$66,898,000 (Plus \$5,000,000 in potential earnings)
(\$71,440,000 in '03 funds)

Grants

1996 6,403,000

20,000,000 Reprogrammed in 1996

Total \$26,403,000 (\$31,160,000 in '03 funds)

Utrik Projects

Year Amount USG Source/Purpose

1954-02 \$20,690,000 Radiological and health monitoring.

1970-94 Energy/radiological and health monitoring

1970-94 Agriculture/Surplus Commodity Food Program

1984 \$1,000,000 Energy (P.L. 97-257)/Four Atoll Health Program

1985 \$22,500,000 Interior (P.L. 99-239)/Nuclear Claims Compensation

Total \$44,190,000 (\$61,810,000 '03 funds)

Appendix C: Descriptions of Federal Radiation Exposure Programs

DEPARTMENT OF JUSTICE (RADIATION EXPOSURE COMPENSATION ACT)

On October 15, 1990, Congress passed the Radiation Exposure Compensation Act (the "Act"), 42 U.S.C. • 2210 note (1994), providing for compassionate payments to individuals who contracted certain cancers and other serious diseases as a result of their exposure to radiation released during above-ground nuclear weapons tests or as a result of their exposure to radiation during employment in underground uranium mines. Implementing regulations were issued by the Department of Justice and published in the Federal Register on April 10, 1992, establishing procedures to resolve claims in a reliable, objective, and non-adversarial manner, with little administrative cost to the United States or to the person filing the claim. Revisions to the regulations, published in the Federal Register on March 22, 1999, served to greater assist claimants in establishing entitlement to an award.

On July 10, 2000, P.L. 106-245, the "Radiation Exposure Compensation Act Amendments of 2000," was enacted. Some of the widespread changes include new claimant populations, additional compensable diseases, lower radiation exposure thresholds, modified medical documentation requirements, and removal of certain disease restrictions. There are now five categories of claimants: uranium miners, uranium millers, ore transporters, downwinders, and onsite participants. Each category requires similar eligibility criteria: exposure to radiation and existence of a compensable disease.

Uranium Miners: RECA 2000 specifies a payment of \$100,000 to eligible individuals employed in an above-ground or underground uranium mine located in Colorado, New Mexico, Arizona, Wyoming, South Dakota, Washington, Utah, Idaho, North Dakota, Oregon, and Texas at any time during the period beginning on January 1, 1942, and ending on December 31, 1971. Additional mining states may be included for compensation upon application.

A. Exposure. The claimant must have been exposed to 40 or more working level months (WLMs) of radiation while employed in a uranium mine.

B. Disease. Compensable diseases include primary lung cancer and certain non-malignant respiratory diseases.

Uranium Millers: RECA 2000 specifies a payment of \$100,000 to eligible individuals employed in an uranium mill located in Colorado, New Mexico, Arizona, Wyoming, South Dakota, Washington, Utah, Idaho, North Dakota, Oregon, and Texas at any time during the period beginning on January 1, 1942, and ending on December 31, 1971.

A. Exposure. The claimant must have worked for at least one year during the relevant time period.

B. Disease. Compensable diseases include primary lung cancer, certain non-malignant respiratory diseases, renal cancer, and other chronic renal disease

including nephritis and kidney tubal tissue injury.

Ore Transporters: RECA 2000 specifies a payment of \$100,000 to eligible individuals employed in the transport of uranium ore or vanadium-uranium ore from mines or mills located in Colorado, New Mexico, Arizona, Wyoming, South Dakota, Washington, Utah, Idaho, North Dakota, Oregon, and Texas at any time during the period beginning on January 1, 1942, and ending on December 31, 1971.

A. Exposure. The claimant must have worked for at least one year during the relevant time period.

B. Disease. Compensable diseases include primary lung cancer, certain non-malignant respiratory diseases, renal cancer, and other chronic renal disease including nephritis and kidney tubal tissue injury.

Downwinders: The Act specifies a payment of \$50,000 to an individual who was physically present in one of the affected areas downwind of the Nevada Test Site during a period of atmospheric nuclear testing, and later contracted a specified compensable disease.

