

Consequential Damages of Nuclear War: The Rongelap Report

Barbara Rose Johnston and Holly M. Barker

*This book is dedicated
with respect and admiration
for those who can no longer tell their story in person
but whose experiences are partly recounted here.*

Alab and former Mayor of Rongelap, John Anjain
Mr. George Anjain
Ms. Almira Matayoshi

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Prologue

The Consequential Damages of Nuclear War: The Rongelap Report is a reprint of an expert witness report submitted to the Republic of the Marshall Islands Nuclear Claims Tribunal (NCT) in September 2001. It was prepared by Barbara Rose Johnston and Holly M. Barker at the request of the NCT Public Advocate Bill Graham with funding provided by the Tribunal. The report served as evidence in the Nuclear Claims Tribunal hearing on hardship, pain, suffering and consequential damages experienced by the people of Rongelap, Rongerik and Ailinginae as a result of the actions and activities of the United States nuclear weapons testing program. The hearing took place in Majuro, the capital city of the Republic of the Marshall Islands from October 29 – November 2, 2001. The report is published in book form, at this time, for a number of reasons that are outlined in this introductory chapter.

The Rongelap Report tells the story of the myriad of changes that occur to a community whose lives and lands are heavily contaminated with radioactive fallout. In 1946, after evacuating the people of Bikini and other nearby atoll communities in the Marshall Islands, the United States detonated two atomic weapons: the same type of bomb that was dropped on Nagasaki in 1945. In 1947, the United Nations designated the Marshall Islands a United States Trust Territory. Over the next eleven years this U.S. territory played host to another sixty-five atmospheric atomic and thermonuclear tests. The largest of these tests, code named “Bravo,” was detonated on March 1, 1954. This 15-megaton hydrogen bomb purposefully exploded close to the ground, melting huge quantities of coral atoll, sucking it up and mixing it with radiation released by the weapon

before depositing on the islands and inhabitants in the form of ash, or radioactive fallout. The wind was blowing that morning in the direction of inhabited atolls, including Rongelap and Utrik, some 100 and 300 miles from the test site at Bikini. The Marshallese communities on Rongelap, Ailinginae and Utrik Atolls, American servicemen on Rongerik Atoll (weathermen who were monitoring winds and fallout), and the 23-man crew of the Japanese fishing vessel Fukuryu Maru (Lucky Dragon), received near-lethal doses of radiation from the Bravo event.¹

International protests and calls for a ban on nuclear weapons testing prompted the United States government to publicly acknowledge the incident and accept liability. The Marshallese filed an April 20, 1954 complaint to the United Nations Trusteeship Council:

... We, the Marshallese people feel that we must follow the dictates of our consciences to bring forth this urgent plea to the United Nations, which has pledged itself to safeguard the life, liberty and the general well being of the people of the Trust Territory, of which the Marshallese people are a part.
... The Marshallese people are not only fearful of the danger to their persons from these deadly weapons in case of another miscalculation, but they are also very concerned for the increasing number of people who are being removed from their land.
... Land means a great deal to the Marshallese. It means more than just a place where you can plant your food crops and build your houses; or a place where you can bury your dead. It is the very life of the people. Take away their land and their spirits go also... (“Petition from the Marshallese People Concerning the Pacific Islands: Complaint regarding explosion of lethal weapons within our home islands.” United Nations Trusteeship Council:T/PET.10/28).²

In response to this petition the United States assured the General Assembly of the United Nations that:

The fact that anyone was injured by recent nuclear tests in the Pacific has caused the American people genuine and deep regret... The United States Government considers the resulting petition of the Marshall Islanders to be both reasonable and helpful... The Trusteeship Agreement of 1947 which covers the Marshall Islands was predicated upon the fact that the United Nations clearly approved these islands as a strategic area in which atomic tests had already been held.

Hence, from the onset, it was clear that the right to close areas for security reasons anticipated closing them for atomic tests, and the United Nations was so notified; such tests were conducted in 1948, 1951, 1952 as well as in 1954... The question is whether the United States authorities in charge have exercised due precaution in looking after the safety and welfare of the Islanders involved. That is the essence of their petition and it is entirely justified. In reply, it can be categorically stated that no stone will be left unturned to safeguard the present and future well-being of the Islanders. (Mears, UN Press Release #1932:1954).³

The United States promised the Marshallese and the United Nations General Assembly that “Guarantees are given the Marshallese for fair and just compensation for losses of all sorts...” (Midkiff, UN Press Release #1932:1954).⁴

These guarantees worked: the United States was able to continue its atmospheric weapons testing program in the Marshall Islands through 1958, and at their Nevada test site through 1963 when the United States, Great Britain and the Soviet Union finally signed on to a Limited Test Ban Treaty.

The United States has not, however, been able to fully live up to its promises to the United Nations nor the Marshallese people to safeguard their well-being. As documented in the previously-classified studies cited in our expert witness report, atmospheric weapons testing program in the Pacific resulted in considerable human and environmental harm.

Global atmospheric nuclear weapons tests released numerous radioisotopes and dangerous heavy metals, of which an estimated 2% of the radioactive fallout was iodine-131, a highly radioactive isotope with an 8-day half-life. The nuclear war games conducted by the United States in the Marshall Islands released some *8 billion* curies of iodine-131.⁵ To place this figure in broader context, over the entire history of nuclear weapons testing at the Nevada Proving grounds some *150 million* curies of iodine-

131 were released, and varying analyses of the Chernobyl nuclear power plant disaster estimate an iodine-131 release of *40 to 54 million curies*.⁶ Much of the iodine-131 released in the Marshall Islands was the by-product of the March 1, 1954 Bravo test detonation of the hydrogen bomb. Designed to produce and contain as much radioactive fallout in the immediate area as possible, in order to create laboratory-like conditions, Bravo unleashed as much explosive yield as the equivalent of one thousand Hiroshima-size bombs. Communities living down-wind from the blast, especially the Rongelap community, were acutely exposed to its fallout.

Evacuated three days after the blast, the people of Rongelap spent three months under intense medical scrutiny as human subjects in Project 4.1, three years as refugees, and were returned to their still-contaminated atoll in 1957 with assurances that their islands were now safe. They lived on Rongelap for another 28 years, and as the closest populated atoll to the Pacific Proving Grounds, they were exposed to additional fallout from another series of nuclear tests in 1958. While living on Rongelap, the community was visited annually, and later biannually, by U.S. Government scientists and medical doctors conducting follow-up studies begun under Project 4.1. Researchers collected fish, plants, soil, and human body samples to document the presence of radioisotopes deposited from the 67 tests, the movement of these isotopes through the food chain and the human body, and the adverse health impact of this radiation on the human body. The community left Rongelap in 1985 after receiving information from some United States scientists that confirmed their long-held fears that their ancestral homeland was contaminated with radiation at levels that posed a serious risk to their health. Today, the Rongelap community lives in exile, largely on borrowed or rented lands in Kwajalein and

Majuro Atolls. Recent efforts to remediate fallout hazards on areas of some islands and rebuild homes and community structure on the island of Rongelap suggest that the community may, someday soon, have the choice of returning home. Whether or not remediation is successful and people decide to return, remains to be seen.

<Insert Map 1. Marshall Islands>

The Rongelap Report examines the nuclear weapons testing program and its affect on host communities from the point of view of the people of Rongelap. Their recent history is sharply defined by the disastrous events of fallout, acute and chronic exposure to radiation, evacuation in 1954, exile, resettlement in 1957, evacuation in 1985 and, again, for the past two decades, struggles to address the many problems of life in exile. The people of Rongelap are not the only nuclear nomads created by the actions of military and nuclear powers over the past six decades. They are, however, one of the most studied communities, and there is much that the world can learn from their experience.

Following their acute exposure in 1954, the people of Rongelap, with residents from a number of other communities, were enrolled in a medical research program sponsored by the Atomic Energy Commission designed to document the movement of radiation through the atmosphere, food chain, and the human body with the goal of understanding the long-term effects of human exposure to ionizing radiation. This biomedical research was conducted by Brookhaven National Laboratory with monies appropriated by United States Congress for the health of the Rongelap people. However,

rather than invest in local health infrastructure, funds were used to periodically transport medical staff and supplies from the United States to the Marshall Islands for brief examinations of the “exposed” and “control” populations; to analyze the samples that were collected; to occasionally treat conditions that were defined as radiogenic in nature; and, in later years, to acquire and supply a ship with the necessary technology to conduct whole-body counting, x-ray, and other laboratory procedures. Some of the residents who developed thyroid tumors and other radiogenic conditions were brought to the United States for study and surgical removal of the thyroid gland. When the U.S. Government states that it has provided millions of dollars to the Marshall Islands for issues related to the weapons testing it does not mention that enormous portions of this money went into advancing U.S. scientific interests, not in services for the people.

Over the years, the United States scientists added to the research program “control” subjects including people on Rongelap who were not present during the Bravo test, people on the nearby atoll of Utrik, people on Likiep (another populated atoll in the Northern Marshall Islands), and people on Majuro. Control subjects were typically selected to match the acutely exposed by age and sex, and scientists studied these people over a period that, in many instances, extended for four decades. Comparative studies documented increases in thyroid disorders, stunted growth in children, and increases in many forms of cancer and leukemia, cataracts, and other radiation-related illnesses.

For four decades U.S. Government scientists returned to the Marshall Islands to conduct exams and collect blood, tissue, bone marrow, teeth and other samples. These studies generated a broad array of scientific findings, including the recognition that acute exposures to radiation not only stimulate short-term effects, but late-effects can also

emerge years and decades following the initial exposure. By studying the Marshallese population scientists found, for example, that radioiodine-131 adheres to and accumulates in the thyroid, stimulating the production of benign and cancerous nodules, and interfering with the production of hormones, leaving pregnant women and children especially vulnerable. They also discovered that people who were not exposed to an acute level of ionizing radiation, but were exposed to low-levels on a daily basis because they lived in an area contaminated by fallout, also developed thyroid and other radiogenic problems. The lessons learned by scientists include an awareness of the many complicated ways that radiation adversely affects the human body.⁷ In today's world -- where uranium mining occurs at historic levels, where depleted uranium is widely used in military training and war, and where nuclear power and weapons production are again on the agendas of the world's nations -- these lessons have currency. The experiences of the people of the Rongelap whose lives were not only transformed by acute exposure, but by the chronic exposure to low-level radiation, should be read as a timely, cautionary tale.

The Rongelap Report details how much of the scientific study in the Marshall Islands, especially the research conducted over the first three decades of the program, occurred with top-secret classification, and how this biomedical research was often conducted without meaningful informed consent. The classified nature of this research had profound effects within the Marshall Islands and within the broader scientific research community. Research protocols, data, and findings were restricted to those with security clearance. Patients and, later, the Marshall Islands government, were denied access to medical records generated by this research. The research agenda itself was shaped to meet United States military and scientific research objectives, rather than the personal

health needs of the affected population. The pressing question for the U.S. government was how to document and interpret the Marshallese experience in ways that might predict the consequences for U.S. troops or U.S. citizens exposed to radiation in the event of nuclear war. Marshallese health concerns, especially their worries that radiation from fallout remained in their environment poisoning their food and their bodies, were often ignored.

The culture of secrecy that characterized biomedical research in the Marshall Islands facilitated efforts to shape public opinion on the safety of the nuclear weapons testing program. Scientific findings were cherry-picked: those studies released to the public were carefully selected and conclusions were carefully worded to support the contention that exposed communities suffered no lasting effects from their exposure, and their exposure presented no threat to the health of subsequent generations. As mentioned above, such actions were taken to counter calls within the United Nations to establish a ban on nuclear weapons testing; to calm local and regional complaints that exposure to radiation was producing a wide array of untreated health effects, especially reproductive effects; and, to reduce the economic liability of the United States government in meeting its obligations to its former territory.⁸

The Rongelap Report differs from other efforts that document for a public audience the nuclear weapons testing history and related experiences of the Marshallese people. Other published accounts typically rely upon a government-controlled interpretation or upon survivor memories and understandings. Because so much of the data on nuclear fallout and the movement of radionuclides through the food chain and the human body was classified, and because the funding and priorities of human

environmental research was controlled by the United States, it has been extremely difficult to produce evidence that corroborates personal testimony. Thus, over the years, Marshallese complaints have been easily dismissed as anecdotal accounts that fly in the face of scientific findings.

On a number of occasions since 1954, formal letters protesting conditions and health problems were sent to the Atomic Energy Commission by Rongelap residents, Marshallese politicians, and members of the Congress of Micronesia. Some of these Marshallese complaints involved health problems occurring outside of the recognized “exposed” atoll populations of Bikini, Enewetak, Rongelap and Utrik. Many complaints involved the sudden experience of previously unknown illnesses and conditions, especially reproductive health problems such as infertility and the birthing of grossly deformed babies. These complaints are presented again in *The Rongelap Report*, as are the carefully constructed replies that were sent back, assuring the people that the problems they were experiencing were normal, to be expected in a small island population, and had nothing to do with the nuclear weapons testing program. Close examination of the record of debate within the AEC after receiving these complaints reveals a public and a private recounting of events in the RMI. In sharp contrast to the carefully constructed placating assurances the AEC sent to the Marshallese people, the AEC noted in its internal communications extensive radioactive contamination of the terrestrial and marine food chain, and recontamination of Rongelap following tests in 1958. Reports and transcripts predicting the human effects of radiation exposure in the Marshall Islands include candid discussion of adverse impact to human fertility and reproduction. The annual and biannual medical surveys of the Rongelap population

carefully record rates of miscarriage and congenital defect (though no research program was developed to systematically study or treat these concerns). On a couple of occasions where deformed children were borne to women on Rongelap, scientists flew in to examine and photograph. And, public health officers throughout the Trust Territory were asked to pay careful attention and to document reproductive abnormalities. Thus, for example, in the Pacific Trust Territory records there is an account by the public health officer of his visit to Wotho in 1957:

Oct. 5, 1957 - I went to the shore at 07:30 this morning to perform a biopsy on [a female patient's] back. I also visited the patient who has cancer of the breast. This case is hopeless so I told [the health aide] to treat her symptomatically... There is another case on the island of Wotho. A girl who is about ten (10) months old and has no vagina. I wanted to bring the child to Majuro but the parents were not ready to come on this trip. I told them to be coming on next field trip...⁹

Testimony from Rongelap survivors indicates that, following their evacuation in 1954, they were told to expect unusual births and higher incidence of miscarriage in the months and years following their exposure. Most Marshallese, however, were not given such advice and were absolutely unprepared to understand and to deal with the varied and extreme defects in their children, previously unknown conditions that occurred in the months and years following the nuclear weapons tests.

As the decades passed, people experienced a growing incidence of adverse health effects, most notably the late-onset of thyroid cancer and the stunted growth and retardation in children in “exposed” as well as “control” populations. These health problems fed concerns that Rongelap Atoll was still dangerously contaminated and posed a significant hazard to occupants, a fact that became evident in the re-study of radiological conditions in the Northern Marshall Islands in 1978. The results of this survey and the input of a few independent foreign experts led the Rongelapese to

evacuate their homes in 1985 with the assistance of the Greenpeace ship Rainbow Warrior on what proved to be its final voyage in the Pacific.¹⁰ The evacuation of Rongelap occurred without the assistance or approval of the United States government. The re-study confirmed that much of the Northern Marshall Islands was, indeed, still contaminated, and in some areas would not be habitable without remediation for at least 25,000 years.

Nuclear Claims Tribunal proceedings

In 1986, after years of negotiations and the threat of some \$7.1 billion in damage claims making their way through the United States court system, a Compact of Free Association between the United States and the Republic of the Marshall Islands was signed, releasing the United States government from pending legal claims through the establishment of a compensation trust fund. The Compact of Free Association requires the United States to continue efforts to adequately address the full range of damages and injuries resulting from the testing program. Section 177 of the Compact outlines responsibilities for monitoring the environment and human health effects of radiation from the nuclear weapons in the Northern Marshall Islands (Bikini and Enewetak, the two ground zero locations and Rongelap and Utrik Atolls, the two communities enrolled in the Project 4.1 biomedical study). An additional provision of Section 177 also enables the Republic of the Marshall Islands to petition the U.S. Congress for additional compensatory funds should conditions change or new information comes to light. One-hundred fifty million dollars were set aside by United States Congress to fund the provisions of the initial Compact establishing a compensation trust fund, with funds

administered according to provisions in the Compact, through a Nuclear Claims Tribunal (NCT) that receives claims and issues awards for personal injury and property damage.

The *Rongelap* Report is one of many expert witness reports prepared over the years in support of the Nuclear Claims Tribunal deliberations. The NCT is an administrative court governed by Marshallese and United States law set up to receive personal injury and property damage claims, produce full and final judgments in all claims, and issue payments from the trust fund established by the U.S. Congress. There are three judges that sit on the Nuclear Claims Tribunal. Claims are developed and presented by the Public Advocate, who with his office staff works with individuals and communities to assist them in the preparation of claims. Claims are reviewed by the Defender of the Fund, who may present a case in defense of the fund against some personal injury claims, but may also admit the claim for a clearly compensable medical condition. The personal injury program of the RMI Nuclear Claims Tribunal is modeled after the 1990 U.S. Congressional program for Downwinders exposed to the Nevada tests. Because it is impossible to determine if a cancer or illness linked to radiation exposure is a direct result of exposure to radionuclides, the Tribunal program, like U.S. programs, presumes that if a claimant was either alive or in utero during the testing program and if they contract an illness highly associated with radiation exposure, then it is presumed that the condition is a result of that exposure. The property damage program considers damage from the nuclear weapons testing including loss of access or use, cost to restore, and the pain, suffering and hardships that are the “consequential damages” of these losses.¹¹

The *Rongelap Report* is a component of the third major property damage claim presented to the NCT. Earlier claims presenting the case of property damage on Bikini and Enewetak Atolls were developed within a western property rights framework. In these cases, property damage as a result of the nuclear weapons testing was largely defined in terms of values associated with the loss of use of dry land, with the assumption that the economic value of using dry land (established through the record of rental agreements set up by the U.S. military) is the sum total of value. For many reasons, this approach did not do justice to the particular problems of the Rongelap experience. Personal injuries were compensated by the NCT in the event that radiogenic cancers occurred and were documented, but people did not “lose” their land, rather, they lost the safe use of their lands. The methods used to develop prior property damage claims did not allow consideration of the broader injuries resulting from the classified medical research program, the pain and problems of living as a stigmatized member of the “bombed” community, the many varied instances of pain, illness, and suffering resulting from years of living in a heavily contaminated setting, or, the hardships and losses of having to again evacuate from their homelands when the U.S. government failed to acknowledge to the Rongelapese the lingering and dangerous contamination they were living with.

Thus, in *The Rongelap Report*, we ask the Nuclear Claims Tribunal to first consider the value of what was a pre-existing self-sufficient way of life before moving to the question of how best to identify and assess damage, and repair injury. We ask the NCT to consider a chain of nuclear weapons testing events that result in multiple abuses of person, property, and fundamental dignities. And, drawing upon Marshallese values

and norms, we argue for a redefinition of the compensation principle employed in prior cases: from a model of compensation for damage and a loss of individual property rights, to a broader model that considers and addresses the community damages associated with the loss of a way of life.