A. Exposure. The claimant must have lived or worked downwind of atmospheric nuclear tests in certain counties in Utah, Nevada and Arizona for a period of at least two years during the period beginning on January 21, 1951, and ending on October 31, 1958, or, for the period beginning on June 30, 1962, and ending on July 31, 1962. The designated affected areas are: in the State of Utah, the counties of Beaver, Garfield, Iron, Kane, Millard, Piute, San Juan, Sevier, Washington, and Wayne; in the State of Nevada, the counties of Eureka, Lander, Lincoln, Nye, White Pine, and that portion of Clark County that consists of townships 13 through 16 at ranges 63 through 71; and in the State of Arizona, the counties of Apache, Coconino, Gila, Navajo, and Yavapai.

B. Disease. After such period of physical presence, the claimant contracted one of the following specified diseases: leukemia (other than chronic lymphocytic leukemia), lung cancer, multiple myeloma, lymphomas (other than Hodgkin's disease), and primary cancer of the thyroid, male or female breast, esophagus, stomach, pharynx, small intestine, pancreas, bile ducts, gall bladder, salivary gland, urinary bladder, brain, colon, ovary, or liver (except if cirrhosis or hepatitis B is indicated).

Onsite Participants: The Act specifies a payment of \$75,000 to individuals who participated onsite in a test involving the atmospheric detonation of a nuclear device, and later developed a specified compensable disease.

A. Exposure. The claimant must have been present "onsite" above or within the official boundaries of the Nevada, Pacific, Trinity, or South Atlantic Test Sites at any time during a period of atmospheric nuclear testing and must have "participated" during that time in the atmospheric detonation of a nuclear device.

B. Disease. After the onsite participation, the claimant contracted one of the following specified diseases: leukemia (other than chronic lymphocytic leukemia), lung cancer, multiple myeloma, lymphomas (other than Hodgkin's disease), and primary cancer of the thyroid, male or female breast, esophagus, stomach, pharynx, small intestine, pancreas, bile ducts, gall bladder, salivary gland, urinary bladder, brain, colon, ovary, or liver (except if cirrhosis or hepatitis B is indicated).

VETERANS ADMINISTRATION

Presumptive Program: Veterans who participated in nuclear tests by the U.S. including certain underground tests at Amchitka Island, Alaska, prior to January 1, 1974, or who served with the U.S. occupation forces in Hiroshima or Nagasaki, Japan, between August 1945 and July 1946, or who were prisoners of war in Japan, or some who served at the gaseous diffusion plants listed above are eligible for compensation for cancers specified in federal law. The 21 types of cancer covered under the presumptive program are: all forms of leukemia except chronic lymphocytic leukemia; cancer of the thyroid, bone, brain, breast, colon, lung, ovary, pharynx, esophagus, stomach, small intestine, pancreas, bile ducts, gall bladder, salivary gland and urinary tract (kidneys, renal pelvis, ureter, urinary bladder and urethra); lymphomas (except Hodgkin's disease); multiple myeloma; primary liver cancer; and bronchio-alveolar carcinoma (a rare lung cancer).

Non-presumptive Program: For radiation-related diseases not covered in the presumptive program, regulations provide for consideration of disability compensation claims from veterans exposed to radiation during military service. Under the non-presumptive program, additional factors must be considered to determine service-connection, including amount of radiation exposure, duration of exposure and elapsed time between exposure and onset of disease.

VA regulations define all cancers as potentially radiogenic, as well as certain other non-malignant conditions, such as posterior subcapsular cataracts; non-malignant thyroid nodular disease; parathyroid adenoma; and tumors of the brain and central nervous system.

DEPARTMENT OF ENERGY:

Public Law 106-398; 114 Stat. 1654A-394); 42 U.S.C. 7384 et seq.) is amended as follows: (1) Certain leukemia as specified cancer.--Section 3621(17) (114 Stat. 1654A-502; 42 U.S.C. 7384(17)), as amended by section 2403 of the Supplemental Appropriations Act, 2001 (Public Law 107-20; 115 Stat. 175), is further amended by adding at the end the following new subparagraph: "(D) Leukemia (other than chronic lymphocytic leukemia), if initial occupational exposure occurred before 21 years of age and onset occurred more than two years after initial occupational exposure."