Classified science and government transparency

The Rongelap Report and its holistic approach to the chain of events, record of injury, and assessment of consequential damage offers a tiny sense of what it must be like for an island population to survive downwind of a nuclear war. This report takes on added relevance when considering that what was known by the general public and Marshallese officials when the Compact of Free Association was negotiated and the Nuclear Claims Tribunal was established. At that time much of the scientific record was classified. The Marshallese were never fully briefed on the nature of the nuclear weapons testing program and the full extent of its damages, and this inequitable access to fundamental information has severely hampered Marshallese efforts to achieve a meaningful and comprehensive remedy. For example, to this day, the United States only acknowledges in its compensatory programs the obligation to address nuclear weapons-related damage to property and people in four atolls: Bikini, Enewetak, Rongelap and Utrik. The United States documentary record tells another story: a 1955 survey, declassified in 1994 and released to the RMI in 1995, reports fallout from the 1954 Bravo test occurring at hazardous levels on 28 atolls throughout the Marshall Islands. The entire nation, not simply the four atolls, is downwind and the whole country has been adversely affected by nuclear weapons.¹²

<Insert Map: Marshall Islands and the US Downwinder Area>

While elements of the Rongelap story have appeared in various newspaper accounts, articles, documentaries, and books, the telling of the human dimensions of this story has largely relied upon anecdotal accounts of the key actors: Marshallese survivors, veterans, and United States scientists.¹³ Only recently have we seen the material evidence that substantiates anecdotal accounts come to light via the declassification of materials documenting the military research agenda, protocols, experiments, and findings concerning the nature of radioactive fallout, its movement through the food chain and human body, and its long-term effects. In 1993, in response to series of newspaper articles describing Cold War-era radiation experimentation involving U.S. subjects, President William Jefferson Clinton ordered a review of files and a declassification of documents in all government agencies pertaining to human radiation experiments. As a result, a trickle and then a flood of documents began to appear on the doorstep on the Marshall Islands Embassy in Washington DC. In 1994, the Advisory Commission on Radiation Experimentation (ACHRE) assessed the available record and concluded that the Marshallese had indeed served as research subjects in several experiments involving radioisotopes but found no conclusive evidence that the long-term research program was an example of human radiation experimentation.¹⁴ By this time, a truck-load of declassified documents had been located by United States government agencies and dumped on the RMI Embassy doorstep, and some of these were reviewed by Holly Barker as part of her effort to determine what the U.S. Government knew but had not told

the RMI Government, and to develop an ethnographic record for the Marshallese government. Following the ACHRE publication of its findings, the historical documents reviewed by the ACHRE were scanned and placed on the word-searchable Human Radiation Experiments (HREX) website and were accessible to the public beginning November 1996. As documents continued to be located and released they were added to a database managed by the Department of Energy (DOE). By late 1998, when we were first contacted by Public Advocate Bill Graham and asked to advise the Nuclear Claims Tribunal on culturally-appropriate ways to value the damages and losses experienced by the people of Rongelap as a result of the weapons testing program, another 10 boxes of documents had been declassified and turned over to the Marshall Islands government. By the end of 1999, DOE had turned over some 77 boxes of declassified information on the nuclear weapons testing program that had been previously withheld from the Marshallese. It was this expanded set of declassified records that were used to build the chain of event events and support consequential damage findings in *The Rongelap Report*.

The Rongelap Report was prepared under the very best of research conditions. We had complete access to and the collaborative assistance of the affected community. Our methods were developed and findings critically evaluated by a scientific peer review committee consisting of environmental and medical anthropologists, ecologists, health physicists, physicians, psychologists, environmental economists, appraisers, historians, and lawyers. We had the transcripts of oral histories conducted by Holly Barker with hundreds of radiation survivors over a five-year period. And, we had access to the

historical documents and scientific reports housed at the Republic of the Marshall Islands Embassy in Washington D.C. and the Nuclear Claims Tribunal in Majuro, RMI.

Perhaps most importantly, we had the use of a word-searchable research engine to easily locate in the many tens of thousands of declassified documents pertaining to the history of nuclear weapons testing and human radiation experimentation, those particular memos, letters, transcripts, trip reports, and scientific studies that might address a specific question, issue or actions. We could find the needle in the haystack. We could demonstrate, for example, that not only were people complaining about poisoning after consuming locally grown food and locally caught fish, the Atomic Energy Commission knew of these complaints, their scientists had taken samples, found high levels of radioiron (Fe-59) and other isotopes, and had then replied to Marshallese with placating statements blaming ill health effects on food preparation, rather than acknowledging the radioactivity in the food itself. We could search for each and every document that included the term “medical matters” or “blood samples” or “bone marrow” or “radioisotope” and in so doing, we could patch together a record of invasive medical sampling that spanned decades, with “exposed” and “control” subjects providing information used in a host of studies. This access to previously classified data and search engine tools allowed us to craft a holistic look at the Rongelap experience, and for the first time, present the anecdotal record as a substantiated body of evidence.

At the time *The Rongelap Report* was accepted by the Nuclear Claims Tribunal in September 2001, the chain of events and supporting documentary evidence were easily verified by accessing the url’s included with each declassified document citation. Access to the declassified documents that support this historical account is a much more difficult

matter today, and it is this fact which drove our efforts to publish *The Rongelap Report*. In January 2003, while conducting follow-up research for the Nuclear Claims Tribunal, online access was denied for specific documents cited in the Rongelap report on the HREX website. One such denial read, "Your client does not have permission to get URL/tiffs/doi/d714594/d714594a/14601012.tif from this server." Over the next few months more and more documents became inaccessible, and by October 2003, the HREX site was completely shut down with a simple statement claiming the Department of Energy lacked the funds to maintain this site. Several months later the statement was changed to reflect its current (January 2008) form:

The HREX website is currently closed down for two reasons: (1) After the events of September 11, 2001, the Federal Government undertook a review of all information on its websites to determine the appropriateness of the information on the websites. The database for the HREX website is currently undergoing a review in light of the events of 9/11 to determine whether all of the information in the database is appropriate. (2) The HREX website was hosted by antiquated technology. After the review of the information in the database is complete, it will be moved to the OpenNet website which is a platform composed of current technologies. The timing of when the HREX information will be available on OpenNet is unknown, therefore you may wish to periodically visit the OpenNet website at <http://www.osti.gov/opennet>. Thank you for your patience.

At this writing it is unclear how much of the supporting documentation for *The Rongelap Report* has been removed from public access or reclassified. In July 2005, with support from a John T. and Catherine D. MacArthur research and writing grant, Barbara Rose Johnston traveled to Washington D.C. and confirmed that the hardcopy of the HREX files were available at the National Security Archive, a non-profit institute at George Washington University. This archive reflects only those documents that were available during the time the ACHRE operated, and not the many documents located and

declassified in the years since. A number of the key documents cited in this report are still accessible on the Department of Energy (DOE) Marshall Islands historical records link, and researchers can access specific documents by searching the DOE's Office of Science and Technology Information (OSTI) archive and requesting copies through their Bechtel sub-contractor (though requests for documents in 2006 and 2007 have gone unanswered). The archive and status of human radiation experiment records declassified after the ACHRE ceased operating by other agencies such as the Department of Defense or the Central Intelligence Agency is unknown. A number of key HREX documents are no longer accessible through the DOE websites, search engines, or OSTI archive. While copies of all documents cited in *The Rongelap Report* are retained by the authors, by the Republic of the Marshall Islands, and by the RMI Nuclear Claims Tribunal, public access has been significantly reduced.

This loss of public access to declassified documents occurs at a time when the United States government is classifying at historic levels a broad array of information pertaining to the perceived security of the state. Effective governance requires the ability to anticipate and meet the basic needs of the public, and to do so in ways that generate and sustain the trust of the public. Transparency is a key element in securing and maintaining trust, especially when earlier actions and times have broken that trust. The experience of researching and writing the Rongelap Report, and participating in the RMI Nuclear Claims Tribunal taught us a great deal about the importance of truth, of forums where truth can be told and responsible parties or their representatives listen, acknowledge, and concur that grave injustices have occurred. Access to the declassified data, and access in searchable form, allow us to not only record the varied accounts of the

difficulties of life and death in a radioactive nation, but to give power to these accounts by identifying the many documents in the declassified record that substantiate their history, experiences, pain and suffering.

Thus, finally, the publication of this report at this point in time reflects a growing awareness that our understanding of history is easily manipulated and even fabricated, especially when the public loses access to the primary documents that underlie historical accounts. The declassification of the 1990s opened a window of transparency, allowing public access to those documents that confirmed the worst fears of how a government takes evil action to insure a political good – securing the military and economic status of the nation to fight the Cold War in ways that involve horrific abuses of fundamental human rights. Declassification and public scrutiny of historical injustices also represents an opportunity to come to terms with the past, and in doing so, take honest and significant effort towards making amends. Shutting down HREX website effectively reduces public access to declassified documents that are the primary documents which tell a story at odds with current administration policy.

The story of Rongelap is one of systemic injury, inadequate, and at times, an abusive response on the part of the United States government. U.S. government activities in the Marshall Islands resulted in profound consequences for the entire nation, unmet U.S. obligations and an inter-generational responsibility. At this writing, the United States government policy is one that views its responsibility to its former territorial possession and those people adversely affected by the nuclear weapons testing program as a set of limited obligations that have, in large part, been addressed. *The Rongelap Report*, and the broader body of reports that emerge from the deliberations of the Nuclear

Claims Tribunal identify experiences, conditions, and continued problems of the Marshallese that contrast sharply with the U.S. government's contention that it has responded adequately to its obligations.

The U.S. Government dehumanized the Marshallese by turning their experiences with nuclear weapons into numbers and statistics, by classifying and restricting public access to the documentation of the human environmental impacts of nuclear militarism, and by trivializing the extent of human environmental damage for political gain. This report returns the voice of the Rongelapese to the forefront and provides the community with the opportunity to explain the effects of the testing program from their point of view.

Acknowledgements

This work is, first and foremost, the end result of five decades of Marshallese commitment to understand the extent of injury, to document and file complaints, and to secure meaningful help. Evidence of this effort to ensure that the world knows the Rongelap story, that true lessons are learned, and that the indignities and abuses they endured are not repeated appear again and again in the documentary record. These words and efforts inspire, and they will not be dismissed. *Kommol tata.*

Initial research and *Rongelap Report* production was supported by funds provided by the Marshall Islands Nuclear Claims Tribunal, Office of the Public Advocate, and staff-release time for Holly Barker from her advisory duties at the RMI Embassy. The resulting expert witness report is a public document accepted by the Tribunal and filed in their office in Majuro. It is reprinted here with the knowledge of and permission from the Tribunal. Sadly, its publication appears after the July 23, 2002 death of the Honorable

Oscar deBrum, a man whose life as a public servant in the administration of the Pacific Trust Territory, to the new Marshallese government, and later as Chairman of the Nuclear Claims Tribunal, was devoted to the struggle to alleviate the suffering caused by the nuclear testing program. Publication of the report was delayed until a final judgment in the Rongelap claim from the NCT was rendered. As discussed in the epilogue, decisions in the Rongelap claim were announced as part of a NCT judgment issued on April 17, 2007.

Research and writing of the framing chapters occurred with the financial support of the John T. and Catherine D. MacArthur Foundation through a research and writing grant to the Center for Political Ecology (2004-05) entitled "Considering the Consequential Damages of Nuclear War Legacies," a Weatherhead Resident Scholar Fellowship at the School for Advanced Research for Barbara Rose Johnston (2006-07), and a grant by The Christensen Fund to the Center for Political Ecology. Again, the Embassy of the Marshall Islands played a helpful role in providing staff release time for Holly Barker.

Since submitting this report to the NCT in September 2001, we have reformatted the text, corrected typographical errors, and, where possible, updated the web citations. As in the original, there is not a separate list of references: complete citations for supporting references are found in the endnotes to each section or chapter. We have also found that a number of the supporting documents submitted with this report remain accessible on the web, others do not. We include a list of the supporting documents submitted to the Tribunal at the end of this book, and we reprint those documents which are not web-accessible.

The Rongelap Report uses Marshallese expressions, military references, health physics data and terms – a great deal of language that may not be familiar to the reader. For this reason we have compiled terms and their meanings in a glossary that appears at the end of this book.

This work is illustrated with images and maps submitted as supporting evidence in the NCT proceedings as well as images located in personal and public archives in the years since. We thank Nick Captain for his permission to reprint the “John Anjain on Rongelap” cover photo. We also thank Glenn Alcalay for permission to use his images of the Rongelap evacuation, which he took in 1985 while documenting the Greenpeace-assisted resettlement. We thank Giff Johnson for the use of his photos. And we gratefully acknowledge the assistance provided by Bill Graham, Glenn Alcalay, Giff Johnson and others who helped locate and provide information about photos taken many decades ago.

As mentioned in *The Rongelap Report*, the Marshallese were intensively photographed on each of the 67 medical survey trips and throughout the initial three-month Project 4.1 documentation of radiogenic health effects from acute exposure to fallout. Over the years exam notes, sampling results, x-ray film, whole body counter data, and photo records resulted in very large medical files for each human subject in the AEC-funded research conducted by Brookhaven scientists. Several copies these records existed: at Brookhaven Laboratory, the Trust Territory Public Health offices, and in the 1970s, a portion of the Rongelap medical record was placed in an embassy safe in Japan. As recounted in the *The Rongelap Report* and further detailed in the Tribunal hearing, around the time that lawsuits were working their way through U.S. Courts and the U.S. began to negotiate terms for independence, a series of fires occurred, reportedly

beginning in locked safes or file cabinets, and resulting in the loss of medical records and photographs in the Marshall Islands and Japan. Requests from the Marshall Islands government for complete access to and of the complete medical records compiled by the AEC and Brookhaven remain unfulfilled. Copies of the images taken by Brookhaven scientists and Trust Territory Public Health officers of the grossly deformed children born to the people of Rongelap, Utrik and other Marshall Island populations have been especially difficult to find.¹⁵

This report makes liberal use of direct quotes from interviews and key witness testimony. Actual names are used where they are a matter of public record. In conducting the research for this report interviews were conducted with the understanding that testimony was being recorded, would be transcribed, and would be incorporated into the formal report. Thus, the use of actual names and direct quotes appear with the informed consent of the Marshallese. In the Epilogue, quotes derived from post-hearing interviews are attributed by initials, rather than names, to protect the privacy of those individuals.

Throughout the report there is some variation in the spelling of the names of people and places: Marshallese names often change over time, and the spelling of names can vary greatly from one source to another.

Suggestions on methodologies and comments on draft findings were provided by a Marshallese Advisory Committee including Iroj Mike Kabua, Senator Wilfred Kendall, Councilwoman Lijon Eknlang, Councilman George Anjain, and handicraft businesswoman Mary Lanwi. The research questions, strategies, and data collection efforts were supported by the collaborative involvement of the Nuclear Claims Tribunal Public Advocate Bill Graham, Associate Public Advocate Tieta Thomas, Marshallese

anthropologist Tina Stege. In an early phase of this work in 1999, Stuart Kirsch provided background information on land claim cases elsewhere in the Pacific, and participated in a week of advisory committee discussion on the Marshallese value of land. In 1999 and 2001, very helpful suggestions on methodologies, supporting research, and peer review comments were provided by Marie Boutté, Norman Chance, Muriel Crespi, Susan Dawson, Ted Downing, Shirley Fiske, Judith Fitzpatrick, Bill Johnston, Matthew Johnston, Terry Johnston, Robert Hitchcock, Bob Kiste, Ed Liebow, Gary Madsen, Bonnie McCay, Laura Nader, Theresa Satterfield, Ted Scudder, Anthony Oliver Smith, Amy Wolfe, and John Young. Our approach to working with Marshallese experts within the tribunal proceedings and the development of a November 2001 post-hearing brief on the role of anthropology as expert witness in land claim proceedings occurred with substantive input from Paul Magnarella, and suggestions from Carmen Burch, Ted Downing, Kreg Ettenger, Richard Ford, Bill Johnston, Jane Hill, Bonnie McCay, Jerry Moles, Triloky Pandey, Wayne Suttles, and John Young. The approach to reparations was drawn in large part from the “Reparations and Right to Remedy” brief prepared by Johnston in 2000 for the World Commission on Dams, and reflect the critical review comments of Ted Scudder, Dana Clark, Aviva Imhof, and Monti Aguirre. Our understanding of the relationship between the Marshallese research and the human radiation experimentation sponsored by the Atomic Energy Commission elsewhere (Japan, the Amazon, and the Arctic) was influenced by research suggestions and critical feedback from Terrence Turner, Norman Chance, and Louise Lamphere.¹⁶

Expert Witness report production occurred with the assistance of Ted Edwards, Benjamin Edwards, and Christopher Edwards. In this latest effort to present *The*

Rongelap Report, we gratefully acknowledge the production assistance of Kay Hagan and Hannah Shoenthal-Muse.

Finally, to Bill Graham whose critical attention to detail, helpful suggestions, editorial expertise, and his unflagging commitment to tell the whole story demonstrated to us the many meanings of the title *public advocate*, we offer our deepest thanks and appreciation.

¹ This third exposure of the Japanese resulted in an international outcry that further fueled an international anti-nuclear movement. For a web-based overview of the Lucky Dragon No.5 experience, see Hiroshima Peace Museum Second Special Exhibition of Fiscal year 2005, Third Radiation - The Lucky Dragon No. 5 and Hiroshima. http://www.pcf.city.hiroshima.jp/frame/Virtual_e/exhibit_e/exhi04_2.html Electronic document accessed February 11, 2008.

As noted in *The Rongelap Report*, the 28 weathermen on Rongerik were evacuated before the Marshallese, and their conditions were also monitored as part of Project 4.1. After the initial three-month research was completed, the servicemen were released for duty and not enrolled in follow-up research. Attention to the question of the long-term health effects of fallout on the servicemen stationed on Rongerik did not occur until the threat of lawsuits from the Marshallese and from atomic veterans (some 250,000 servicemen whose duty during atmospheric weapons test resulted in exposure to radiation) prompted additional U.S. government scrutiny. In 1981, US Public Law 97-72 was passed providing free healthcare to Veterans whose health problems may be a result of exposure during war to radiation or Agent Orange. In 1982, four Air Force veterans exposed during the Operation Castle tests filed lawsuits challenging the Government's explanation of how people came to be exposed. In 1983, the U.S. government announced that Public Law 97-72 also includes atomic veterans whose exposure resulted from service during atmospheric weapons tests (1945-1962). Access to healthcare required being able to demonstrate proof of exposure. In 1984, the Navy began sending out health questionnaires to atomic veterans. Thus, some thirty years after initial exposure the military reassessed their records and issued estimated doses to Rongerik service personnel. See, the 1987 report "Analysis of Radiation Exposure – Service Personnel on Rongerik Atoll, Operation Castle - Shot Bravo" by J. Goetz et al, Science Applications International Corp, 9 July 1987. Defense Nuclear Agency contract 001-85-C-0101. Electronic document <http://www.dtra.mil/documents/rd/DNATR86120.pdf> accessed February 10, 2008.

² The United Nations Trusteeship Council response to the Marshallese petition noted "The Administering Authority adds that any Marshallese citizens who are removed as a result of test activities will be reestablished in their original habitat in such a way that no financial loss would be involved." United Nations Trusteeship Council. "Petitions Concerning the Trust Territory of the Pacific Islands." July 14, 1954, p.5. (T/L.510).

³ Statement by Mr. Mason Sears, United States Representative to the Trusteeship Council, United States Mission to the United Nations Press Release #1932, July 7, 1954). Electronic document <http://worf.eh.doe.gov/data/ihp1d/400107e.pdf> accessed February 5, 2008.

⁴ Statement by Mr. Frank E. Midkiff, High Commissioner of the Trust Territory of the Pacific Islands, United States Mission to the United Nations Press Release #1932, July 7, 1954. Electronic document <http://worf.eh.doe.gov/data/ihp1d/400107e.pdf> accessed February 5, 2008.

⁵ In 1998 the Center for Disease Control (CDC) estimated some 6.3 billion curies of Iodine-131 had been released in the Marshall Islands as a result of nuclear weapons tests. The record of radioactive release from the Marshall Islands atmospheric weapons tests was later reassessed, producing the finding that the CDC value "appears too low by at least 32% and possibly by as much as 42%" (Steve Simon, August 23, 1999 personal communication to RMI Nuclear Claims Tribunal Chairman Oscar deBrum, cited in Judge James H. Plasman testimony to US Congress, House Committee on Resources and the Committee on International

Relations Subcommittee on Asia and the Pacific, July 25, 2007. Electronic document <http://www.yokwe.net/ydownloads/052505plasman.pdf> accessed February 5, 2008.

⁶ See Simon, Steven L., Andre Bouville and Charles E. Land. "Fallout from Nuclear Weapons Tests and Cancer Risks: Exposures 50 years ago still have health implications today that will continue into the future" in *American Scientist*, Volume 94 January-February 2006: 48-57.

⁷ In the review of medical findings from 26 years of AEC sponsored research some 260 reports and publications resulting from the Marshallese studies are cited. See, Conard, R.A., (1980) Review of Medical Findings in a Marshallese Population Twenty-Six Years After Accidental Exposure to Radioactive Fallout (Upton, N.Y.: Associated Universities, January 1980). Just a few of the hundreds of publications resulting from A.E.C.-funded research on the health effects of fallout on the Marshallese: Cronkite E.P., V.P. Bond, R.A. Conard, N.R. Shulman, R.S. Farr, S.H. Cohn, C.L. Dunham (1955), Response of human beings accidentally exposed to significant fall-out radiation, *JAMA* 150, 430-454; Cronkite E.P., V. P. Bond, and C. L. Dunham, Some Effects of Ionizing Radiation on Human Beings (Washington, D.C.: Atomic Energy Commission, July 1956); Conard, R. A., L. M. Meyer, J. S. Robertson, W. W. Sutow, W. Wolins, H. Hechter (1959), Effects of Fallout Radiation on a Human Population, *Radiation Research Supplement*, Vol. 1, Proceedings of the International Congress of Radiation Research, Burlington, Vermont, U. S. A., August 11-15, 1958 (1959), pp. 280-295; Lessard, E.T., R.P. Miltenburger, S.H. Cohn, S.V. Musolino, and R.A. Conrad (1984), Protracted exposure to fallout: the Rongelap and Utrik experience, *Health Phys.*, 46, 511-527; Neel, J.V., R. E. Ferrell, and R. A. Conard, (1976), The frequency of "rare" protein variants in Marshall islanders and other Micronesians, *Am J Hum Genet.* 1976 May; 28(3): 262-269. For a recent example, see Takahashi T, Schoemaker MJ, Trott KR, Simon SL, Fujimori K, Nakashima N, Fukao A, Saito H., (2003), The relationship of thyroid cancer with radiation exposure from nuclear weapon testing in the Marshall Islands, *Journal of Epidemiology*, 2003 Mar;13(2):99-107.

⁸ See for example, the March 1, 1977 letter from Dr. Robert Conard (Brookhaven Laboratory) to Dr. James L. Liverman (Division of Biological and Medical Research, Energy Research and Development Administration) with suggested statements to use in response to letters from the people of Rongelap and Utrik. Electronic document http://worf.eh.doe.gov/data/ihp1a/1584_.pdf accessed February 10, 2008. For more detailed discussion and case specific essays on United States and Soviet cold war militarism, secrecy, and the related caustic impacts on public health and the construction of science, see *Half-lives and Half-truths: Confronting the Radioactive Legacies of the Cold War*, edited by Barbara Rose Johnston (SAR Press, Santa Fe, MN) 2007. For a brief look at the Rongelap experience, see Holly Barker's *Bravo for the Marshallese: Regaining Control in a Post-Nuclear, Post-Colonial World* (Thomson, Wadsworth Publishers) 2004.

⁹ Excerpt from the TTPI Public Health Department WFT Report, 15 October 1957, Medical Field Trip Officer Isaac K. Lanwi to the TTPI District Administrator, Marshalls; Trust Territory of the Pacific Islands Archives, TTA Microfilm Roll 994, University of Hawai'i at Manoa. In this quote, names have been removed to protect the privacy of individuals.

¹⁰ On July 10, 1985, Greenpeace's Rainbow Warrior ship was sunk while at dock in Auckland, New Zealand by two explosive devices placed on its hull by French commandos working under the authorization of French President François Mitterrand. The detonation killed the photographer Fernando Pereira. The French sabotage was an attempt to disrupt Nuclear Free Pacific protests against French nuclear testing at Mururoa Atoll in the Tuamotu Archipelago of French Polynesia. See David Robie's *Eyes of Fire: The Last Voyage of the Rainbow Warrior* (South Pacific Books) revised edition, 2005.

¹¹ For additional detail on the history and workings of the tribunal and a thorough review of the various proceedings and judgments issued through 2002, see the independent audit conducted by former US Attorney General Dick Thornburgh: "The Nuclear Claims Tribunal of the Republic of the Marshall Islands: An Independent Examination and Assessment of its Decision-Making Process" by Dick Thornburgh, Glenn Reichardt, and Jon Stanley (Kirkpatrick & Lockhart LLP: Washington DC), January 2003. Electronic document <http://www.bikiniatoll.com/ThornburgReport.pdf> accessed February 5, 2008.

¹² See "Radioactive Debris from Operation Castle, Islands of the Mid-Pacific," by Alfred Breslin and Melvin E. Cassidy, January 18, 1955, United States Atomic Energy Commission. Electronic document <http://www.yokwe.net/ydownloads/RadioactiveDebrisCastle.pdf> accessed February 5, 2008. This document was declassified by the U.S. Department of Energy in 1994 as part of the Advisory Commission on Human Radiation Experimentation review. It was provided to the Republic of the Marshall Islands in 1995. Exposure levels in that report show that radiation fallout doses were measured at sites throughout the

Marshall Islands atolls following each of the six tests conducted in 1954. The document reports significant fallout on 28 atolls, of which 22 were populated during Operation Castle (March 1 through May 14, 1954). No monitoring was reported for the islands of Mejit, Lib and Jebat. Confirmation that regardless of location in the Marshall Islands, exposure doses to residents as result of the atmospheric weapons tests are substantial was confirmed in the 2002 analysis by Behling et al. See "Final Report: Radiation exposures associated with the US Nuclear Testing Program for Twenty-one Atolls/Islands in the Republic of the Marshall Islands" by Hans Behling, John Mauro and Kathy Behling (McLean, VA: S.Cohen and Associates).

¹³ For a survivor point of view see the many, many instances where Marshallese citizens testified in U.S. Senate and Congressional hearings. See, for example, the testimony of Jeton Anjain (1989), Testimony to the Committee on Interior and Insular Affairs regarding the Safety of Rongelap Atoll, Washington DC: U.S. House of Representatives. For a visual account of the Rongelap story contrasting the lived experience with the formal military framing of that experience, see Dennis O'Rourke's 1986 film *Half Life: A Parable for the Nuclear Age* (Los Angeles: Direct Cinema, 86-minute video cassette). The experience of serving as a military participant during the 1958 tests is captured in Michael Harris's book *The Atomic Times: My H-bomb Year at the Pacific Proving Ground, a Memoir* (Ballantine Books, New York) 2005. The perspectives and sentiments of a government-scientist in charge of the biomedical research program can be found in Robert Conard's 1992 report, *Fallout: The experiences of a medical team in care of a Marshallese population accidentally exposed to fallout radiation* (Brookhaven National Laboratory, Report BNL-46444, Upton NY). For a critical assessment of how public perception of the atomic age was shaped and manipulated via United States government control of information and their publishing relationship with the New York Times, see Beverly Ann Deepe Keever's *News Zero: The New York Times and The Bomb* (Common Courage Press, Monroe, Maine) 2004.

¹⁴ Final Report of the Advisory Committee on Human Radiation Experimentation, Chapter 12: The Marshallese (U.S. Government Printing Office, Washington DC) 1995. Electronic document http://www.hss.energy.gov/healthsafety/ohre/roadmap/achre/chap12_3.html accessed February 5, 2008.

¹⁵ Photojournalists from Japan have compiled a record of images capturing some of the health problems experience in the Marshallese population, arguably as a result of first, second, or third generation exposure to radiation. See, for example, Hiromitsu Toyosaki's 1986 book *Good-bye Rongelap!* Translated by Masayuki Ikeda and Heather Ikeda (Tokyo: Tsukiji. Shokan). And the photo documentary work of Kousei Shimada, including his 1977 work *BIKINI: The Testimony of Bomb Victims in the Marshall Islands* (JPU Shuppan). For a narrative description, see *Children of the Atomic Bomb: An American Physicians Memoir of Nagasaki, Hiroshima, and Marshall Islands*, by James N. Yamazaki with Louis B. Fleming (Duke University Press) 1995.

¹⁶ The broader history of Atomic Energy Commission-sponsored research involving indigenous populations in the Arctic, Amazon, Andes, the Pacific, and the American Southwest is discussed by Barbara Rose Johnston in the chapter "'more like us than mice': Radiation Experiments with Indigenous Populations" in *Half-lives & Half-truths: Confronting the Radioactive Legacies of the Cold War*, edited by Barbara Rose Johnston (SAR Press, New Mexico) 2007:25-54.

**Hardships and Consequential Damages from Radioactive Contamination,
Denied Use, Exile, and Human Subject Experimentation Experienced by the
People of Rongelap, Rongerik, and Ailinginae Atolls**

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PART ONE: INTRODUCTION

1. Introduction

The United States Nuclear Testing Program was conducted in the Marshall Islands from 1946 through 1958. The United States Government detonated atomic and thermonuclear weapons with the aim of achieving world peace through a deterrence policy. This report demonstrates some of the ways that the Marshallese people subsidized this nuclear detente with their lands, health, lives, and future. The evidence summarized within illustrates some of the consequences of the United States Nuclear Testing Program: its actions essentially inflicted nuclear war conditions on a fragile atoll ecosystem and vulnerable population. The Marshallese, despite appeals to the United Nations, were powerless to stop the testing and unprepared to address the proliferation of problems resulting from the testing.

This report presents findings from a collaborative, participatory environmental anthropology research project exploring the human environmental impacts of nuclear testing, contamination, and exile as experienced by the people of Rongelap, Ailinginae, and Rongerik Atolls.¹⁷ Data from ethnographic research and a review of the scientific literature supports findings that nuclear testing in the Marshall Islands resulted in contamination, short and long-term exposure to radioactive substances, and alienation from land and other critical resources. Nuclear testing destroyed the physical means to sustain and reproduce a self-sufficient way of life for the people of Rongelap. Radioactive contamination and involuntary relocation radically altered health, subsistence strategies, sociopolitical organization, and community integrity. A lifetime of service as human subjects in a wide range of biomedical experiments further harmed the health and psychosocial well being of the people of Rongelap.

This report argues that the full extent of damage and injury and the consequences of this damage and injury must be considered when attempting to shape compensatory and remediative responses. Compensatory actions must reflect individual injuries and experiences, including pain, suffering, and hardship. Compensatory actions must also reflect the corporate experience of the people of Rongelap whose health, vitality and way of life have been fundamentally altered by the United States Nuclear Weapons Testing Program. Evidence presented in this report support claims for compensation for:

- (1) Social, cultural, economic, and political hardships and injuries experienced by the population of Rongelap as a result of the loss -- through (a) involuntary relocation and through (b) extensive contamination of terrestrial and marine resources -- of the material basis to sustain a healthy, self-sufficient way of life;
- (2) Psychosocial stigmatization, pain and suffering experienced by the people of Rongelap as a result of their acute and long-term exposures to fallout;
- (3) The pain and suffering endured by members of the Rongelap community as a result of (a) their involvement in long term studies on the effects of radiation, and (b) their use as human subjects in a range of isolated experiments that had nothing to do with their individual health and treatment needs;
- (4) Natural resource damages and socioeconomic stigmatization experienced by the people of Rongelap, and the broader nation, as a result of contamination produced by the United States Nuclear Weapons Program.

2. Summary of Relevant Findings

- The people of Rongelap experienced involuntary displacement from Rongelap and Ailinginae Atolls when physically removed from their atolls (March – May 1946; 1954-1957). When people returned to their atolls they lost access to a viable healthy ecosystem (thus, displaced from their ability and rights to safely live in their environment in the years between 1957-1985). They became exiles (1985-present) when finally informed of the life-threatening contamination levels in their homeland.

- Families were deprived of their right to live and use lands on Rongerik Atoll.¹⁸ Rongerik Atoll was taken for United States Naval use following World War II and used as a weather and fallout tracking station during the Nuclear Testing Program (1946-1958). The United States Navy, without permission or compensation, used Rongerik as a resettlement site for the Bikinians (1946-1948). And, in 1957 when the Rongelap community was resettled on Rongelap and Ailinginae, all access and subsistence use of Rongerik Atoll was prohibited by the United States due to severe contamination from nuclear weapons fallout.

- Exposure concerns involve much more than the exposure to radiation and fallout from a singular testing event in 1954. Exposure concerns involve the persistent presence of contamination from 67 atmospheric tests of nuclear weapons in the Marshall Islands. This contamination includes radioactive elements released through nuclear explosions, as well as tracer chemicals, such as arsenic, used to “fingerprint” the fallout from each weapon. The people of Rongelap, Rongerik and Ailinginae were not only exposed to external

radiation and other toxic substances from fallout, but more significantly, from internal ingestion -- breathing dust and smoke from household and garden fires, drinking water, consuming terrestrial and marine food sources, living in houses and using the material culture fashioned from contaminated materials.

- “Exposed” people of Rongelap include those living on Rongelap and Ailinginae in 1954 who were exposed to Bravo and other test fallout; those who were resettled in 1957; those who were born on the contaminated atoll; those who were exposed to materials and food originating from Rongelap, Rongerik and Ailinginae atolls; and, the descendents of people exposed to radioactive contaminants. Given the synergistic, cumulative and genetic effects of long-term exposure to radioactive isotopes and other environmental contamination from military testing, exposure is of concern to this and future generations.
- The people of Rongelap, Rongerik and Ailinginae, with other Marshallese, served as unwitting subjects in a series of experiments designed to take advantage of the research opportunities accompanying exposure of a distinct human population to radiation. Human subject research involving the Marshallese was initially funded by the Atomic Energy Commission (AEC) in 1951 in an effort to document “spontaneous mutation rates” to better estimate the genetic effects of radiation produced through the Nuclear Weapons Testing Program. Research on the human effects of radiation was intensively conducted beginning in March 1954, with efforts to document the physiological symptoms of American servicemen and Marshallese natives exposed to fallout from Bravo test. Initial findings from this and other biological research projects helped shape the goals and

approach to an integrated long-term study on the human and environmental effects of nuclear weapons fallout that began in 1954 and was continued by Brookhaven National Laboratory until 1998.

- The people of Rongelap believe, and the documentary record confirms, that the United States was aware of the extraordinary levels of fallout of Bravo and subsequent tests and continuing levels of radioactivity, was aware of contamination in the marine as well as terrestrial ecosystem, was aware of the bioaccumulative nature of contamination, noted radiation-induced changes in vegetative and marine life that islanders relied upon for food, monitored the increased radiation burdens of the resettled people returned to Rongelap in 1957, and documented the human health consequences of this systematic and cumulative exposure. Medical exams, especially in the 1950s to early 1970s, involved monitoring and diagnostic procedures meant to document bioaccumulation processes and the physiological symptoms related to radiation exposure, rather than clinical efforts to treat the various radiogenic and related health problems of the people of Rongelap. Periodic “Medical Surveys” also subjected the people of Rongelap to procedures that produced biological samples --blood, marrow, teeth and other samples were harvested and sent back to the United States -- in support of a wide range of experiments, many of which had little or no connection to the individual health and treatment needs of the people of Rongelap. Various human subject experimentation also occurred during medical treatment trips to research laboratories based in the United States. Ethnographic and documentary evidence demonstrates that these human subject experiences were painful, abusive, and traumatic.

- In addition to biophysical injuries, exposure to the environmental hazards generated by the United States Nuclear Testing Program (and related biomedical research) resulted in stigmatization and other psychosocial injuries that adversely affected individuals, the community, and the nation. Nuclear testing introduced new taboos where certain lands and certain foods were off limits, where marriage to certain people involved new social stigmas, where birthing presented new fears and health risks, and where family life often involved the psychological, social and economic burden of caring for the chronically ill and disabled. The failure of the United States Government to provide the Rongelap people with accurate information concerning environmental hazards and risks, coupled with contradictory pronouncements on what is and is not safe, created taboos that were incomprehensible, yet dominated living conditions after the onset of testing in the Marshall Islands. This transformation in the loci of control over “taboos” from a Marshallese cultural realm to a United States scientific realm undermined rules and the customary power structures that shaped, interpreted, and reproduced strategies for living in the Marshall Islands. The fear of nuclear contamination and the personal health and intergenerational effects from exposure color all aspects of social, cultural, economic, and psychological well-being. This imposed stigmatization adversely affects the economy, society, family, and individual health and well being of the people of Rongelap, Ailinginae, and Rongerik, and to varying degrees, the entire nation.

- After leaving Rongelap and Ailinginae Atolls in 1985, the Rongelap community faced severe hardships as they struggled to rebuild some semblance of community in Mejjatto, Majuro, Ebeye, and other locations. Involuntary resettlement placed hundreds of people

on small bits of rented land, creating extremely dense, unsanitary, and impoverished communities. The Rongelap community represents some 8% of the total Marshall Islands population, and while an estimated 48% of the nation is able to support household needs through agricultural production, the Rongelap community is alienated from land and the traditional resources needed to survive. This loss of access affects diet, health, and household economy. Extremely dense residential patterns created by communities of exiles living on rented land has created or exacerbated terrestrial and marine pollution. The impoverished condition of the Rongelap community has intensified local resource use, and the ecosystemic viability of host island environs has been degraded. Restricted access to critical resources inhibits the ability to teach younger generations the means to sustain a self-sufficient way of life. Loss of access to customary lands further inhibits efforts to transmit key information across the generations, knowledge that is essential to the survival of the community if they are ever to return to customary lands. These social, cultural, economic, and environmental problems of urbanization are linked to the contamination and loss of lands and represent consequential damages directly linked to nuclear testing.

- Nuclear testing destroyed the means to sustain a self-sufficient way of life for the people of Rongelap. Customary uses of Rongelap, Rongerik and Ailinginae atolls encompassed a rich range of social, cultural, economic activities, values, and meanings that allowed a vibrant, marine-based, self-sufficient and sustainable way of life. Current and customary laws, traditions, and subsistence production patterns involve an inherited system of rights to both terrestrial and marine resources. The consequential damages of contamination

from the Nuclear Weapons Test Program affects both terrestrial and marine ecosystems, including the natural and cultural resources that sustain life. Thus, damage assessments and compensatory actions need to include consideration of lagoon, reef heads, clam beds, reef fisheries, turtle and bird nesting grounds. Damage assessments and compensatory actions also need to address the loss of those resources important for sustaining the social and cultural aspects of life including family cemeteries, burial sites of *iroij*, sacred sites and sanctuaries, and *morjinkot* land. Because sustainable subsistence production requires access to multiple locations to survive without overusing the resource base, clean up and resettlement of the main island of Rongelap Atoll is not sustainable without restoration of all of Rongelap's islands and Rongerik and Ailinginae atolls. Compensatory actions should reflect a commitment to replace, restore, or create new means to sustain a self-sufficient way of life.

- Nuclear testing created environmental hazards, health problems, hardships and other consequential damages that will persist for decades to come. Compensatory actions should incorporate principles of nuclear stewardship and provide sufficient funds, facilities, expertise, and training to allow the people of the Marshall Islands the means and ability to conduct their own intergenerational epidemiological surveys, environmental risk assessments, to develop culturally appropriate environmental risk management strategies (including monitoring contamination levels and remediating terrestrial and marine ecosystems), and provide intergenerational medical care.