"...based on the radiation dose received by the employee (or a group of employees performing similar work) at such facility and the upper 99 per-cent confidence interval of the probability of causation in the radioepidemiological tables published under section 7(b) of the Orphan Drug Act (42 20U.S.C. 241 note), as such tables may be updated under section 7(b)(3) of such Act from time to time..."

Data Required to Estimate Probability of Causation:

Sec. 81.5 Use of Personal and Medical Information. Determining probability of causation may require the use of the following personal and medical information provided to DOL by claimants under DOL regulations 20 CFR part 30:

- (a) Year of birth.
- (b) Cancer diagnosis (by ICD-9 code) for primary and secondary cancers.
- (c) Date of cancer diagnosis.
- (d) Gender.
- (e) Race/ethnicity (if the claim is for skin cancer or a secondary cancer for which skin cancer is a likely primary cancer).
- (f) Smoking history (if the claim is for lung cancer or a secondary cancer for which lung cancer is a likely primary cancer).
- (g) This information will include annual dose estimates for each year in which a dose was incurred, together with uncertainty distributions associated with each dose estimate. Dose estimates will be distinguished by type of radiation (low linear energy transfer (LET), protons, neutrons, alpha, low-energy x-ray) and by dose rate (acute or chronic) for external and internal radiation dose.

Appendix D: Table of Radiation Compensation Programs:

RMI Nuclear Claims Tribunal, U.S. Veterans Administration (VA), U.S. Department of Justice (DOJ) and the U.S. Department of Energy (DOE)

	VA	DOJ	DOE	NCT
Tumors of the salivary gland (malignant)		\$50,000	\$150,000	\$50,000
Cancer of the pharynx		\$50,000	\$150,000	\$100,000
Cancer of the esophagus		\$50,000	\$150,000	\$125,000
Cancer of the stomach		\$50,000	\$150,000	\$125,000
Cancer of the small intestine		\$50,000	\$150,000	\$125,000
Cancer of the colon		\$50,000	\$150,000	\$75,000
Cancer of the cecum		\$50,000	\$150,000	\$75,000

Cancer of the rectum		\$50,000	\$150,000	\$75,000
Cancer of the liver (except if cirrhosis or hepatitis B is indicated)		\$50,000	\$150,000	\$125,000
Cancer of the bile ducts		\$50,000	\$150,000	\$125,000
Cancer of the gall bladder		\$50,000	\$150,000	\$125,000
Cancer of the pancreas		\$50,000	\$150,000	\$125,000
Bronchial cancer (including cancer of the lung and pulmonary system)		\$100,000	\$150,000	\$37,500
Cancer of the bone			\$150,000	\$125,000
Non-melanoma skin cancer in individuals who were diagnosed as having suffered beta burns)				\$37,500
Cancer of the breast (not recurrent or requires lumpectomy)		\$50,000	\$150,000	\$75,000
Cancer of the breast (recurrent or requires mastectomy)		\$50,000	\$150,000	\$100,000
Cancer of the ovary		\$50,000	\$150,000	\$125,000
Cancer of the urinary tract		\$50,000	\$150,000	\$75,000
Cancer of the kidney		\$50,000	\$150,000	\$75,000
Tumors of the brain, including schwannomas (excluding other benign neural tumors)		\$50,000	\$150,000	\$125,000
Cancer of the central nervous system				\$125,000
Cancer of the thyroid (recurrent)		\$50,000	\$150,000	\$75,000
Cancer of the thyroid (non-recurrent)		\$50,000	\$150,000	\$50,000
Tumors of the parathyroid gland (malignant)				\$50,000
Lymphomas (except Hodgkin disease)		\$50,000	\$150,000	\$100,000
Multiple myeloma		\$50,000	\$150,000	\$125,000
Leukemia (other than chronic lymphocytic leukemia)		\$50,000	\$150,000	\$125,000
Tumors of the salivary gland (benign and requiring surgery)				\$37,500
Tumors of the salivary gland (benign and not requiring surgery)				\$12,500
Non-malignant thyroid nodular disease (unless limited to occult nodules – total thyroidectomy)				\$50,000
Non-malignant thyroid nodular disease (unless limited to occult nodules – partial thyroidectomy)				\$37,500
Non-malignant thyroid nodular disease (unless limited to occult nodules – not requiring thyroidectomy)				\$12,500
Parathyroid adenoma				
Meningioma				\$100,000
Non-malignant brain and central nervous system tumors				
Radiation sickness diagnosed between June 30, 1946 and August 18, 1958, inclusive)				\$12,500
Beta burns diagnosed between June 30, 1946 and August 18, 1958, inclusive)				\$12,500
Unexplained hyperparathyroidism				\$12,500
Unexplained hypothyroidism (unless thyroiditis indicated)				\$37,500
Severe growth retardation due to thyroid damage				\$100,000
Severe mental retardation (provided born between May and September 1954, inclusive, and mother was present on Rongelap or Utirik Atolls at any time in March 1954)				\$100,000
Unexplained bone marrow failure				\$125,000
Chronic kidney disease		\$100,000		
Chronic respiratory disease		\$100,000		