3. Research Concerns

This expert witness report is the result of a research project initiated at the request of Bill Graham, Public Advocate for the Marshall Islands Nuclear Claims Tribunal. The Public Advocate sought anthropological input on culturally appropriate strategies for assessing the value of land in a non-market environment for the purposes of awarding just compensation for damages incurred on Rongelap, Rongerik, and Ailinginae atolls as a result of the United States Nuclear Weapons Testing Program, and assistance in identifying the consequential damages and losses experienced by the people of Rongelap as a result of the United States Nuclear Weapons Testing Program. Research was conducted by environmental anthropologist Barbara Rose Johnston (Principal Investigator and Senior Research Fellow, Center for Political Ecology, Santa Cruz, California) and applied anthropologist Holly M. Barker (Ethnographer and Senior Advisor to the Ambassador, Embassy of the Republic of the Marshall Islands).¹⁹ Our research was initiated in November 1998, when the Public Advocate contacted Barbara Rose Johnston and Holly M. Barker with an invitation to provide assistance in valuing the damages and loss experienced by the people of Rongelap, Rongerik, and Ailinginae atolls as a result of the United States Nuclear Weapons testing program. We began with a review of appraisal documents prepared for the Bikini and Enewetak land claims to consider the difference between appraisal definition of land value and Marshallese interpretations of the value, meaning, and significance of land; and we identified strategies for broadening the assessment and valuation process in ways that reflect a Marshallese way of life. Because previous research suggested that the people of Rongelap suffered damages when they were physically removed from their lands, when certain areas or atolls were declared off limits, and when they were removed from the safe use of their

lands and resources due to contamination from fallout (Barker 1997; Johnston 1994), we identified the time frame for this research as extending from pre-testing up through the present.²⁰

Our initial review found that in the Marshall Islands rights to use critical resources are socially constructed, typically determined according to maternal relationships, legitimized according to communal relationships, and fluid rather than fixed. Existing appraisal documents considered one aspect of land valuation: the economic value of rights to use (lease) land. To consider damage and loss from a Marshallese perspective we identified a number of key questions: What does land mean to the Marshallese? Can you assign a value to land? Does a valuation that assumes “property” is terrestrial space-- the dirt underfoot-- adequately incorporate all that a *weto* -- parcels of land extending from ocean side to and into the lagoon -- represents? How do you value damage to the ecosystem and loss of the wide variety of natural resources (marine, terrestrial, arboreal)? How do you value the loss of access and use of atoll resources and the meaningful interaction of people and their environment? How do you value the loss of a self-sufficient way of life? What sort of valuation strategies might be used to articulate the broader range of damages and loss suggested by a human environmental impact analysis of nuclear weapons testing in Rongelap, Rongerik, and Ailinginae Atolls? These questions and considerations provided a starting point for developing an approach to assessing the value of land from a Marshallese perspective and suggesting some of the damages incurred by the Rongelap community as a result of nuclear weapons testing.

Research concerns were also shaped with reference to the Rongelapese experience as human subjects in ecological and medical research. For decades, the people of Rongelap have complained about medical and scientific researchers who document radiation-induced decay in their bodies and ecosystems, yet ignore or fail to treat the broader health needs of the people (see

for example, Conard 1958).²¹ The Rongelapese also complain that research conducted by outsiders does not involve them and typically fails to consider the knowledge that the Rongelapese have based on their experiences with radiation. The Rongelapese serve as study subjects, but rarely receive the results of research, or recognize any direct benefit from research. Thus, we developed a research approach that was purposefully transparent: involving participatory work with the people from Rongelap, Rongerik and Ailinginae in shaping research questions, suggesting knowledgeable informants to interview, conducting research, analyzing findings, and refining recommendations. An earlier report on the value of land to the Rongelapese was reviewed by the Marshallese Land Value Advisory Committee and a number of Marshallese informants to insure that translations and ethnographic interpretations accurately reflected Marshallese perceptions and experiences. A draft of this document was reviewed by the Senator and Mayor of Rongelap, key informants, and by other experts to ensure that the contents of the report accurately reflect the consequential damages and injuries suffered by the Rongelapese as a result of the testing program. The research questions, strategies, and data collection efforts were supported by the collaborative involvement of the Nuclear Claims Tribunal Public Advocate Bill Graham, Associate Public Advocate Tieta Thomas, and Marshallese sociologist Tina Stege. Access to supportive data was enhanced by the contributions of a peer review network of anthropologists, economists, sociologists, health physicists, lawyers, and other environmental scientists.

4. Research Methods

Ethnographic sampling procedures used in this research included saturation sampling and interviewing to sufficient redundancy, and snowball sampling. Data gathering techniques

included spatial mapping, focus group interviews, and rapid ethnographic assessment techniques. Rapid ethnographic assessments included narrow problem-oriented definition; participatory, rapid sampling of representative sectors; small sample sizes; focus on cultural patterning and differences across sectors of populations (rather than intercultural complexity or range of variation); a systems perspective (with an emphasis on collecting information from all relevant sectors in the community); cognitive techniques used to identify and assess cultural domains; and relatively minimal use of quantitative sampling or survey techniques.²²

In March 1999, we traveled to Majuro and began working with a Marshallese “land value advisory committee” to help shape fieldwork questions, plan research strategies, identify knowledgeable informants, and generate public interest and support for the project. The land value advisory committee was organized by the Office of the Public Advocate and included members knowledgeable in customary and current Marshallese resource relations (i.e., fishing; cultivation; production of baskets, maps and other material goods, medicinal ethnobotany; spiritual and other cultural uses and meanings of the landscape), and men and women who lived on Rongelap and Ailinginae during the Bravo event and in the years following the 1957 resettlement. The land value advisory committee included Iroij Mike Kabua, Senator Wilfred Kendall, Councilwoman Lijon Eknilang, Councilman George Anjain, and handicraft businesswoman Mary Lanwi.²³ The advisory committee helped shape strategies to work with the Rongelapese to:²⁴

- Establish the key variables that sustained their previously self-sufficient way of life by documenting traditional patterns of resource value, access, use and control;
- Identify key events and conditions that adversely impact these resource relations, and thus altered or destroyed their ability to be self-sufficient, and;

- Document their perceptions of the broader social and cultural damages associated with these damages and losses, and assess some of the socioeconomic consequences of these changes.

In addition to a formal advisory committee, this research profited by the contributions from key members of the Rongelap community, representatives of the Rongelap local government, and representatives of the RMI national government (including educators, environmental and health professionals, as well as elected officials and staff in the various ministries) who met with project consultants and provided background information and supporting documentation. Broad-based input was provided by the Majuro-based Rongelap community during and following a public meetings in March 1999. This meeting introduced project goals and activities, and resulted in comments and support, testimonials, and further involvement by Rongelap community members. A public meeting held in July 1999 provided community members the opportunity to review and discuss preliminary findings.

Testimony from informants was compiled by interviews with Holly Barker, often occurring with the collaboration of Marshallese sociologist Tina Stege and Assistant Public Advocate Tieta Thomas. Testimony from 1994 research conducted by Holly Barker on the health consequences of nuclear testing (for the RMI Government in support of a “Changed Circumstances” petition) was used to develop the chain of events and describe some of the Rongelapese experiences. Interviews with the Rongelap community on Majuro, Ebeye, and Mejjatto took place in March-April 1999. Follow-up interviews took place on Majuro in July 1999 and April 2001, and on Hawaii in July 2001. Interviews with the Rongelap community were also conducted by Holly Barker and Tina Stege on Rongelap Island in 1999, during the first community visit to Rongelap

since the 1986 evacuation. All interviews, other than advisory committee meetings, were conducted in Marshallese and later translated by Holly Barker with assistance from Tina Stege. Dr. Barker speaks fluent Marshallese, has over a decade of experience and relationships in the Marshallese community, and has previously worked with many of the informants to record their individual health problems associated with nuclear testing. Use of the native language ensured that interviewees could express themselves effectively, and also provided linguistic evidence of people's perceptions and experiences.

Access to Rongelapese informants was significantly enhanced by the efforts of Rongelap Senator Abacca Anjain-Maddison and Mayor James Matayoshi of Rongelap, who provided introductions and encouraged the testimony of many members of Rongelapese community. In June 2001, the Senator helped arrange group interviews with members of the community who were in Hawaii for a meeting with the U.S. Department of Energy (DOE). The Senator was present during most of the group discussions and assisted with the translation of traditional, older words and encouraged people to share their experiences. Over 70 Rongelapese participated as informants in the formal interview phases of research.

Preliminary research findings on the value of land and damages associated with the loss of a way of life were initially drafted in July 1999, and submitted to the advisory committee who met in Majuro to refine ethnographic interpretations and help develop research findings and implications. This meeting produced significant insights on compensatory concerns and recommendations. A revised report was submitted to the Public Advocate in October 1999.

Between 1999 and 2001, Barbara Rose Johnston conducted research on reparations and the right to remedy -- identifying valuation procedures and precedent-setting court cases and settlements providing compensation for damages and hardships associated with involuntary

resettlement, loss of a way of life, and human subject experiments. In March 2001, Barbara Rose Johnston reviewed the Atomic Bomb Casualty Commission files at the National Academy of Science archives in Washington DC, identifying documents describing funded research involving the Marshallese population in research on the genetic effects of radiation beginning in 1951. In April 2001, Holly Barker and Barbara Rose Johnston were asked by Public Advocate Bill Graham to rework the October 1999 draft report to add consideration of the hardships endured and consequential damages experienced by the people of Rongelap, and to outline appropriate remedies. The declassified literature was re-examined by Dr. Johnston to identify key documents demonstrating use of the Rongelap population in range of human subject experiments and these findings were coupled with earlier research by Dr. Barker on the declassified documents. Additional testimony was collected from Rongelap informants by Barker in Majuro (April 2001) and in Hawaii (June 2001) concerning the hardships associated with involuntary resettlement, and the pain and suffering experienced while enduring human subject experiments. Interviews with members of the Rongelap community living in Hawaii added an important element to this research, highlighting the difficulties of managing radiation-related illness and gaining access to medical care as required by the 177 Agreement of the Compact of Free Association.

Throughout the history of Nuclear Weapons Testing Program and related research on the human environmental effects of nuclear weapons use in the Marshall Islands, information has been closely controlled by the United States Government. Some of the secrecy has involved levels and content of fallout, fallout patterns, and the long-term bioaccumulative effects of fallout. The human effect of radiation, especially information relating to the wide range of studies and experiments involving the Marshallese people, has been the other major category of

classified information.²⁵ The Clinton Administration's declassification order in 1994 resulted in the disclosure of documents demonstrating the use of Marshallese subjects in a wide range of experiments, including purposeful intent to involve the population of Rongelap in long-term human environmental studies on the hazards of fallout. Declassification and disclosure has not been exhaustive, however, and some of the material released includes significant deletions. The review of documents and declassification of material still continues. Because the declassification order only relates to those experiments involving the use of radioactive materials on human subjects, other experiments may still be classified. Thus, this report reflects complaints and requests compensation for abuses currently known and documented. We fully expect new information about further abuses to continue to come to light.

5. Report Framework

The following report presents the findings from ethnographic and documentary research in ways that link anecdotal experience to the documentary record: fifty years of human and environmental monitoring has produced substantive documentation of radioactive contamination, exposure, bioaccumulative hazards, and biodegenerative conditions. This documentary record is used to illustrate, substantiate or punctuate Rongelapese testimony.

Testimony from the people of Rongelap was obtained through a series of interviews conducted with the understanding that comments and concerns would be recorded and used in this report, and that this report would be submitted to the Republic of the Marshall Islands Nuclear Claims Tribunal and entered into the public record. Direct quotes from Rongelapese informants are included in this report as testimony, and thus their names, dates, and interview locations are also provided.

Names used in this report reflect spelling at the time of the interview or published account. As Marshallese is a fluid language with an evolving written tradition, many variations on spelling exist.

Citations for documents, publications, and other sources are mentioned in text and full reference detail is provided in endnotes. United States Government documents are referenced in three ways: those materials filed at the National Academy of Sciences Atomic Bomb Casualty Commission archives are referenced by file box title and number, document date and title; those declassified materials posted on the Department of Energy website archives for human radiation experiments and the Marshall Islands are referenced by web site address; and those materials presented to the Government of the Republic of the Marshall Islands (RMI) by the U.S. Department of Energy are referenced by file access numbers, date and document title. Some of these files contain more than one document. Documents presented by the U.S. Department of Energy to the RMI are on file at the RMI Embassy in Washington D.C. These documents were classified and not available to the Marshallese government or general public during negotiations for the Compact of Free Association between the Republic of the Marshall Islands and the United States. The majority of these documents were declassified in the mid- and late 1990s as part of the Clinton Administration's inquiry into the use of human subjects in radiation experiments.

To fully identify and understand the consequential damages of the United States Nuclear Weapons Testing Program it is important to consider the pre-existing context, as well as the meaning and value of atoll resources from a Marshallese point of view. Thus, Part 2 presents the physical ingredients, actions, and culturally constructed mechanisms that allowed the people of Rongelap, Rongerik, and Ailinginae to experience a self-sufficient, sustainable way of life. This

summary of the key elements of the traditional subsistence system includes tangible resources as well as the knowledge and social structures that allow effective, viable use of terrestrial and marine resources. In demonstrating the key elements of a viable system, this summary provides the ethnographic and environmental detail supporting research findings that contamination and involuntary relocation fundamentally altered, and in many instances destroyed, the material basis to sustain a healthy, self-sufficient way of life; and, consequential damages include damage and loss of natural and cultural resources, and the means to produce and reproduce a sustainable way of life.

An annotated outline of the chain of events and related concerns associated with the United States Nuclear Weapons Testing Program and its human subject research program is presented in Part 3. Key events include the contamination of an entire population and their homelands; removal of people from the safe use of their surroundings; injuries that produced the need for life-long and intergenerational medical treatment; and, the use of people as human subjects in scientific research programs. Informant testimonies concerning these events have been included to further contextualize experiences and suggest some of the psychosocial, cultural, economic, and political hardships and injuries experienced by the population of Rongelap as a result of exposure to fallout, medical research, extensive contamination of terrestrial and marine resources, and involuntary relocation.

Part 4 presents a summary of damages from these events as experienced by the people of Rongelap and the broader nation. The consequences of these events include economic, political, social, cultural and psychological injuries and hardships experienced by individuals, households, kin networks, the broader corporate group, and the nation as a whole. This section includes the

pressing questions, comments and remedial suggestions offered by Rongelap informants, and those emerging from an anthropological analysis of events and experiences.

Part 5 addresses the question of meaningful remedy from a broader, legal perspective by identifying and defending major categories of damage and loss, reviewing significant statements of culpability, and citing relevant valuation tools, compensatory actions, court findings and settlement precedents in similar cases in the United States and internationally.

¹⁷ In this report the people of Rongelap -- or Rongelapese-- refers to those people exiled from Rongelap, Rongerik and Ailinginae Atolls. They are typically considered by other Marshallese as being a single sociopolitical unit and they are represented in the RMI Government by one elected senator, though members of the Rongelap community retain rights to three atolls. Ethnographic interviews and historic records confirm the presence of villages and year round residential use in each of the three atolls.

¹⁸ Rongerik Atoll is the rare example of *morjinkot* land -- land that an iroij gives to a warrior for heroics in battle. The story of how this land became *morjinkot* in the mid-1800's is still told today. See Map 3, Anjain map of Rongerik.

¹⁹ Barbara Rose Johnston is an environmental anthropologist and senior research fellow at the Center for Political Ecology (P.O. Box 8467, Santa Cruz, California 95061). She holds an independent studies M.A. in Cultural Ecology from San Jose State University and a Ph.D. in Anthropology from the University of Massachusetts, Amherst. Significant publications at the time of this report include the edited volumes *Who Pays the Price? The Sociocultural Context of Environmental Crisis* (Island Press, 1994), *Life and Death Matters: Human Rights and the Environment at the End of the Millennium* (AltaMira 1997) and, with John Donahue *Water, Culture, Power: Local Struggles in a Global Context* (Island Press 1998). She has served as chair of the American Anthropological Association Committee for Human Rights, and Director for the Society for Applied Anthropology Environmental Anthropology Project Director.

Holly Barker lived in Mili Atoll in the Republic of the Marshall Islands in 1988-1990 where she served as an English Instructor and Teacher Trainer with the Peace Corps. From 1990 through the present she has divided her time between the Marshall Islands and the United States, serving as a senior advisor to the Ambassador for the Republic of the Marshall Islands on political, health, environmental, education, and radiation-related issues. Holly Barker holds an M.A. in Education and a Ph.D. in Anthropology from the American University. Her Ph.D. dissertation analyzed ethnographic and archival data related to the U.S. Nuclear Weapons Testing Program conducted in the Marshall Islands from 1946-1958 with particular emphasis on language used by communities in the Marshall Islands to convey their experiences with radiation.

Cultural anthropologist Stuart Kirsch (the University of Michigan) attended initial Advisory Committee discussions of the Marshallese value of land in 1999. He also provided background information on other compensation cases in the Pacific region involving indigenous peoples and efforts to claim compensation for loss of a way of life.

²⁰ See Holly M. Barker, "Fighting Back: Justice, the Marshall Islands, and Neglected Radiation Communities" in *Life and Death Matters: Human Rights and the Environment at the End of the Millennium*, edited Barbara Rose Johnston (Alta Mira Press: London) 1997. Barbara Rose Johnston. "Experimentation on Human Subjects: Nuclear Weapons Testing and Human Rights Abuse" in *Who Pays the Price? The Sociocultural Context of Environmental Crisis*, edited by Barbara Rose Johnston (Island Press: Washington DC) 1994.

²¹ Robert A. Conard. June 5, 1958. Letter to Dr. Charles L. Dunham, Director of Biology and Medicine for the Atomic Energy Commission, regarding continued exposure of the Rongelapese.

²² These terms and procedures are described in Robert Trotter and Jean Schensul "Methods in Applied Anthropology" in H. Russell Bernard's edited volume *Handbook of Methods in Cultural Anthropology* (Alta Mira 1998) 691-736. For an example of using ethnographic methods to define and assess environmental risk associated with low-level radioactive storage see Richard Stoffle, *et al*, 1991 "Risk Perception Mapping: Using Ethnography to

Define the Locally Affected Population for a Low-Level Radioactive Waste Storage Facility in Michigan” *American Anthropologist*, 93 (3): 611-635.

²³ The authors of this report were saddened by the death of George Anjain in February 2000. As discussed in part three of this report, the Rongelapese believe that George’s death, like many others, was a result of inadequate health care services.

²⁴ The political ecological framework is historical, processual, and allows analysis of the complex forces that stimulate and shape human environmental change. The emphasis on political and economic forces, ecosystemic conditions and dynamics, and sociocultural relationships is especially helpful in analyzing the social and cultural consequences of environmental crisis. See, for example Barbara Rose Johnston, ed., 1994, 1997.

²⁵ *Advisory Committee on Human Radiation Experiments, Final Report*. October 1995 (Washington DC: Government Printing Office) pgs. 621-668.

PART TWO: LOSS OF A HEALTHY, SUSTAINABLE WAY OF LIFE

1. Introduction

This chapter presents evidence to suggest that consequential damages and injuries associated with the U.S. Nuclear Weapons Testing Program include the loss of the means to sustain a healthy, sustainable way of life. In their review of compensation claims for the people of Bikini and Enewetak the Nuclear Claims Tribunal has awarded compensation for loss of land based on valuation of land derived from a record of leases in Majuro, Kwajalein, and other atolls. Such valuations reflect one aspect of economic value—the value of temporal occupation of dry acreage. Such valuations do not consider and adequately address social and cultural values, meanings, and uses of land. Nor do these valuations address the wider realm of arboreal and marine resources that sustain the Marshallese way of life. In this chapter we focus on the complex social, cultural, political, and economic relationships between the people of Rongelap and their atolls. We outline customary rules and obligations, identify critical resources, and describe some of the mechanisms used to care for and transmit knowledge about the land and the sea. This human environmental detail provides a framework for interpreting subsequent damages and injuries experienced by the people of Rongelap when removed from the healthy use of their homelands.