The U.S. Veterans Administration (VA) pursuant to the Radiation-Exposed Veterans Compensation Act provides compensation to veterans and their survivors

proportional to disability and family considerations. Although it is not possible to assign a lump-sum payment it is unlikely that a veteran would receive more than \$35,000 per year in wages in addition to VA provided medical care under the Veterans Health Reform Act. Veterans who worked at one of the Department of Energy Gaseous Diffusion Plants are also eligible for lump sum payments in addition to any VA compensation.

The U.S. Department of Justice (DOJ) Radiation Exposure Compensation Act Amendments of 2000 updated the original program that provides radiation compensation as a lump-sum payment. Uranium miners, millers and ore transporters are covered as well as people living downwind of the Nevada Test Site. Uranium workers receiving a DOJ payment are also eligible, under certain circumstances to receive additional \$50,000 compensation from the U.S. Department of Energy compensation program.

The U.S. Department of Energy (DOE) Employees Occupational Illness Compensation Program Act provides compensation to workers diagnosed with radiation-related cancer if: the employee developed cancer after working at a facility of the Department of Energy. Federal employees, contractors, and subcontractors are eligible. The employee's cancer is judged to be "at least as likely as not related to that employment" in accordance with guidelines issued by the Department of Health and Human Services. The worker or surviving family member receive a lump-sum payment, exposed people who are living are also eligible for workers compensation from their respective state agency to cover medical costs and lost wages.

The Nuclear Claims Tribunal (NCT) was established as an independent entity within the Republic of the Marshall Islands to adjudicate claims of radiation illness and loss of use of land. Lump-sum awards are made to people with specified conditions but are paid out periodically over a number of years. The RMI Government gave the NCT full authority to determine what medical conditions it would consider radiation-related. The NCT makes awards without testing the likelihood of exposure.

Appendix E: Executive Summary Included in "Findings of the Nationwide Radiological Study of the RMI"

Summary Report, prepared for the Cabinet of the Government of the RMI, December 1994, by Dr. Steve Simon, Study Director

For a five-year period (1989-1994), the RMI Government has undertaken an assessment of radiological conditions throughout the nation. This scientific work was performed in accordance with the Section 177 Agreement which dedicated funding for radiological monitoring activities. The RMI Nationwide Radiological Study has measured radiation in the environment and gathered samples of food crops, soil and water at all of atolls and at every island of significant size. These samples were subsequently analyzed at the environmental radiation laboratory in Majuro. The Study has also reviewed previous scientific information about the nuclear tests, consulted with the international scientific community, met with outer island communities and their leaders, conducted the specialized work of the Rongelap Resettlement Project, and examined the health effects of radiation exposure, especially thyroid disease.

The Study has determined the levels of radioactivity retained in the environment at locations throughout the country. The radioactive element cesium is the largest contributor to radiation exposure, partly because it enters the food crops through the roots of plants. At most locations in the Marshall Islands, the amount of cesium is about the same, or only slightly higher, than it would be at other tropical locations throughout the world. The Study found evidence of local radioactive fallout in the northern portion of Kwajalein Atoll and at Wotje Atoll and at islands and atolls north of these locations.

From the present levels of radiation in the environment, the Study is able to estimate the cumulative radiation that an individual might have received from the environment since the end of the testing program in 1958.

The Study has also estimated the exposure levels that would be encountered by people living at different locations throughout the country. The radiation dose than an individual might receive is the sum of the external dose received directly from the environment and internal dose coming from food and drink. From these calculations, the Study has determined that the use of some of the islands in the four atolls should be restricted: Bikini, Enewetak, Rongelap and Rongerik. While other atolls and islands received fallout from the nuclear tests, the amount of radioactivity remaining in the environment has diminished to levels that are not of concern. However, the present measurements cannot eliminate the possibility that exposure to radioisotopes of iodine may have been of radiological concern. Therefore, a special study of thyroid disease throughout the Marshall Islands has been implemented and should be completed.

Appendix F: References

SECTIONS 3.1 AND 3.2

Boyce RL. Statement of Ralph L. Boyce, Deputy Assistant Secretary of State, East Asian and the Pacific Affairs, Department of State. In: The Status of Nuclear Claims, Relocation and Resettlement Efforts in the Marshall Islands. Hearing Before the Committee on Resources, House of Representatives, One Hundred Sixth Congress, First Session, May 11, 1999, Washington, D.C.

Hamilton TF. Rongelap Resettlement Support - Preliminary Report Part 1. In-situ gamma spectrometric measurements around the service and village area on Rongelap Island. Lawrence Livermore National Laboratory Report No. UCRL-143680, April 2001.

Hamilton T, Hickman D, Conrado C, Brown T, Brunk J, Marchetti A, Cox C, Martinelli R, Kehl S, Arelong E, Langinbelik S, Bell RT, Petersen G. Individual radiation protection monitoring in the Marshall Islands: Rongelap Island resettlement support (1998-2001). Lawrence Livermore National Laboratory Report No. UCRL-LR-149600, June 2002a.

Hamilton T, Hickman D, Conrado C, Brown T, Brunk J, Marchetti A, Cox C, Martinelli R, Kehl S, Johannes K, Henry D, Bell RT, Petersen G. Individual radiation protection monitoring in the Marshall Islands: Enewetak Island resettlement support (May-December 2001). Lawrence Livermore National Laboratory Report No. UCRL-LR-149601, June 2002b.

International Atomic Energy Agency. Radiological conditions at Bikini Atoll: Prospects for resettlement. Vienna: IAEA, 1998.

McEwan AC, Simon SL, Baverstock KF, Trott KR, Sankaranarayanan K, Paretzke HG. Some reflections on the role of the Scientific Advisory Panel to the Marshall Islands nationwide radiological study. Health Physics 1997, 73(1):265-269.

National Research Council, Committee on Radiological Safety in the Marshall Islands. Radiological assessments for resettlement of Rongelap in the Republic of the Marshall Islands. Washington, D.C.:NRC, 1994.

National Research Council. Evaluation of Enewetak radioactivity containment. Committee on Evaluation of Enewetak Radioactivity Containment, Advisory Board on the Built Environment, Commission on Sociotechnical Systems. Washington, D.C.: National Academy Press, 1982.

Nuclear Claims Tribunal annual report to the Nitijela for the calendar year 1999. Majuro: NCT, 1999.

Robison WL, Noshkin VE, Hamilton TF, Conrado CL, Bogen KT. An assessment of the current day impact of various materials associated with the U. S. nuclear test program in the Marshall Islands. Lawrence Livermore National Laboratory Report No. UCRL-LR-143980, May 2001.