2. Valuing Land from a Marshallese Perspective

Outside observers traveling to the islands from their continental homes have described the Marshall Islands world as a very small place-- tiny spits of sand and reef forming islands and atolls, and separated by immense stretches of open sea. In actuality, the Republic of Marshall

Islands extends across some 750,000 square miles of ocean, an area equivalent to the landmass of Mexico. Within this national boundary lie an estimated 870 reef systems and some 1,225 islands distributed along two island chains: the Ratak (sunrise chain) and Ralik (sunset chain). These islands form 29 atolls and 5 individual islands with a total estimated dry land mass of some 70 square miles. For an estimated 4,000 years, the people of the Marshall Islands have survived and thrived on thin stretches of land in a universe of ocean. From their perspective, the world is largely water, and their terrestrial lands are part of--rather than separate from--the sea. Survival required knowledge, experience, and access to critical resources present in both these fixed and fluid realms.

Descriptions of the land by outside observers often emphasize severe limitations: “Of all the island and atoll types in Micronesia, the drier coral atolls” such as Rongelap, Ailinginae, and Rongerik “present the greatest challenge to human occupancy” (Mason 1968:278). These low-lying, dry atolls have “slender resources” [and] “practically no soil covers the coral, and the inhospitable sand will grow few plants” (Krieger 1943:21).²⁶

Ethnographic interviews with the people of Rongelap, Ailinginae and Rongerik paint a different picture. For example:

Lijon Eknilang: *The islands in the northern islands, like Rongelap, they were the garden islands. Everyone knew they were the best place to grow arrowroot, pandanus... there were whole islands covered with birds, and turtles* (March 4, 1999, Advisory Committee meeting, Majuro).

Kajim Abija: *There was always pandanus and coconuts. During the times of hunger, we were not really hungry because there was so much of the pandanus* (March 16, 1999, Holly M. Barker, Ebeye).

Mwenadrik Kebenli: *I was born in 1917 on Rongerik. We came together and made food. We stored food. So many kinds of food. Every type was there. There was water. We ate arrowroot, preserved breadfruit, pandanus, coconut, fish, crab, foods from the reef like octopus, clam and small fish. There’s an island, Jipedbao, with lots of birds. There were also turtles on the islands. We would sail overnight in the outrigger canoe to Rongelap. We would take food to Rongelap. We always exchanged food. There were so many good things on Ailinginae* (March 16, 1999, Holly M. Barker, Ebeye).

Dorothy Amos: *There was a lot of coconut, lots of pandanus and foods we make from pandanus, also arrowroot. Foods from the ocean, there were so many. Big clams, crab, every kind in the depths of the ocean. We ate, or sold them to boats that would come in, we could exchange shells and food supplies. So many crabs, and birds. We got life from them. There was good well water on Ailinginae. There was also good food on the small islands around Rongelap, not just on Ailinginae* (March 18, 1999, Holly M. Barker, Ebeye).

These contrary perceptions of the resource base as limited or lush in some ways reflect different worldviews. From a continental perspective, limited land meant limited resources-- minimal agricultural production, no rivers, lakes or streams, and relatively few trees. From a Pacific Island point of view, land provided access to an immense array of resources. Cultivation and husbandry of trees and bushes were elements of a broader subsistence strategy that utilized the resources provided by the currents of wind and water -- migratory birds, fish, and marine mammals were all essential elements of the Marshallese subsistence economy. Critical resources included not only terrestrial and marine materials and foods necessary for basic survival, but also the knowledge to use and exploit resources in sustainable ways.

3. Land and Sea Tenure

The importance of land to the Marshallese--not only as a place to live and grow food, but also as the essence of Marshallese life-- is well documented. On April 20, 1954, a petition was submitted to the United Nations Trusteeship Council on behalf of the Marshallese citizens of the Trust Territory of the Pacific Islands. In this petition, the Marshallese people cite their concerns about the United States Nuclear Weapons Testing Program, concerns that included damage to health and the long-term implications of being removed from their land:

... We, the Marshallese people feel that we must follow the dictates of our consciences to bring forth this urgent plea to the United Nations, which has pledged itself to safeguard

the life, liberty and the general well being of the people of the Trust Territory, of which the Marshallese people are a part.

... The Marshallese people are not only fearful of the danger to their persons from these deadly weapons in case of another miscalculation, but they are also very concerned for the increasing number of people who are being removed from their land.

... Land means a great deal to the Marshallese. It means more than just a place where you can plant your food crops and build your houses; or a place where you can bury your dead. It is the very life of the people. Take away their land and their spirits go also... (“Petition from the Marshallese People Concerning the Pacific Islands: Complaint regarding explosion of lethal weapons within our home islands.” United Nations Trusteeship Council:T/PET.10/28).²⁷

This paramount role of land rights in traditional Marshallese society was documented by anthropologist Jack A. Tobin (1958:3), District Anthropologist for the United States Territory of the Marshall Islands, and expressed in an interview he conducted: “We will never willingly accept any other land in exchange for our lineage land.”²⁸ As noted by Tobin, the concepts of alienation of lands by sale, lease, or rental were “introduced by foreigners” (1958:21). Marshallese land tenure “forbids sale of land to non-indigenes” (1958:1), and the “Marshallese will not willingly accept complete alienation of their lands” (1958:3).

The Marshallese value land as an integrated part of the marine ecosystem, a fact noted in the reports of Jack Tobin. In his 1958 report Tobin noted that property rights extend from terrestrial property into the marine area: “According to custom, the property rights extended out to the area where people stood, usually waist deep, in order to fish with a pole. These rights belonged exclusively to the lineage, whose land holding bordered the marine area” (op cit, 1958:57).

Tobin also noted that the marine resources belonged to the *iroij*, but the people residing on an atoll were free to use the resources:

Traditionally everything of value in the lagoon such as shellfish, langusta, etc., was considered to be the property of the chiefs. The inhabitants of the particular atoll did not have to ask permission to take these items unless they were tabu property of the chiefs: the concept that the right to exploit the marine resources of an atoll is the prerogative of the inhabitants of that atoll only still persists (ibid:8).

Customary resource relations involve the rules and traditions governing the access and use of critical resources, as well as the meanings and values assigned to critical resources. The Marshallese are not alone in establishing rules and traditions to govern marine property. Anthropologist John Cordell in his analysis of sea tenure systems notes that throughout the Pacific “seascapes are blanketed with history and imbued with names, myths, legends, and elaborate territories that sometimes become exclusive provinces partitioned with traditional rights and owners much like property on land” (1989:1). Cordell notes that evidence of marine property systems is reflected in the localized and specific knowledge of reefs, tides, currents, winds; in the traditions that govern access and limit knowledge of fishing areas to those with specific entitlements; and, in the names for territories, subsurface features, rocks, and reef clefts - names that represent events and mythical characters and provide local people with a “constant visible historical anchor” (1989:9).²⁹

4. Rules Governing Access and Use Rights

In his 1958 report on customary land tenure in the Marshall Islands, Tobin observed that “land, which is the source of their day-to-day existence, is considered by the Marshallese to be their most valuable asset” (1958:2), and while this asset is valued, it is not owned. According to Tobin, the Marshallese property rights system is “premised on the notion that no single person owns the land. Rather, the three-tier social structure acts like a corporation that collectively oversees the best interests of the property. The lineage (*bwij*) members may live on and exploit the resources of the land parcel or, if they possess rights in more than one land parcel, as is usually the case, merely make copra on it and use its food resources such as: coconuts,

breadfruit, arrowroot, pandanus, bananas, and taro. Pigs and chickens are kept and fish and shellfish are obtained from the adjacent marine areas” (ibid:7-8).

Maintenance of the property and resources are critical to ensuring the continued livelihood of everyone in the corporation with rights to the property. “On certain occasions, landowners may allow non-landowners to live and work on their property. Members and associated members of the lineage (*bwij*) work the land, clearing it of underbrush and performing other tasks necessary for the simple type of agriculture practices in these low-lying coral atolls with their limited resources. In some instances people are allowed to work land not belonging to their lineage when members of another lineage have more than enough land for their own needs, or want to help some less fortunate person” (ibid:10).

In this type of non-family use arrangement, the non-landowning tenant acts, in western terms, as a renter. The renter is expected to provide a portion of cultivated resources or profits from the resources to the landholders.³⁰ Additionally, the renter is expected to maintain the land by using resources sustainably and ensuring the future production capacity of the property and resources. If the renter is not a responsible steward of the property and resources, the landholders will evict the renters. The landholders benefit from this rent-like arrangement by having their property and resources cared for responsibly. By the same token, the renter benefits from accessing resources necessary for survival. In addition to caring for property and resources for the well being of the existing generation, people with land rights work collectively to ensure that the lineage holdings will be productive for the succeeding generations that will inherit the land. In this regard, customary ownership of property and resources is based on sustainable interactions with the environment and responsible stewardship that allows future generations to flourish.

The national law of the Republic of the Marshall Islands reflects and codifies this customary law, protecting landholders and users and their customary traditions that allow sustainable subsistence in a fragile island environment. Section 5.1 of the Constitution of the Republic of the Marshall Islands recognizes that the “means to obtain subsistence and benefits is of utmost value. For this reason, the RMI Constitution upholds the notion of just compensation for all interest holders of the land when land is taken.” Because the Marshallese view themselves as intergenerational holders of the land, interest holders of the land extend to future generations who will have rights to the land.³¹

These excerpts from Tobin (1958) and the Constitution of the Republic of the Marshall Islands illustrate a critical feature of the Marshallese subsistence system: this is a tightly structured common property rights system where rights to use land and other critical resources are inherited. Our ethnographic research confirmed the presence and importance of land use rights that are transferred between generations. The western notion of individual property rights (meaning the ability to own, sell, or buy a piece of land) and thus, a free market in land, do not exist. There are exceptional cases where individuals with rights to *wetos* (parcels of land extending from ocean/ reef side to and into the lagoon) legally transfer their rights to land (to, for example, release themselves from a serious debt). However, even in these cases, transactions involve the transfer of use rights between Marshallese families, with the transaction regulated and controlled by customary authority. Non-Marshallese individuals cannot purchase land. Rights to use land are occasionally exchanged for cash payment, but customary and current use rights are highly prescriptive, typically involving the right to occupy, and do not include rights to freely use without permission coconut, pandanus, and other materials resources situated on the land, or reef heads and other marine resources adjoining the land. Customary exchanges of use

rights, and many current use rights arrangements, typically involve the exchange of labor and the products of labor for the right to occupy and use with permission the natural resources of a particular *weto*, or area. Traditional and current use-rights arrangements include an implicit agreement to care for the land, including husbandry of trees, clearing underbrush, burning and improving the fertility of soil. The privilege to occupy or use a *weto* can be revoked when stewardship principles are not being met.

Land rights in Marshallese society represent far more than the economic means to sustain a household:

Mike Kabua: *Land gives you the meaning of life and the role of each individual in society...* (March 4, 1999, Advisory Committee meeting, Majuro).

Wilfred Kendall: *The people here have tenaciously held onto land. The resource people treasure most is land. Land speaks of your being, essence, reason for living. You relate to the world in terms of land... [that] provides for your present, future, and future needs... You cannot put enough value on land.... How do you put a value on something that people consider as a living thing that is part of your soul?* (March 3, 1999, Advisory Committee meeting, Majuro).

The pattern of access and use rights to property and natural resources reflect social relationships and standing in the community:

Dorothy Amos: *We have different customs than Americans. They won't say there are three tiers of land rights, but for us, there are. We protect the land. This is our inheritance from our grandfathers and grandmothers. We bury on our land. We do planting* (March 18, 1999, Holly M. Barker, Ebeye).

Customary traditions and current practices involve a fluid, rather than fixed system of rights to *wetos*. *Weto* rights are inherited, with women often investing a male member of her family with the power to claim use rights. To claim the right to use a *weto*, one must be able to describe it in relation to other *wetos*. The power to recognize and validate that claim rests in the hands of customary authorities (*alabs* and *iroij*). Customary authorities adjudicate conflicts over family

claims. Changes in family structures and changes in customary power structures (with, for example the death of a mother, or an *alab*, or *iroij*) can produce a redistribution of use rights. Monetary compensation for denied use or damage to land based on the rights to use as defined and recognized at a given point in time can, in effect, impose a system of individual property rights, and this has the potential to undermine the traditional balance of power between men and women in society.

Marshallese culture and the structure of society revolve around a three-tier approach of reciprocal use rights for the *iroij*, *alab* and *ri-jerbal*. Because the social structure of the Marshall Islands is extensively documented elsewhere (Tobin 1953, 1958, Mason 1968, and Kiste 1974), this portion of our report focuses on Rongelapese perspectives about the three-tier social structure as it relates to property and access to resource rights.³²

Iroij: Although the *iroij* did not reside on Rongelap, Rongerik or Ailinginae, the *iroij*, as everywhere in the Marshall Islands, is responsible for the people. The *iroij* provides for the people. He/she is expected to provide in times of need and to help distribute resources so everyone is taken care of. The *iroij* is the key to the customary resource management system. It is his/her job to decide the rules of access and use-- to hear and settle disputes over fish weirs; stolen fish, breadfruit and coconut; and to determine *weto* boundaries, rights to use *wetos*, and succession rights:

Mike Kabua: *The iroij always protects their people like a fence wrapped around them, standing at the gate taking care of them* (March 4, 1999, Advisory Committee meeting, Majuro).

Lijon Eknilang: *The iroij is like our government* (March 4, 1999, Advisory Committee meeting, Majuro).

Wilfred Kendall: *The iroij have people clean the land. People get to use the resources on the land and the iroij benefit from having the land maintained* (March 5, 1999, Advisory Committee meeting, Majuro).

Alab: In exchange for the care and use of land provided by the *iroij*, the *alabs*, or managers of the land, keep records and books with information about the land and the *wetos*. They provide daily oversight for the land and the workers of the land, the *ri-jerbal* or *kajor*. The *alab* also carry the rights to their lineages-- their “property.”

Mike Jenkins: *Alabs essentially act like a corporation. There is a system of checks and balances in place. You can't have private ownership anymore. Instead, the corporation looks after your trust, or "jolet." The alab is the Chairman of the Board. The alab can't make an agreement that is binding on our next generation. It is important to understand the holding of the corporation (what land), the conditions of the land, and what decisions you are allowed to make regarding the land. Alabs are closer to the iroij than other people in the community because they bring them their food when they visit and they serve as intermediaries between the workers and the chief* (March 15, 1999, Holly M. Barker, Gugeegue).

Ri-jerbal or kajor: While the *alabs* have the power to control the day-to-day work on the land, the *ri-jerbal* have the rights to use the land. *Ri-jerbal* is a word that developed during Japanese times when the people began to collect coconuts for commercial value (Mike Kabua, August 7, 1999). *Ri*, literally the people, and *jerbal*, or work, defined those that did the work for money. *Kajor* is the traditional word that is used to describe the third tier of society. *Kajor* means strength in the Marshallese language and reflects the symbiotic relationship of society in which the *kajor* provide the strength or support to the *alab* and *iroij*. While the *alabs* control and manage the land, the *ri-jerbal* maintain the rights to use the land and its resources necessary for survival. If a *ri-jerbal* does not take proper care of the property and its resources, the *iroij* might forbid the *ri-jerbal* from using it. The majority of the community members of Rongelap, Rongerik and Ailinginae are the *ri-jerbal* who have the rights to work and maintain the land in exchange for sustenance and survival from the land.

The Rongelapese recognize the *iroij's* ultimate authority over the natural resources. To demonstrate this, certain foods and areas of the reef and land are set aside for *iroij*:

Lijon Eknilang: *Certain species are used just for the iroij, such as brown eel, turtle, whales, dolphins, and frigate birds. Other coral heads in a lagoon are reserved just for the iroij as the place to collect food for the iroij. It is “mo,” or forbidden, to go to islands and areas reserved for the iroij* (March 2, 1999, Advisory Committee meeting, Majuro).

Mitjua Jankwin: *When he was here [on Rongelap], we gave him food from those coral heads. Sometimes food from those coral heads was sent to Ebeye. We sent janwin (preserved breadfruit), too* (March 10, 1999, Holly M. Barker, Rongelap).

Delineating land rights: Beyond *iroij* authority over critical resources, all three tiers of society are entitled to use the land and resources for their well being. The strongest entitlements come from matrilineal rights to the land, although the Rongelapese recognize paternal rights to the land as well:

John Anjain: *On Jabwaan, my father is the ri-jerbal. I don't have to ask to use my father's land. On Eniaetok, my mother is the alab. All of your mother's family has rights. Even if someone is gone for a long time, his or her rights won't disappear. If other people have rights to the land, they can use it. People who don't have any rights have to ask permission to use it* (March 16, 1999, Holly M. Barker, Ebeye).

In addition to rights inherited from parents, people obtain rights to the land by permission of the *iroij* or family, or by marriage:

Johnsay Riklon: *When you are married, you are entitled to the land of your spouse. It is also understood that relatives can ask for resources* (February 28, 1999, Holly M. Barker, Barbara Rose Johnston, and Stuart Kirsch, Majuro).

Because land is so important to survival, “the Marshallese jealously guard their land rights and will not willingly part with them” (Tobin, 1967:3).³³

The Rongelapese are very clear about the boundaries of their *weto* property. It is clear, for example, that the extension of *weto* boundaries incorporate rights to the lagoon:

Emos Jilej: *The boundary of this weto (Tutulonarijet weto), my wife's land, is the small, sharp peninsula you will see further down and the row of pandanus trees over there* (March 10, 1999, Holly M. Barker, Rongelap).

George Anjain: *My land extends from the middle of this island all the way down to the end. My land covers half of the island. Weto rights extend to the water's edge, including the sand and any exposed areas. Beneath the tidal zone out to 5 miles belongs to the local government. From 5 miles to the 200-mile EEZ [exclusive economic zone] belongs to the national government (March 15, 1999, Holly M. Barker, Rongelap).*

John Anjain: *People have rights up to the high tide mark where the water ends. The Navy explained this to us. Sometimes we just go and take food from the water area on someone's property, but sometimes we ask for permission (March 16, 1999, Holly M. Barker, Ebeye).*

Everyone who has rights to land also has the responsibility to help harvest or maintain shared resources-- including cleaning, planning, harvesting, and the division of food resources. People with land rights are also responsible for deciding what plants will be grown on certain islands, and what areas will remain in a wild state. If someone does not have rights to the land, they can ask the landholders for permission to use the land. This enables those who seek permission to benefit from the resources on the land and for the landholders to have their land taken care of:

Wilfred Kendall: *People ask permission to work on someone else's land, but it is always expected the land will be returned in good shape. You do what is expected of you or people will have the right to keep you from the land (March 3, 1999, Advisory Committee meeting, Majuro).*

John Anjain: *If someone uses your land, they are expected to take care of it, and to maintain it. If they don't or if they cut trees or wreck the house, you can stop them from making copra. You can even stop a family member from using the land because there is always a leader in the family (March 16, 1999, Holly M. Barker, Ebeye).*

In some cases, especially in the urbanized areas of Majuro and Ebeye, housing is rented. In these cases renters have the right to occupy, but do not have the right to use any of the other resources associated with the land. They cannot harvest fruits, cut or clear trees, or use other significant resources without express permission from the landowner:

Mike Kabua: *They are merely leasing the house--not the land. The property owner still has the right to collect breadfruit (March 3, 1999, Advisory Committee meeting, Majuro).*

In addition to maintaining the land for their own use, the Rongelapese have a clear perception of the importance of protecting the land for future generations. The Rongelapese understand that they are fortunate to receive the gift of property from their ancestors. They, in turn, look forward to bequeathing it to future generations:

Lijon Eknilang: *It's better to use the word jolet (inheritors) instead of owner. We are the inheritors, but the owner is God.* (March 16, 1999, Holly M. Barker, Ebeye).