Seligman PJ. Statement of Dr. Paul J. Seligman, M.D., M.P.H., Deputy Assistant Secretary for Health Studies, U.S. Department of Energy. In: The Status of Nuclear Claims, Relocation and Resettlement Efforts in the Marshall Islands. Hearing Before the Committee on Resources, House of Representatives, One Hundred Sixth Congress, First Session, May 11, 1999, Washington, DC.

Simon SL and Graham JC. 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, December 1994. RMI Nationwide Radiological Study/Ministry of Foreign Affairs, Majuro Marshall Islands.

Simon SL and Graham JC. Findings of the First Comprehensive Radiological Monitoring Program of the Republic of the Marshall Islands. Health Physics 1997a, 73:66-85.

Simon SL, Robison WL, Thorne MC, Toburen LH, Franke B, Baverstock KF, Pettingill HJ. A Comparison of Independently Conducted Dose Assessment to Determine Compliance and Resettlement Options for the People of Rongelap Atoll. Health Physics 1997b, 73:133-151.

Simon SL and Graham JC. A comparison of aerial and ground level measurements of ¹³⁷Cs in the Marshall Islands. Environmental Monitoring and Assessment 1998, 53:363-377.

Stayman AP. Statement of Allen P. Stayman, Director of the Office of Insular Affairs, Department of the Interior, before The House Committee on Resources Regarding Radiation-Related Matters and the Resettlement, Relocation, and Radiological Rehabilitation of the Bikini, Enewetak, Rongelap and Utrik Atolls, May 11, 1999.

Takahashi T, Schoemaker MJ, Trott KR, Simon SL, Fujimori K, Takahashi T, Trott KR, Fujimori K, Nakashima N, Ohtomo H, Schoemaker MJ, Simon SL. Thyroid disease in the Marshall Islands: Findings from 10 years of study. Sendai: Tohoku University Press, 2001.

Tipton WJ and Meibaum RA. An aerial radiological and photographic survey of eleven atolls and two islands within the northern Marshall Islands. U.S. Department of Energy Report No. EGG-1183-1758, June 1981.

SECTION 3.3

Behling H, Mauro J, Behling, K. Reassessment of Acute Radiation Doses Associated with BRAVO Fallout. McLean, VA: S. Cohen and Associates. May 2000.

Breslin AJ, Cassidy ME. Radioactive Debris from Operation Castle, Islands of the Mid Pacific. NYO-4623. United States Atomic Energy Commission, New York Operations Office, Health and Safety Division. Available from Las Vegas: Coordination and Information Center. 1955.

DNA. Compilations of local fallout data from test detonations 1945-1962 extracted from DASA 1251, Volume 11-Oceanic U.S. tests. Prepared by the General Electric Company-TEMPO. Washington, D.C.: Defense Nuclear Agency, 1979.

Environmental Measurements Laboratory (EML). EML Procedures Manual, HASL-300. 28th edition, available at <http://www.eml.doe.gov/publications/procman/>. 1997.

ICRP. 1990 Recommendations of the International Commission on Radiological Protection, ICRP Publication 60, International Commission on Radiological Protection. Oxford: Pergamon Press. 1990.

Joint Committee on Atomic Energy (JCAE). The Nature of Radioactive Fall-Out and Its Effects on Man, Part 1, Washington, D.C. 1957.

Lessard E, Miltenberger R, Conard R, Musolino S, Naidu J, Moorthy A, Schopfer C. Thyroid Absorbed Dose for People at Rongelap, Utrik and Sifo on March 1, 1954 BNL 51882. Upton, NY: Brookhaven National Laboratory, Safety and Environmental Protection Division. 1985.

MedlinePlus Health Information, A service of the National Library of Medicine. Web page: "Urine 24 hr volume." Available at <http://www.nlm.nih.gov/medlineplus/ency/article/003425.htm>. Accessed June 6, 2002.

National Research Council. Health effects of exposure to low levels of ionizing radiation: BEIR V. Washington D.C.: NAS, 1990:181.

National Research Council. The effects on populations of exposure to low levels of ionizing radiation. BEIR I. Washington D.C.: National Academy of Sciences, 1972.