There is also a conscious effort by the Rongelapese to teach the younger people where their land rights are so they can continue to claim and use their property in the future. Knowledge of the land, its resources, the family history of use, and the relationship of the *weto* boundaries in relation to other *wetos* are essential to proving a family claim:

James Matayoshi: *My mother shows me where our land is so I can take care of it* (March 1, 1999, Holly M. Barker, Majuro).

Emos Jilej: *My grandchildren have never been to Rongelap. I tell them where their land rights are so they will know* (March 10, 1999, Holly M. Barker, Ebeye).

Mike Jenkins: *I was raised in the United States. My mother was Marshallese. She was an alab of Kwajalein, and my father was American. My mother taught me all about Marshallese land rights. Before I ever came to the Marshall Islands, my mother taught me about the iroij system, land claims and family rights. My mother chose me out of all ten children to come back to the Marshall Islands to claim my family's land rights* (March 15, 1999, Gugeegue).

5. Cultural Land and Seascapes

Marshallese place names explain the history of terrestrial and marine property. Atoll, island, *weto*, seamount and reef names all remind the Rongelapese of the history and the social and environmental significance of their property, as illustrated in Table 1 below.³⁴

Table 1: Examples of Place Names for Rongelap, Ailinginae and Rongerik.

Atoll names:

Rongelap: *Ron* (hole, referring to the lagoon) *lap* (large) = large lagoon

Rongerik: *Ron* (hole) *rik* (small) = small lagoon

Ailinginae: *Aelon* (atoll) *in* (in) *ae* (current) = atoll in the current

Island names:

Enetaitok: *Ene* (island) *aitok* (long) = long island

Enebarbar: *Ene* (island) *barbar* (rocky, or lots of reef) = island with lots of reef

Aeroken: *Ae* (current) *rok* (southern) *en* (away from speaker) = southern current

Weto names:

Marren: *Mar* (bushes) *en* (away from speaker) = land with bushes away from the village

Monbako: *Mon* (house) *Bako* (shark) = house of the sharks

Aibwej: *Aibwej* (water) = water

Reef names:

The reefs have names, like *Kapijinamu*, the huge reef in the south of Rongelap = the place to fish and get food from the reef. Other reef names are *Kijukan*, *Patelona*, *Kejenen*, *Tuilok en Kijenen*, and *Metalaen*.

Source: Land Valuation Advisory Committee, March 1999.

Weto names are place names that typically describe physical characteristics or explain why and how people inherited and use the land:

Wilfred Kendall: *Land speaks for everything out here in the island... the name (of the land) speaks to the history, whose rights, and why those rights exist* (March 3, 1999, Advisory Committee meeting, Majuro).

The interviewees know where all of the important natural resources are located on the atolls:

John Anjain: *There are places where we lived and places where we would go to stay and gather food. People would stay for years on Buokku, Eniaitok, Jabwaan, Rongelap, Aerik, Mellu and Yugui.* (March 16, 1999, Holly M. Barker, Ebeye).

One interviewee, Mwenadrik Kebenli, recited a chant (*roro*) about *Kapijinamu* reef that teaches listeners to follow the waves off of the reef in order to get to the atoll. The waves bouncing off the reef affect the wave patterns far off the land and help sailors find the reef. The fact that reefs on Rongelap have place names indicates that the reefs were an integral and valued part of the lives of the Rongelapese people. Names are assigned by the Rongelapese to the reefs and seamounts in the same way as atolls, islands, and *wetos*.

One of the reasons why the northern atolls enjoy such an excellent reputation for fisheries is their proximity to seamounts. Seamounts are large submarine volcanic mountains rising at least 1,000 m (3,300 feet) above the surrounding deep-sea floor. Preliminary oceanographic studies have shown that seamounts are biologically rich areas supporting a distinct benthic (bottom dwelling) community of animals, many of which are unique and do not occur elsewhere on earth. In addition to supporting diverse marine life, seamounts attract pelagic species-- schools of large fish, especially tuna, that visit to feed and spawn.

Seamounts are more than a magnet for sea life, they also attract fishermen. Traditional fishing in these areas sustainably supported the needs of a community. However, technologically-intensive exploitation seriously damages the coral forests and associated marine life found in seamounts worldwide, and seamounts are increasingly being devastated by commercial fishing, especially by trawlers. This threat to a unique marine habitat has been recognized by the United Nations Environment Program and by a number of nations that are attempting to protect seamount resources by designating them as marine reserves.³⁵

Of the 43 named seamounts in the Marshall Islands, some 30 are located in the northern atolls. Seamounts immediately north of Ailinginae are *Ruwituntun* and *Look*. Immediately south of Ailinginae (between Ailinginae and Wotho) is *Lewonjpoui*. Northeast of Rongerik is *Lawun-*

Pikaar. And, immediately north of Bikini is *Wodejebato*. According to Alfred Capelle, some of the names associated with the seamounts were those of sea demons and legendary spirits, both good and evil, inflicting upon those who knowingly went near them either good or bad luck, depending upon the intent of the trespasser (personal communication, September 2001). Rongelap informants both confirmed the importance of these areas as fishing grounds, and expressed their fears that foreign commercial trawlers were destroying these areas in their long absence from Rongelap.³⁶

For the Rongelapese and other Marshallese people, the cultural landscape is fixed and fluid – both terrestrial and marine. Seamounts, reefs, islands, and lagoons are all significant features of the land and seascape and are valued for many reasons. Marshallese stories of the beginnings of life on earth involve features of the seascape. In many cases place names represent the physical manifestations of social relationships over time. Land is inherited through family name and valued for its connections to future generations. The name of the land in itself can depict important events and relationships. For example:

Mike Kabua: *The names of some land reflect the possession history of the property: “kited” land is land that an iroij or alab gives to his wife. That land will be passed down through the family of the wife upon her death.... Of all the types of land, land acquired by battle is particularly important.* (March 2, 1999, Advisory Committee meeting, Majuro).

This type of land acquired in battle, *morjinkot*, literally means “taken at the point of a spear” (Tobin 1958:29). It is given to a warrior by an *iroij* to show appreciation for a warrior’s battle skills. *Morjinkot* “was always given by the *iroij* alone to commoners” (ibid, p.29). Rights to the land extended to the family of the warrior as “maternal relatives and paternal relatives both used the land. Maternal relatives have a usufruct right to the land. Paternal relatives could utilize the resources of the land but did not have usufruct rights in the land” (ibid, p.31).

All of Rongerik Atoll is *morjinkot* land. Rongelap's former Magistrate, John Anjain, has recorded a history of Rongerik Atoll in his Magistrate's records.³⁷ Rongerik was given to Lejkonikik Antoren, an ancestor of Rongerik's current Iroj Anjua Loeak, for heroics in a battle between Kili and Jaluit. For this reason, the property on Rongerik is accorded great respect and great value in the Marshallese culture.

6. Spiritual Values of Land and Seascape

It is exceedingly difficult to use western terms in order to convey the spiritual value of land to the Marshallese. All of Marshallese life, culture, and sense of identity emanates from the people's connection to their land. In an April 1999 interview, one Rongelapese youth equated the loss of one's land to hanging oneself with a rope (Malal Anjain, 1999). Comparing the violence levied against the Rongelapese people and their environment to the violent suicides of many Marshallese youth demonstrates that the Rongelapese feel they have been violently removed from the land. In this regard, removal from land takes away purpose and meaning in life and is akin to a violent death for the Rongelapese.³⁸

Because of the central importance of land and property to the Marshallese, people have a strong attachment and sense of who they are in society that comes from their families' land. The Marshallese have words to capture the importance of this connection that translate poorly into English, such as *lamoren*, or "old lineage land" (ibid, p.22), and *jolet*, or inheritance. This notion is expressed throughout the Marshall Islands in national and local government seals, in the Constitution, and in the national anthem, popular songs and stories. The first national anthem of the Republic describes the spiritual value of the land for the Marshallese:

*Ij iokwe lok aelon eo ao
Ijo iar lotak ie.*

*Melan ko ie im iaieo ko ie.
Ijamin ilok jen e
Bwe ijo jiku emool.
In ao lamoren in deo emman
Lok ne inaa j mij ie.*

I love my island
Here where I was born.
The beautiful surroundings and joining together with friends.
I don't want to leave here
This is my true place.
It's my inheritance forever
It's best for me to die here.³⁹

The sanctity of certain land is reflected in the range of taboos: there are certain areas where it is forbidden to walk, such as medicinal areas (*taban*). Certain areas were also set aside for magic, and other areas for birthing. There are some islands where it is forbidden to scream. In some cases there are taboos against saying the real name of a place, and nicknames are used out of respect for the place or the events that created the name.⁴⁰

Historically, this attachment to the land appears rooted in the indigenous religion of the Marshall Islands. Although the arrival of the missionaries in the 19th century effectively replaced the indigenous religion with Christianity, there is evidence of a Marshallese religion devoted to the natural gods, such as the god of breadfruit, *Jebro*; the god of fish, *irooj rilik*; chants to the sharks before fishing; and the establishment of sacred bird sanctuaries. In 1958, anthropologist Jack Tobin noted the existence of bird sanctuaries in the Marshall Islands existing from “time immemorial” as reserves for birds and turtles. According to Tobin, elaborate rituals to *Lawi Jemo*, or the *kanal* tree god, accompanied annual food gathering trips to these bird sanctuaries. Chiefs would lead a fleet of canoes from a neighboring atoll to the sanctuary. Upon arrival, women hid under mats in the canoes for fear of bringing bad luck to the gathering of birds and eggs. For the men, “it was tabu to use ordinary Marshallese, [and] the *laroij* (esoteric)

language was mandatory” (ibid, p.50). Special chants were used to request strength to haul the canoes up on the beach. Once the expedition arrived at the sanctuary island:

The chief was the first person to step ashore. Everyone assembled on the beach before proceeding inland and cut a leaf of coconut frond. With the chief leading the way toward Lawi Jemo (the kanal tree), they walked in single file, each individual carefully stepping in the footprints of the person in front of him so that only one set of footprints would appear, as if only one person had been there. Strict silence was observed on the way to worship *Lawi Jemo*. When the group reached the tree, each man placed his coconut leaf over a branch of the tree and then sat down in front of the tree and waited for a breeze to come and blow the leaf off. When this occurred, the *kebbwi in bwil* (ritual name for the chief on this occasion) would announce: *Wurin*, (we are lucky)” (ibid, pp.51-52).

The spiritual significance of place was confirmed in our ethnographic interviews, where some of the strongest expressions of Marshallese sentiment were voiced in relation to the meaning of atolls and land rights. For the Rongelapese, land represents much, much more than what is expressed in western notions of property ownership. Land is the physical framework for a spiritual realm that brings meaning, cohesion and happiness to people’s lives:

Mwenadrik Kebenli: *Without the land, all shatters. Land binds us. I was really happy on Rongerik because it’s my place, I grew up there* (March 16, 1999, Holly M. Barker, Ebeye).

Isao Eknilang: *The three atolls, truthfully are like one person. We looked after one another and fed one another when we were there... The three atolls are like one person in our understanding, and we have to take care of each other* (May 7, 1999, CMI Nuclear Institute, Majuro).

Boney Boaz: *On Rongelap, I went everywhere. No one told me I was forbidden from going anywhere. In Ebeye, I just go from my home to work and back again. What is the importance of land? It’s so important! The land is what is important. Here are some examples: I planted so many coconut and pandanus seedlings. It used to be great. I didn’t watch my father work. I planted the seedlings myself. But, now I’m not there to see the trees I planted* (March 17, 1999, Holly M. Barker, Ebeye).

Dorothy Amos: *Last week [during our quick visit] on Rongelap, I was sad, extremely sad. The atoll is so big. And it’s the surroundings where I grew up. I might or I might not live. If they go back there, I will make a trip again. I stood in the church and remembered our good times there. The breadfruit there is all gone. I walked to Jabwaan so I could really see the land. I saw the tombstones and really stared at them. I stared at them for an hour... It was sad* (March 18, 1999, Holly M. Barker, Ebeye).

Kajim Abija: *We were sad about leaving Rongelap. It’s our place. I was accustomed to it* (March 16, 1999, Holly M. Barker, Ebeye).

Isao Eknilang: *Rongelap's Local Government seal has a picture of the flower for Rongelap and it's arrowroot, and it's not because there was no reason to pick it as Rongelap's flower. The reason is because we ate so much of that food that it was the most important for us...* (May 7, 1999, Holly M. Barker, CMI Nuclear Institute, Majuro).

In discussing the value of land and traditional means to sustain a livelihood, informants clearly valued their way of life -- a life to be proud of, one that allows families and communities to be happily self-sufficient. Money and material are not as important as the ability to live without outside influences:

Mitjua Jankwin: *This is the house where I lived (pointing to the fallen-down remains of her home on Rongelap which is nothing more than a concrete floor and rotted planks). My room was here (points to the front). My father died in this room (points to another area). We buried him over there (points to the cemetery down the road)* (March 10, 1999, Holly M. Barker, Rongelap).

Lijon Eknilang: *It makes me sad to come here because I used to come here all the time with my grandmother (swimming in the lagoon in front of her grandmother's house on Rongelap). She used to swim everyday in this small pool...I lived in three different places while I was here [on Rongelap]. I moved back and forth between my mother and father's places. Life was so good here. We really had fun* (March 10, 1999, Holly M. Barker, Rongelap).

Kajim Abija: *Papa said that Rongelap was a place to get younger. You don't get older but you get younger on Rongelap. Rongelap women were known for looking young when they are older even though they may not be as good looking as women from other atolls when they are younger [laughs]* (March 16, 1999, Holly M. Barker, Ebeye).

7. Environmental Knowledge and Sustainable Resource Use

George Anjain: *Using resources from all islands and all available atolls is essential to survival. People depend on the ability to use their whole system of islands. In Rongelap, we need to use the northern islands. Survival depends on being able to use everything around us and on sharing food. People got together to sail to distant islands and also to harvest food. Food was then collected and distributed to everyone* (March 3, 1999, Advisory Committee meeting, Majuro).

The people of Rongelap, Rongerik and Ailinginae, like other Marshallese, have a keen understanding of local environmental conditions, resources, and ecosystemic dynamics.

Ecosystem knowledge was essential to survival. Atoll resources provided water, food, building materials, tools, transportation, medicine, toys, and ceremonial needs.

The geophysical characteristics of atolls-- small spits of land, sparse vegetation, porous substrata that limited the build up of fresh water aquifers-- meant that terrestrial resources were scattered across the atoll, rather than concentrated on a specific island mass. Thus, the sustainable use of scarce resources required the ability to travel, sparse settlement patterns that encouraged mobility rather than permanent residency, resource management systems that allowed each household access and use rights to ecologically diverse settings throughout the atoll system, and social and cultural systems that allowed efficient use and equitable distribution of food and other critical resources.

The island ecosystem presented challenging biophysical constraints: scarce land, high vegetative stress from salt-laden winds, constant threat of erosion from wave action and storm surges, relatively infertile soils, minimal fresh water sources, and a tendency towards salt water intrusion in the few subsurface aquifers present on coral-based atolls. Therefore, sustainable use of scarce resources also required the development of resource management strategies that enhanced ecosystemic viability while encouraging greater productivity. Soil fertility was enriched with fish remains. Pandanus, breadfruit, and coconut trees were carefully nurtured. Woven mats and baskets were used to shelter seedlings from the wind and fierce sun. Mature trees were regularly pruned, and the fronds and other debris carefully piled, burned, and the ashes reworked into the soil. Rocks and coral rubble were used to build small retaining walls around the root systems of trees growing near the shore. These rubble-retaining walls captured plant debris, allowed the build up of soil around the root system, and served as a protective barrier during periodic inundation from the tidal surge accompanying tropical storms. These

traditional agroforestry practices are still used today and illustrate the essential role played by humans in the maintenance of the Marshall Islands ecosystem.

Some Rongelapese believe that the people and plants are symbiotically linked. After observing that the trees and plants on Rongelap have no flowers or fruit, a Rongelapese woman explained that:

Lijon Eknilang: *Plants don't grow without people. We make the plants happy and they make us happy* (March 9, 1999, Holly M. Barker, Rongelap).

Without exception, and despite long absences from their lands, all interviewees were able to clearly identify and describe the resources and use strategies critical to survival on Rongelap, Rongerik, and Ailinginae. In reviewing traditional patterns of resource access and use, interviewees expressed keen frustration in their current ability to teach the younger generation the information and skills needed to survive on an isolated atoll. Some of the areas of information that informants identified as being important to produce and pass on to the next generation include survival and self-sufficiency, sustainability, storing or preserving resources, sharing of resources, medicine, legends or *bwebwenatos*, navigation, and strategies for coping with famine, drought, and other dangers. These points are illustrated and discussed below.

Water: Drinking water sources include springs and ponds fed by subsurface aquifers, rainwater caught and stored in giant clamshells (*emok*), the hole in the ground from a fallen coconut tree, and rainwater caught from tin roofs or in catchments first paved by the Japanese. Despite long absences, and in the case of Rongerik despite lack of personal experience, interviewees were able to describe the location of potable water sources on Rongelap, Rongerik, and Ailinginae atolls.

John Anjain: *On Jabwaan, we drank the well water. It was less salty than the well water on Eniaitok or Rongelap. Rongerik had good ground water. Ailinginae had one*

well. Mwenlap weto on Jabwaan has the best water. It is a water source from long ago. (March 16, 1999, Holly M. Barker, Ebeye).

Lijon Eknilang: *We had different ways to quench thirst... coconut milk, pandanus, we used the big roots from the pandanus tree to get at water* (March 2, 1999, Advisory Committee meeting, Majuro).

Wilfred Kendall: *Anyone can get water, but you must ask permission. Rainwater is more reserved for family* (March 2, 1999, Advisory Committee meeting, Majuro).

Fish: Fish is central to the Marshallese diet. There are 66 entries in the Marshallese-English dictionary that depict the wide range of fishing methods available to take advantage of different weather variables, times of the day, or to catch specific species of fish. Fish was caught with long line (*mueo*), net (*ok*), and fish traps (baskets of different sizes). Lobsters were snared. Rainbow runners and dolphins were hunted with lines, lassoed and beached. The Rongelapese consider themselves masters at fishing and pride themselves in their knowledge about where and how to fish. The Rongelapese men sailed throughout their three-atoll system to exploit different fishing areas. On Rongerik, one of the three ocean beaches was set aside for women to fish, usually with nets (according to Lijon Eknilang, March 3, 1999). The entire community helped chase migratory schools of fish on to the reefs, and into shallow storage ponds. Fish was used to sustain the people and pay tribute to the *alab* and *iroij*, but the Rongelapese also used fish bones and scraps to fertilize their land.

John Anjain: *We got food from all of the islands on Rongelap. There was lots of fish and lobster on Buroku Island. It was a place to get our meats* (March 16, 1999, Holly M. Barker, Ebeye).

Boney Boaz: *On Rongelap, Karuwe and Boarok islands in the north were the best places to fish* (March 17, 1999, Holly M. Barker, Ebeye).

Birds: Many of the interviewees discussed the importance of birds and bird eggs to their diet. In fact, the people on Ailinginae were busy collecting birds and bird eggs when they experienced the fallout from the Bravo test. Bokankaer, Enebarbar, Enealo, and Eniaitok islands

were particularly known for having many birds including *ak* (frigate), *kalo* (brown booby), *kear* (tern), and *pejwak* (brown noddy). The interviewees were able to identify favorite locations for nesting birds and describe techniques for capturing them:

Lijon Eknilang: *We would break the wings of birds when they were young so they wouldn't fly away. [This enables people to go back and get them when they are older]. Not all the young have their wings broken. We also collected the eggs of birds to eat. Birds were found on certain islands. Some types of birds were best to catch at nighttime* (March 2, 1999, Advisory Committee meeting, Majuro).

On Rongerik, people used to collect the eggs from many birds, including the *oo*, *ak*, *kalo*, *ker*, and *pejwak*. Jipedbao Island (which literally means the place with birds) on Rongerik was known for its' birds.

Mitjua Jankwin: *On Ailinginae there were plenty of oo birds to eat. We used to fill buckets with oo* (March 10, 1999, Holly M. Barker, Rongelap).

Turtle: All five of the world's sea turtle species nest in the Marshall Islands, and turtles were found all over Rongelap, Rongerik and Ailinginae. There are no seasons for turtles. Again, the interviewees know the best locations to find turtles. Bock Island on Rongerik is particularly well known for turtles.

George Anjain: *Turtles used to lay eggs everywhere on the atolls, even on populated islands* (March 3, 1999, Advisory Committee meeting, Majuro).

Nerja Joseph: *Rongerik is known as the atoll of birds and turtles* (March 8, 1999, Holly M. Barker, Majuro).

Mitjua Jankwin: *Turtles used to lay their eggs on Rongelap. There were turtles on all the side islands* (March 10, 1999, Holly M. Barker, Rongelap).

Emos Jilej: *Rongelap was always known for its bounty of food. It was number two in turtle after Kwajalein. There were turtles on all the small islands* (March 10, 1999, Holly M. Barker, Rongelap).

Clam: Giant clams and other clams species found in the reef are important sources of food.

Clams shells were also used as tools such as the *dekenin* used to soften the fibers woven for mats, or giant clams used to collect and store rainwater. Women and children often gather

smaller clams found along the shoreline. Men would collect the larger clams found in deeper waters.

Lijon Eknilang: *On Rongelap, there were always lots of clams on the reef where my grandmother lived, near the church* (March 10, 1999, Holly M. Barker, Rongelap).

John Anjain: *Ailinginae was known for its clams and birds. We would ask for permission to make trips to gather them* (March 16, 1999, Holly M. Barker, Ebeye).

Crab: Coconut crabs are considered a delicacy to Marshallese. Islands such as Arbar Island on Rongelap Atoll had crabs everywhere, and the Rongelapese ate coconut crabs on a consistent basis. Smaller crabs that live in the rocks and coconut husks by the shore were also consumed.

Lobster and octopus:

John Anjain: *The reefs on all three atolls were full of lobsters and octopus. Anyone could go to the reefs and collect them because the reef food belonged to everyone* (March 16, 1999, Holly M. Barker, Ebeye).

Pumpkin: Pumpkin was available on all three of the atolls.

Lijon Eknilang: *There was pumpkin all the time, it has no season* (March 19, 1999, Holly M. Barker, Kwajalein Island).

Kajim Abija: *When people traveled from Ailinginae to Rongelap at Christmas time, they would always bring pumpkin* (March 16, 1999, Holly M. Barker, Ebeye).

Coconuts: Coconuts provided not only food to the Rongelapese, but materials important to survival. As the Marshallese advisory committee noted, there are 1,000 different uses of the coconut tree. The Marshallese depend on the coconut tree for food, drink, building, toys, and money made from selling the dried coconut meat. The Rongelapese traded dried coconut meat, or copra, for cash or needed supplies from the ships that stopped in Rongelap every three to six months.

Johnsay Riklon: *While the United States might look at a coconut tree and see the value of the copra, we see medicine, toys for our kids, food, weaving materials, sails and canoes. Nothing is wasted. One coconut tree, similarly to a pandanus or breadfruit tree, can almost support a family with all of its needs* (February 28, 1999, Holly M. Barker, Barbara Rose Johnston, and Stuart Kirsch, Majuro).

Pandanus, breadfruit, arrowroot: Pandanus, breadfruit and arrowroot are other staple food sources. Breadfruit is a staple food that can be prepared in a variety of ways. Arrowroot was so abundant that the Rongelapese used it to make flour from it. Pandanus and breadfruit are seasonal foods, arrowroot is not. The Rongelapese distributed these foods as gifts to their relatives and their *iroij*, who in turn, shared them with people throughout the Marshall Islands. The Rongelapese often gave gifts of staple foods, and later received gifts of other cultivated foods or supplies. When the supply ships sailed to Rongelap, Rongerik and Ailinginae, the people bought flour, sugar, rice and other foods, but the preservation techniques the Rongelapese used to prepare pandanus, breadfruit and arrowroot ensured that the people did not go hungry if the supply ships did not arrive.

Pandanus is important for making certain types of food for the *iroij*, such as *jaankun*, but also to make baby food. People eat the fruit raw or boil it and use the softened meat for baby food, baked goods, or candy. People also depend on the leaves of the pandanus trees to weave sleeping mats. The roots of pandanus trees served as storage areas for water in times of extreme drought. As a water substitute, people would steam pandanus tree roots in a fire until the water comes out.

Medicine: Non-edible plants are used for windbreak, tools, spices, but particularly for medicine. Some medicines are passed down in a family, some require higher, more rare knowledge that exists with a few people. Some parts of the plant may be more powerful, some times of the year the plant may be deadly, some means for ingestion may cure, and others may harm or even kill.

Knowledge about medicine is considered powerful. People use virtually every indigenous species of plant for medicinal purposes:

Lijon Eknilang: *Everything that grows is medicinal. Even grass is used for kids, and as reproductive medicines. But, Marshallese medicines are never to be used on menstruating women. When the people lived on Rongelap, Rongelap used to be a place for making medicine (March 3, 1999, Advisory Committee meeting, Majuro).*

The interviewees felt that Rongelap, Rongerik and Ailinginae were very good areas for acquiring medicine. Although Marshallese medicine is free, healers benefit from the power and prestige that their knowledge accords them and from the food and other expressions of appreciation given by their patients. *Ri-bubu*, usually men, are particularly strong healers.

Transmitting environmental knowledge through legends or *bwebwenatos*: It is clear from the interviewees that legends and story telling are important means to transmit knowledge about the environment that is essential to survival. For example, local stories instruct listeners about the best location to catch eels, find important resources, and navigate the islands:

Mwenadrik Kebenli: *On the ocean side of Rongerik when you look out at the ocean, it looks like there are men out there fishing and they are looking for eels. The rocks are shaped like that (March 16, 1999, Holly M. Barker, Ebeye).*

John Anjain: *An old man, Jelan, saw an akwolej bird digging into the ground. When he went to see what it was, he found water (March 16, 1999, Holly M. Barker, Ebeye).*

Kajim Abija and Lijon Eknilang: *In order to find Rongelap, sailors would follow the North Star, Limanman. Limanman is included on the Rongelap Local Government's seal to help people find the atoll (March 16, 1999, Holly M. Barker, Ebeye).*

John Anjain: *Eniaitok, an island known for its birds is shaped like a bird. There is a story of a boy, Leok, who threw a rock at the bird, Jebtaka, and knocked it to the ground. The north and south sides of the island are the wings, and the central part of the island, Jibiken, is the tail of the bird. The large stone in the reef on the northern part of the island is the stone used to knock the bird down (March 16, 1999, Holly M. Barker, Ebeye).*

Knowledge about dangers in the environment saved the Rongelapese from potential hazards or threats to their lives. This knowledge is critical to the well being of the community. Children

were taught about the species of fish and plants that were dangerous to consume or touch. The adults on Rongelap also taught children the locations with many sharks:

Shirley Kabinmeto: *As children, we didn't go swimming at the end of the island where I lived, Jabwaan, because Jabwaan is full of sharks. Jabwaan is at the end of the island, near a deep pass where the sharks enter the lagoon from the ocean side* (March 10, 1999, Holly M. Barker, Rongelap).

Navigation: Navigational knowledge is transmitted in the ancient chants, or *roro*, that instruct sailors about the hazards of the reefs and how to navigate their islands. Locally based knowledge about navigation is crucial to the survival of the Marshallese. People can not live solely from the resources of one island and depend on navigation to maintain their social and political relationships and to gain access to the full range of natural resources necessary for survival. The Marshallese are legendary, even among Pacific Islanders, as being the best navigators (Krieger 1943).

The Rongelapese relied on their navigational abilities to access the small islands on Rongelap, Rongerik and Ailinginae. This is particularly true for Ailinginae (*aelon in ae* = atoll in the current), which is known as one of the most difficult currents to navigate. The people who went to Ailinginae were expert sailors and navigators.

Boney Boaz: *I know how to sail an outrigger canoe. I've sailed to every single island on Rongelap, which is about thirty miles across... On Rongelap, we grew up learning sailing and navigation* (March 17, 1999, Holly M. Barker, Ebeye).

Natural resources and social relations: Natural resources provided the essentials for biological well being such as food, shelter, and water. During the collection of ethnographic data, one interviewee explained the importance of land in terms of self-sufficiency and how the land and the resources provide for people:

Dorothy Amos: *The importance of land? We eat from it. We drink from it. We make handicrafts from it. We can make foods and things to drink from it. We make “enra,” Marshallese plates for our one-year birthday celebrations. We also make copra that people can sell. We prepare the fronds from the coconut tree for sitting on and making fires. We also make brooms for the houses. And pandanus, the ancestors made clothes from the coconut and pandanus. Women use the pandanus leaves to make sleeping mats, things to lie on... And many kinds of food. There is pandanus time, and breadfruit. Wonderful food. Boats--outriggers. We make Marshallese tin by weaving coconut fronds. Coconut husks to make ropes. They don't cost anything. Today they are really expensive* (March 18, 1999, Holly M. Barker, Ebeye).

Ethnographic interviews also involved considerable discussion of the critical role played by natural resources in providing the material essentials for social well-being. First-year birthdays (*kemem*), marriages and funerals, and *iroij* visits are important occasions for the community members to meet as a group, to celebrate, and to socialize. At one year, the child has a much greater chance of surviving, and, therefore, is recognized as part of the community. Gifts and food are exchanged to celebrate the well being of the child:

Mike Kabua: *It is important to have materials to weave mats for funerals, as well as important occasions like iroij visits, the first year birthday party (kemem), weddings and Christmas. It is also essential to share food with everyone on these occasions as the gifts and the food make people feel closer together as a community* (March 3, 1999, Advisory Committee meeting, Majuro).

During funerals:

Mike Kabua: *During funerals, people come together and revisit and learn their family connections and place in society. People give gifts to burial areas. Community members place white rocks around gravesites as a symbol of purity. People come together at the “eoreak” to forgive each other... a time to forget hatreds and to forgive any misdeeds of the departed. People know where the burial areas are. They also know where the sea burials took place* (March 3, 1999, Advisory Committee meeting, Majuro).

During *iroij* visits:

Lijon Eknilang: *Certain flowers are used for the iroij during visits, such as the kano [fern]. People always put the flowers on a necklace so they don't touch the head of the iroij* (March 3, 1999, Advisory Committee meeting, Majuro).

Mike Kabua: *Food is prepared in advance of the visit. Fish comes from the coral heads designated for the iroij. Certain types of foods are given to the iroij, such as turtle, coconut crabs, preserved breadfruit and pandanus, arrowroot, dolphins and certain species of fish. The only type of coconut the iroij can drink is the “nibarbar.” Food is placed in a large, woven basket or “kilek” that only the alab can bring to the iroij. The iroij collects food as he goes from island to island (kejinbwij) (March 3, 1999, Advisory Committee meeting, Majuro).*

8. Flexible Patterns of Resource Use – Sustainable Living on Atoll Ecosystems

A major factor that provided the Rongelapese with a flexible, fluid means of gathering resources necessary for survival is full access to a range of cultivation options from numerous small islands of three atolls. The Rongelapese accessed the plants, terrestrial animals, birds, marine and reef life from Rongelap, Rongerik and Ailinginae. This range of options allowed the Rongelapese to live within their environment by ensuring that they did not deplete available resources in any single area. Multiple resource gathering options also enabled the Rongelapese to adjust to seasonal and climatic variations.

In order to protect their resource base, sustainable resource use was an important aspect of food gathering on Rongelap, Rongerik and Ailinginae. For example:

George Anjain and Lijon Eknilang: *...the Rongelapese know to only fish for two days in one spot and then move. With the coconut crab, we didn't use to take the females and we didn't take too many from one place. We never took small crabs or pregnant crabs. As for the turtles and birds, we never took all their eggs. We didn't break the wings of all the older birds, either, because we wanted to leave some older birds to lay more eggs. These principles are also true for trees and plants because if you don't clean them and take care of the dead flowers or fruits, the trees and plants get sick and don't grow well (March 3, 1999, Advisory Committee meeting, Majuro).*

Sustainable gathering techniques were also used with the oo birds:

Mitjua Jankwin: *We broke their wings when they were young. We ate the younger birds so the adult birds could make more birds. We only ate them during the birthing season (March 10, 1999, Holly M. Barker, Rongelap).*

It was critical for the Rongelapese to be familiar with techniques for preserving and storing food because of the limited seasons of their primary food sources, in particular, staple crops such as breadfruit, pandanus and arrowroot, but also water:

Lijon Eknilang: *Breadfruit appears in the “rok” season from July through December. Pandanus and arrowroot appear in the “anonaen” season from December through July. People got together to harvest arrowroot, breadfruit and other foods to preserve them. We salted, dried and grated pandanus for preservation. “Jekaka” is dried pandanus that is grated like a powder or flour so it can last for years (March 3, 1999, Advisory Committee meeting, Majuro).*

Timako Klonij: *Young girls like me learned to make janwin [preserved pandanus] and other foods from pandanus (March 18, 1999, Holly M. Barker, Ebeye).*

Lijon Eknilang: *Rainwater was carefully collected and stored. People placed basins or “emok”, at the bottoms of coconut trees to catch runoff rainwater. These basins were usually made of clamshells or carved wood (March 3, 1999, Advisory Committee meeting, Majuro).*

Because food and water are critical to life, but limited on a coral atoll, the sharing of resources is essential to survival. The Rongelapese worked together to harvest and prepare food, and shared water and food resources with their families and neighbors. For example, the interviewees discussed how they would come together and work during breadfruit season, from July through December, to make preserved breadfruit for ceremonies, family consumption, and to send to distant family members and *iroij*. Other resources were shared, too:

Wilfred Kendall: *Because of its central importance, water was shared perhaps more than any other resource. It was understood that if you have a good well, people can come and ask to use it, or just take it (March 2, 1999, Advisory Committee meeting, Majuro).*

Mitjua Jankwin: *On Monluel weto, there was a big fence with chickens in it. The birds belonged to the family, but people would ask for them. When there were many birds, sometimes they would hand out a bird to each family (March 10, 1999, Holly M. Barker, Rongelap).*

Due to the seasonality of important resources, droughts, and the intense labor required to secure food, people periodically faced times of famine and drought with severely limited

resources. Because the Rongelapese could depend on the small islands of three atolls and ocean resources, they had multiple areas they could gather resources from. Multiple access sites and their knowledge about their environment allowed the Rongelapese to survive times of famine and drought relatively well:

Kajim Abija: *There was always pandanus and coconuts. During the times of hunger, we were not really hungry because there was so much of the pandanus* (March 16, 1999, Holly M. Barker, Ebeye).

Boney Boaz: *We used to eat coconut in times of hunger. If I could have eaten those foods, like [restricted coconut] crab, during the famines [occurring after resettlement in 1957], I wouldn't have been so hungry* (March 17, 1999, Holly M. Barker, Ebeye).

Timako Kolnij: *We relied on sprouted coconut and things from the ocean-- large clams, crab, small clams, fish-- they were adequate in the times of hunger. We ate mature coconut and drank the drinking coconuts... As a water substitute, people would suck on the coconut husk or the roots of the plant to get the liquid out. We also drank the young coconuts, or "ni"* (March 18, 1999, Holly M. Barker, Ebeye).

Despite the many years that have passed since they last lived in Rongelap, informants demonstrated a keen and thorough knowledge of the best times, places, and techniques to catch various species of fish. During certain times of the year, there are runs of particular species of fish:

Lijon Eknilang: *In January and February, the mackerel (mwilmwil) run. In November and December the grouper fish (lojepjep) run* (March 19, 1999, Holly M. Barker, Kwajalein Island).

When the fish were running, the Rongelapese would work together as a group to catch as many of the fish as possible and to smoke them and preserve them so they could eat them for many months and send them to the *iroij* and family members in distant places.

9. Taboos and Resource Management

Customary rules and traditions are an essential component of the Marshallese psyche. Rules that restrict behavior (termed, here, as taboos) were traditionally defined and imposed by internal actors in ways that established and regulated social, political, and economic relationships. Traditional taboos made sense. The taboo and the rationale for a taboo were often embedded in stories, legends, and sayings. Some taboos support the three tier social structure by demonstrating respect to the *iroij*. For example, it is taboo to touch the head of an *iroij*, to stand or sit above or higher than the *iroij*, or to pass between the *iroij*'s house and the lagoon. Other taboos are for health and safety reasons. For instance, it is taboo to have sexual relations for several months after a woman gives birth, or for women to climb coconut or other trees. And, some fish are taboo during different seasons (and if eaten when taboo, will result in fish poisoning). Still other taboos enable people living together on very small parcels of land to cooperate and live together peacefully. It is inappropriate, for instance, to express anger or grievance directly with someone. Instead, the use of a third party to relay information and mitigate the disagreement is encouraged. Some taboos reinforce the roles of women and men in society:

Lijon Eknilang: *It is taboo for women to be on the beach when some fish show up... On Rongerik island there are three sides, one which is reserved for women to swim, fish-- a place that is taboo for men* (March 3, 1999, Advisory Committee meeting, Majuro).

Many taboos restrict free access, but establish permissive use. Use of critical resources such as drinking water, wild plants, crabs, seashells, and fishing off coral heads is generally unrestricted for family members, and accessible with permission by others.

Mike Kabua: *I guess that's why we respect each other. Someday you will need something from your neighbor* (March 2, 1999, Advisory Committee meeting Majuro).

Many taboos regulate resource access and use. A number of the islands set aside for *iroij* are migratory bird nesting sites:

Wilfred Kendall: *There are areas we know that are set aside specifically and you don't clear the land. Animals need food from plants. These islands are set aside to leave as they are. The knowledge (of these areas) is handed down through the generations* (March 2, 1999, Advisory Committee meeting, Majuro).

Mike Kabua: *"Kinbit" is the word for the rules and regulations about when you collect coconut crab... Only the largest males are collected, no females. Nowadays I see people eating female coconut crab because they don't know how to tell. I say "you know you're eating female coconut crab?" They say "how do you know?" I turn it over and show them.... and they say "oohhh!" (laughs).* (July 18, 1999, Holly M. Barker, Majuro).

Taboos established the rules on what you can, and cannot use, and why. Some foods and locations were taboo for all but the *iroij*, some taboo for all but the *alab*, and some foods for all but the *ri-jerbal*. Many of these taboos helped shape seasonality, protecting plants and animals during vulnerable periods and allowing use without over exploitation.

10. Concluding Discussion

The traditional way of life in Rongelap, Rongerik and Ailinginae Atolls involved social, cultural, and economic activities, values, and meanings that supported a vibrant, marine-based, self-sufficient and sustainable way of life. Inherited access and use rights, and the associated stewardship responsibilities, included atoll islands, reefs, lagoon, and the myriad of resources within. The natural resources of Rongelap, Rongerik and Ailinginae provided the daily and long-term needs of the household and the community. Food, shelter, transportation, tools, and toys were all derived from locally accessible materials. According to informants, and the records kept by Rongelap Magistrate John Anjain, in the years immediately preceding the United States Nuclear Weapons Testing Program relatively few provisions were purchased-- kerosene, tin roofing, lamps, cigarettes, matches, thread and needles, sugar, rice, and flour-- and the lack of

these items did not severely impact household health. These were supplementary provisions acquired by the Rongelapese by trading or selling copra and handicrafts with ships that passed by their islands. Men processed and sold copra (Tobin 1958, Mason 1988). Women used handicrafts to exchange for goods, and Rongelap was the first area to establish a woman's group:

Lijon Eknilang: *We had a coop used to do all kinds of work, such as making copra, pumpkin, and limes. The name of this group was "White Rose" named after something rare and beautiful* (March 10, 1999, Holly M. Barker, Rongelap).