National Research Council. The effects on populations of exposure to low levels of ionizing radiation: 1980. BEIR III. Washington D.C.: National Academy of Sciences, 1980.

Peterson K, CASTLE-BRAVO Air Concentrations and Deposition Patterns from a 3-D Particle-in-Cell Code. UASG 81-20, Livermore, CA: Lawrence, Livermore National Laboratory, 1981.

Robison WL, Noshkin VE, Conrado CL, Eagle RJ, Brunk JL, Jokela TA, Mount ME, Phillips WA, Stoker AC, Stuart ML, Wong KM. The northern Marshall Islands radiological survey: data and dose assessments. Health Physics 73(1):37-48, 1997.

Sharp R, Chapman WH. Report to the scientific director: Exposure of Marshall Islanders and American military personnel to fallout, WT-938, Operation Castle Project 4.1 Addendum. Bethesda, MD: Naval Medical Research Institute, 1957. Extract version prepared for Defense Nuclear Agency (Washington, D.C.) 1980.

Simon SL, Graham JC. Findings of the Nationwide Radiological Study: Summary Report, submitted to the Cabinet of the Government of the Republic of the Marshall Islands. December 1994. Available from Ministry of Foreign Affairs, Government of the Republic of the Marshall Islands, Majuro, Marshall Islands, 96960. 1994.

Simon SL, Graham JC. Findings of the First Comprehensive Radiological Monitoring Program of the Republic of the Marshall Islands. Health Physics 73(1):66-85. 1997.

Sondhaus CA, Bond VP. Physical factors and dosimetry in the Marshall Island radiation exposures. Operation CASTLE, Pacific Proving Grounds addendum report for Project 4.1. WT-939(del). San Francisco, CA: U.S. Naval Radiological Defense Laboratory. 1959.

U.S. Department of Energy. Closing the circle on the splitting of the atom: The environmental legacy of nuclear weapons production in the United States and what the Department of Energy is doing about it. Washington, D.C.: DOE, 1995.

U.S. Department of Energy. Order DOE 5400.5, Radiation protection of the public and the environment, February 8, 1990 & supplements dated June 6, 1990 and September 4, 1992. Washington, D.C.: DOE.

U.S. Environmental Protection Agency. Federal radiation protection guidance for exposure of the general public. Federal Register, December 24, 1994. [22 FR 4402].

U.S. Nuclear Regulatory Commission. Standards for protection against radiation; Final rule. In: 10 CFR Part 20, 56 FR 23391, May 21, 1991.

U.S. Office of the President. Federal radiation protection guidance. Federal Register, May 18, 1960. [54 FR 51654].

SECTION 5

Omnibus Territories Act of 1977, Section 104(a)(4). Public Law 95-134. 91 Stat. 1162.

Compact of Free Association Act of 1985, Section 103(h)(1). Public Law 99-239. 91 Stat. 1159.

Office of Environment, Safety and Health; Notice of availability of funds and Request for Applications to deliver special medical care in the Marshall Islands. Federal Register 1997, 62:177:48065-73.

Department of Energy/Office of Environment, Safety and Health: Draft Notice of Availability of Funds and Request for Applications for the Department of Energy Medical Program in the Republic of the Marshall Islands, 62 Fed. Reg. 29125 (May 29, 1997).

SECTION 8

Bell RT. Comments on the Marshall Islands proposed medical monitoring and treatment legislation S1804 and other matters, June 20, 1996. U.S. Department of Energy, Office of Health Studies, Marshall Islands Program Document No. vfc/ O970000GW.PDF.

Bikini Atoll Rehabilitation Committee, Report No. 1, Resettlement of Bikini Atoll: Feasibility and estimated cost of meeting the Federal Radiation Protection Standards. Prepared by the Bikini Atoll Rehabilitation Committee for the U.S. Congress, House and Senate Committees on Interior Appropriations pursuant to Public Law 97-257. Berkeley: BARC, November 15, 1984.

Bikini Atoll Rehabilitation Committee, Supplementary Report No. 1, Environmental assessment for initial resettlement of Eneu Island, Bikini Atoll. Prepared by the U.S. Army Corps of Engineers, Pacific Ocean Division for the U.S. Congress, House and Senate Committees on Interior Appropriations pursuant to Public Law 97-257. Berkeley: BARC, January 1, 1987.

Church BW. History of cleanup standards/criteria at nuclear test and accident sites. Session XVI - Thirteenth Technical Information Exchange Workshop, Albuquerque, New Mexico, November 12-15, 2001. Washington, D.C.: U.S. Department of Energy, Office of Environmental Management..

Friesen B. Enewetak radiological support project: Final report, September 1982. U.S. Department of Energy, Nevada Operations Office Report NVO-213. Las Vegas: NVO, 1982, Chapter 2.

Hamilton T. Personal communication regarding cleanup standards.

International Atomic Energy Agency. Application of radiation protection principles to the cleanup of contaminated areas. IAEA-TECDOC-987. Vienna: IAEA, 1997.

International Atomic Energy Agency. Radiological conditions at Bikini Atoll: Prospects for resettlement. Radiological Assessment Reports Series. Vienna: IAEA, 1998.

International Commission on Radiological Protection. Protection of the Public in Situations of Prolonged Radiation Exposure, ICRP-85. Annals of the ICRP 2000, 29 (Issues 1 & 2).

Mauro J. Statement by John Mauro before the Committee on Resources regarding the status of nuclear claims, relocation, and resettlement efforts in the Marshall Islands. U.S. House of Representatives, May 11, 1999.

Monroe RR, Peters R, Wilson DL. The radiological cleanup of Enewetak atoll. Defense Nuclear Agency, 1981.

Robison WL, Phillips WA, Mount ME, Clegg BR, Conrado CL. Reassessment of the potential radiological doses for residents resettling Enewetak Atoll. Livermore National Laboratory Report No. UCRL-53066, October 1980.

Robison WL, Conrado CL, Phillips WA. Enjebi Island dose assessment. Lawrence Livermore National Laboratory Report No. UCRL-53805, July 1987.

Robison WL, Bogen KT, Conrado CL. An updated dose assessment for a U.S. nuclear test site – Bikini Atoll. Lawrence Livermore National Laboratory Report No. UCRL-ID-122368, 1995.

Robison WL, Stone EL. The evaluation of critical pathways, radionuclides, and remedial measures for reducing the radiological dose to returning populations at a former nuclear test site. U.S. Department of Energy, Waste Management Symposium, Session 17, 1998.

Robison WL, Conrado CL, Bogen KT. Utirik Atoll dose assessment. Lawrence Livermore National Laboratory Report No. UCRL-LR-135953, October 1999a.

Robison WL, Conrado C, Stuart M, Stoker A, Hamilton t. Resettlement of Bikini Atoll – U.S. nuclear test site. In: International Symposium on Restoration of Environments with Radioactive Residues. International Atomic Energy Agency, IAEA-SM-359. Arlington, VA, 1999b.

Simon SL, Graham JC. Findings of the Nationwide Radiological Study, Republic of the Marshall Islands, Summary Report. Majuro: NWRS, 1994.

Simon SL, Robison WL, Thorne MC, Toburen LH, Franke B, Baeverstock KF, Pettingill HJ. A Comparison of Independently Conducted Dose Assessment to Determine Compliance and Resettlement Options for the People of Rongelap Atoll. Health Physics 1997, 73:133-151.

U.S. Department of Energy. Linking legacies: Connecting the cold war nuclear weapons production process to their environmental consequences. Washington, D.C.: U.S. DOE, Office of Environmental Management, January 1997, chapter 4.

Weber JM. Final Report, Task 1: Cleanup levels at other sites. Radionuclide Soil Action Level Oversight Panel. Risk Assessment Corporation. RAC Report No. 6-RSALOP-RFSAL-1999-FINAL, RAC: 1999.

SECTION 10

Hamilton, T., and others. Status of Environmental Assessments On and Around Runit Island, Enewetak Atoll. Lawrence Livermore National Laboratory, 2004 (unpublished.)