In addition to providing for the day-to-day economy of the household and community, natural resources provided the Rongelapese the means to create and sustain social relationships. Resources were exchanged for other resources, for labor, or to mark important cultural occasions. The rights and responsibilities associated with these resources both reflect and reinforce the basic rules of society. As will be further illustrated in later chapters of this report, environmental contamination from nuclear weapons testing not only damaged the health and viability of the natural resources and those who relied upon them, but also denied the Rongelapese the means to produce and reproduce their self sufficient lifestyle. The social, cultural, economic, political, and psychological consequences of this damage and loss are complex and profound:

Lijon Eknilang: *When we move from Rongelap, it's like we are using somebody else's bedroom and one of these days these people will come and ask for their room back...* (March 2, 1999, Advisory Committee meeting, Majuro).

Mike Kabua: *Land speaks for everything out here in the islands... [without land] you lose your respect for your elders, community leaders. Customs mean respect. Without land you don't have any fear of punishment... Authority comes from land, respect for the elders comes from land* (March 3, 1999, Advisory Committee meeting, Majuro).

Lijon Eknilang: *People who were born outside of Rongelap have little sense of belonging. Their sense of identity is through their parents, not from having lived there [on Rongelap], not from experience...* (March 2, 1999, Advisory Committee meeting, Majuro).

In their review of compensation claims for the people of Bikini and Enewetak the Nuclear Claims Tribunal has awarded compensation for loss of land based on valuation of land derived from a record of leases in Majuro, Kwajalein, and other atolls. Such valuations reflect one aspect of economic value—the value of temporal occupation of dry acreage. They do not reflect or address the damages associated with the loss of the wider realm of arboreal and marine resources that sustain the Marshallese way of life. The data contained in this review demonstrate the need to consider and address:

- 1) Natural resource damage and loss of lagoon, reef heads, clam beds, reef fisheries, turtle and bird nesting grounds.
- 2) Cultural resource damage and loss of access to family cemeteries, burial sites of *iroij*, sacred sites and sanctuaries, and *morjinkot* land.
- 3) The consequential damages to this and future generations produced by the loss of access to and ability to use a healthy ecosystem.
- 4) Consequential damages include problems resulting from the inability to interact in a healthy land and seascape in ways that allow the transmission of knowledge and the ability to sustain a healthy way of life.

²⁶ Leonard Mason, 1968. “The Ethnology of Micronesia.” *In* Peoples and Cultures of the Pacific, Andrew Vayda, Ed. The Natural History Press: Washington D.C., pg.278. Herbert W. Krieger, September 15, 1943. “Island Peoples of the Western Pacific: Micronesia and Melanesia. Smithsonian Institution: Washington D.C., pg.21.

²⁷ The United Nations Trusteeship Council response to the Marshallese petition noted “The Administering Authority adds that any Marshallese citizens who are removed as a result of test activities will be reestablished in their original habitat in such a way that no financial loss would be involved.” United Nations Trusteeship Council. “Petitions Concerning the Trust Territory of the Pacific Islands.” July 14, 1954, p.5. (T/L.510).

²⁸ Jack A. Tobin, 1958. “Land Tenure in the Marshall Islands.” Land Tenure Patterns in the Trust Territory of the Pacific Islands. Office of the High Commissioner of the Trust Territory of the Pacific Islands: Guam.

²⁹ John Cordell, 1989. A Sea of Small Boats. Cultural Survival Report 26. Cultural Survival, Inc.: Cambridge, MA.

³⁰ Tobin describes land rights in terms of lineage ownership, but uses the term “landowner”. The Marshallese have no word for landowner. In this report, we use the term “landholder” to refer to the current generation of people with recognized rights and responsibilities to the land. This use is at the request of the Land Value Advisory Committee, one whose members remarked: “*can we change the word ‘landowner’? We do not own the land, it belongs to the generations.*” Lijon Eknilang, March 3, 1999.

³¹ Constitution of the Republic of the Marshall Islands, Section 5.5.

³² Jack A. Tobin. 1953. "The Bikini People, Past and Present." Office of the High Commissioner of the Trust Territory of the Pacific Islands: Guam.

Tobin 1958.

Mason 1968.

Robert C. Kiste. 1974. *The Bikinians: A Study in Forced Migration*. Cummings Publishing Company: Menlo Park.

³³ Jack A. Tobin. 1967. *A Preliminary Anthropologist Report: Bikini Atoll Survey*. Prepared for the Office of the High Commissioner of the Trust Territory of the Pacific.

³⁴ See Byron Bender, 1963. *A linguistic analysis of place names of the Marshall Islands*. Unpublished Ph.D. dissertation, Indiana University. Available at the Alele Museum in Majuro, and the Pacific Collection at the University of Hawaii.

See also pages 499-589 of the *Marshallese-English Dictionary*, by T. Abo, B. Bender, A. Cappelle, T.deBrum (1976) Honolulu: Univ. of Hawaii Press.

³⁵ On 16 May 1999 the Tasmanian Seamounts Marine Reserve was declared under the Australian National Parks and Wildlife Conservation Act 1975. <<http://www.ea.gov.au/coasts/mpa/seamounts/index.html>>.

³⁶ The United States Geological Survey (USGS) began exploring the Marshall Islands seamounts during Operation Crossroads, and much of the research in the 1950s examined the impact of chemical deposition from nuclear weapons tests on seamount reefs. Surveys done in the 1950s and 1960s noted location of seamounts, and beginning in the 1970s attention was placed on the geological structure, especially the presence of economically valuable mineral resources. In 1999 USGS published a bathymetric map to accompany mineral reports demonstrating the presence of potentially valuable deposits of minerals ("Bathymetry of the Republic of the Marshall Islands" by James Hein, Florence Wong, and Dan Mosier, USGS, 1999). The USGS map is most notable for including the Marshallese names to all seamounts, indicating that the Marshallese had a lengthy knowledge of and use of these areas for sociocultural and economic reasons. Marshallese names were provided to Jim Hein by Alfred Capelle, who obtained this information through interviews with Marshallese fishermen. There are 43 Marshallese names for seamounts on the bathymetric map.

³⁷ See Map 3, Map of Rongerik and historical notes by John Anjain.

³⁸ Suicide rates are unusually high amongst Marshallese youth. In Australia, aboriginal communities also face high morbidity and mortality rates (much higher than non-indigenous Australians). Medical anthropologist Judith Fitzpatrick (personal communication, October 1, 1999) reports a range of stresses associated with chronic ill health and high death rates. Constantly having to put on funerals and the associated rituals drains emotional and financial resources. High death rates seriously inhibit the community's ability to perform social roles and reproduce cultural knowledge. All of this contributes to community ill-health.

³⁹ Translated by Holly Barker with assistance from the Advisory Committee.

⁴⁰ One of the comments made by a Marshallese informant in reading the draft of this report is that "taboo" is not a Marshallese term, and may be too strong of a word. In general, rules are known and followed, and specific terms are used for specific sets of rules. Adherence to these rules is not enforced by a strict code of sanctions, as has been described in some other Pacific Island cultures. The term taboo is used here to mean those "rules that restrict behavior." Members of the advisory committee, when speaking in English, used the term.

PART THREE: CHAIN OF EVENTS AND CRITICAL ISSUES OF CONCERN

1. Introduction

The United States Nuclear Weapons Testing Program in the Pacific permanently altered the lives and future of the people of Rongelap, Rongerik, and Ailinginae atolls. The Rongelap people experienced personal health injuries and involuntary displacement when fallout from the largest thermonuclear weapon ever tested by the United States (Bravo test) forced their physical evacuation from 1954-1957. They lost access to a viable healthy ecosystem and lost their ability and rights to safely live in their environment when they were resettled on Rongelap (1957-1985). And, they became exiles (1985-present) when they were finally provided evidence of hazardous levels of radioactive contamination throughout their homelands. These events and critical issues of concerns are identified and briefly contextualized with testimony from Rongelap informants. Evidence that substantiates informant accounts and consequential damages is found in the declassified documents cited in this section and other portions of this report.

2. Evacuation from Rongelap to Lae in 1946

As a precautionary step, the U.S. Navy evacuated the Rongelapese from their home islands in May to August of 1946 for the Able and Baker weapons tests on Bikini Atoll. It was felt at the time that the Rongelapese were so close to the testing area that it was best to remove them as a precaution. In May of 1946, 108 Rongelapese and the people from Wotho were temporarily taken to Lae on L.S.T. 1108 (Anjain 1946:118).⁴¹ The United States Government contemplated the permanent resettling of downwind populations to Lae (DOE #458, p.2590.2), but the Rongelapese were returned to Rongelap shortly after their stay on Lae.⁴²

Almira Matayoshi: *We were sad when we left Rongelap because we had no idea what we were going to face when we got to Lae. We ran out of food on Lae. There was rice, but nothing to go with it. We relied on the people of Lae to give us what little they could with so many people on their island...*

When we returned from Lae to Rongelap, we had to start from the beginning in terms of food production, and getting our households back in order. For example, we missed arrowroot season so we didn't have time to prepare the foods that would store for long periods of time and get us through the more difficult times. We came back between the food seasons so we had very little to eat. There were also more of us in our group because we had children on Lae and some of us married. Our houses needed to be redone. Some of the roofs were gone. The Navy didn't stay and help us (June 13, 2001, Holly M. Barker, Honolulu).

Isao Eknilang: *I clearly remember the time. I knew there was testing of some sort going on, but I didn't really understand it. It was difficult because we lived in tents for several months. We had no privacy, and many aspects of Marshallese custom were broken, particularly those relating to adults changing their clothes or trying to leave to go to the bathroom in front of children of the opposite sex...*

Another custom that people began to violate for the first time I remember was not sharing food with people. The Navy gave some food to us Rongelapese, but it was not adequate. I remember a fist-fight that broke out over whether or not to share our food resources. Some people thought we had to share our food with the people of Lae and Wotho, and others thought we shouldn't because the resources were inadequate for everyone. I remember being stunned that adults would fight over this. In addition to food, there was not enough water for everyone, and the Navy didn't bring in water supplies when we asked.

We tried to fish on Lae to supplement our diets, but the fish were much smaller and it was hard to catch enough fish to feed so many people. On Rongelap, people had three entire atolls to cultivate food. On Lae, an island a fraction the size of Rongelap, there were not enough resources to feed three atoll populations (Rongelap, Wotho and Lae) despite the food the Navy did supply...

While on Lae, we worried about our homes, and what would happen to our animals and plants when we weren't there to tend to them. We children attended school while on Lae, but the school was extremely overcrowded with the addition of the children from Rongelap and Wotho. Also, we didn't earn money while on Lae because we didn't own the coconut trees so we couldn't produce copra. By the same token, we lost the opportunity to make copra on our own land during that time...

When we returned to Rongelap from Lae... It was clear that the U.S. had used our land and houses. Some of our sailing canoes were found on distant islands, and others disappeared and were never returned. We even had a large sailing canoe that could hold 20 people. The canoe was gone when we returned... The canoe is very essential to gather food, housing materials, to produce copra and it takes at least 6 months to build a "walab."

Also, the turkeys that we used to care for and keep on Rongerik were all gone when we returned. Similarly, the pumpkin that was on Ailinginae was gone. Also, our houses were a mess. The thatch roofs were falling apart and water leaked into many of the houses... The bushes were all overgrown and we had no local food ready to use. We

were not able to get local food for some time. The U.S. Navy left two U.S. boats filled with packaged food. We ate the food, but later on we were concerned because we heard that the boats had been at Bikini for the tests and were probably contaminated (June 13, 2001, Holly M. Barker, Honolulu).⁴³

Summary of Consequential Damages

Conditions of life during the involuntary resettlement on Lae were harsh, with food and water in short supply. Traditional customs were violated as people were forced to compete for increasingly scarce resources. The people of Rongelap experienced fears and anxiety about their exile and concern for their homes. Upon return to Rongelap, the people confronted extensive damage to home and property, inadequate food supplies, and were fearful that provisions left on U.S. Navy boats used to support operations at Bikini for the tests were contaminated. Furthermore, they had lost the opportunity to generate an income by cultivating their resources.

3. Damage and Continued Loss of Access to Rongerik

Rongerik Atoll is *morjinkot* land, given by the *iroij* alone to commoners to show appreciation for a warrior's battle skills (Tobin 1958:29).⁴⁴ Rights to the land extend to the family of the warrior as "maternal relatives and paternal relatives both used the land. Maternal relatives have a usufruct right to the land. Paternal relatives could utilize the resources of the land but did not have usufruct rights in the land" (ibid:31). Rongerik was given to Lejkonikik Antoren, an ancestor of Rongerik's current *iroij*, Anjua Loek, for heroics in a battle between Kili and Jaluit. For this reason, the property on Rongerik is accorded great respect and great value in the Marshallese culture <see Map 3, Anjain Map of Rongerik>.

Population movement between atolls was restricted by the Japanese military during World War II. In 1943, the Japanese moved all of the people residing on Ailinginae and Rongerik to Rongelap. Rongelap's Magistrate, John Anjain, recorded this event, noting the names of the 9 people moved off of Rongerik on January 12, 1943 and the 12 people later moved off of Rongerik on July 3, 1943 (Anjain 1943:119).⁴⁵ When the United States liberated the Rongelapese from Japanese control on April 4, 1944, the Rongelapese declared this date their Liberation Day (ibid:9).⁴⁶ The United States Navy continued the ban on access and use of Rongerik Atoll, using Rongerik as a military site for monitoring weather and tracking fallout.

In 1946 the United States Government relocated 181 Bikinians to Rongerik Atoll when Bikini Atoll was selected as a ground-zero location for the testing program. Rongerik was too small to support the Bikini populations, and the Bikinians ravished the islands and the food sources in an effort to survive. By 1948, the Bikinians were in an extreme state of impoverishment due to exhaustion of local food resources, and were evacuated from Rongerik and moved to Kili.

During the entire time the Bikinians lived on Rongerik, the United States Government failed to ask Rongelapese landholders for permission to relocate the Bikinians. When the United States Government relocated the Bikinians from Rongerik to Kili, the United States Government retained Rongerik Atoll for military use, again, without the permission of the Rongelapese landholders. Rongerik received extensive fallout during the Bravo event and additional fallout from other weapons tests. No cleanup has ever occurred on Rongerik. The atoll is contaminated and remains off limits for Marshallese use.

John Anjain: *In 1946, the Navy stopped the field trip ship service between Rongerik and Rongelap and the Bikinians didn't have supplies. Ninety-nine percent of the land on Rongerik was ruined by the Bikinians. Three quarters of the land was burned in 1946 by an accidental fire from cigarettes. The people even ate the tiny pandanus and coconut*

seedlings because the Bikinians were moved from their own homeland and left alone... This made me very sad because this was the land of my grandfather and it is difficult to return Rongerik to the way it was before (March 16, 1999, Holly M. Barker, Ebeye).

As Magistrate of Rongelap, John Anjain kept a meticulous record book of events, resources, and actions that influenced the land and lives of the Rongelap people. This record book includes documentation of each breadfruit, coconut, and pandanus plants for each *weto* on Rongerik damaged by the Bikinians, notations that suggest the importance of these resources on the land to the people. There is also a sworn statement in John Anjain's record book stating that the landowner did not give permission to the U.S. to make Rongerik available for the Bikinians to use:

Epr. 22 – 1949. Na Ekinilan W. ij likit ao (cut off) Ijin bwe iar jab katlok bwe dri Bikini ro Ren komakot jabrewot ion ailin eo ao Rongerik ejelok juon iar jiron kin (cut off). Na Ekinilan. W. Dri kamol John Anjain. (Anjain 1949:78).

Apr. 22 –1949. I, Ekinilan W. I am stating [cut off] here because I did not give permission for the Bikinians to move anything on my island of Rongerik and no one ever asked me [cut off]. Signed, Ekinilan W. Written [and]witnessedby, John Anjain (Anjain 1949: 78, translated by Holly M. Barker, Tina Stege, and Tieta Thomas, April 1999).

Summary of Consequential Damages

The United States Navy seized, without permission or compensation from the landowners, *morjinkot* land owned by the people of Rongelap. The United States Navy placed, without compensation or permission, the people of Bikini on Rongerik Atoll. Subsequent damage to Rongerik Atoll by the people of Bikini was never compensated or otherwise remediated. Beyond damage inflicted by the Bikinians, Rongerik Atoll was severely contaminated as a result of the Bravo event and other weapons test fallout. The people of Rongelap have been involuntarily displaced from access and safe use of their customary lands and resources on Rongerik Atoll.

4. The Bravo Event

The Bravo event of March 1, 1954 exposed the people and islands of Rongelap, Rongerik and Ailinginae to dangerous amounts of radiation and other toxic contaminants such as the chemicals used in each of the weapons tests to indicate the amount of fallout from each individual test. In addition to exposing downwind communities to radiation, “the radioactive debris [from the Castle series] dispersed quickly throughout the world and all but a few stations experienced measurable fallout at sometime during the series” (DOE#44:7).⁴⁷ Prior to the Castle series, the United States military plan included post-shot evacuation “if radiological conditions indicate it necessary” on four hours notice (DOE#473:-5). Weeks before the test a Navy Commander visited communities downwind from the test site and “tried to explain something to them about a test, and bombs” but, despite the efforts of an interpreter, the people did not understand what he was talking about (DOE #1023:81).⁴⁸

Although the United States Government had removed the Rongelapese from their homeland for much smaller tests in 1946, no relocation occurred in 1954. Shortly before the Bravo test, the United States Department of Interior changed the official “danger zone” and placed Rongelap, Rongerik, and Ailinginae immediately outside of the area that would necessitate evacuation despite the fact that the planned detonation was designed to produce heavy fallout and was, in fact, the largest nuclear device ever tested by the U.S. Government. The decision to change the boundaries of the “danger zone” was influenced in part by a February 5, 1953 letter to Mr. James P. Davis, Director of the Office of Territories at the U.S. Department of Interior from Elbert D. Thomas, High Commissioner of the Trust Territory of the Pacific Islands, with High Commissioner Thomas in an effort to prevent the contamination of critical resources, requesting that the “Danger Area” exclude Ailinginae arguing:

This atoll (Ailinginae), although not 'inhabited' in the sense that people are permanently domiciled there, is regularly used and harvested by the people of Rongelap and contributes a substantial part of their living. It is owned by the Iroij of the area and, while it is geographically a separate atoll, it is politically, socially, and economically an integral part of Rongelap. These northern atolls of the Marshall Islands are poor. They offer only the most meager living for the inhabitants. The removal of Ailinginae, or even part of it, from the economic orbit of Rongelap could be expected to result in critically lowered living standards and it might force migration of part of the population to other area(s) to maintain the subsistence balance of the atolls. There is also no question that such an incursion on their lands will result in serious social repercussions in these islands that might readily extend throughout the Marshalls...

While it is impossible to predict the exact nature of the reactions, experience has shown that the most probable result would be first, a lowering of morale with a consequent reluctance to fend for themselves, followed by the expectation that the Government would provide their food in return for the land that had been taken... To them, land, and the lagoons that they fish in, are the only assets which they recognize that they can depend up on to feed them... In fact, land and their fishing grounds are the only assets that can assure these islanders freedom from fear and want.⁴⁹

While the people of Rongelap were, on paper, now out of the “Danger Zone” this action did not remove them from harm. Rongerik Atoll was approximately 135 nautical miles from zero point, Rongelap was 105 nautical miles, and Ailinginae 83 nautical miles. “For several days prior to March 1, 1954, the Air Force weather station on Rongerik noted the upper winds coming from the west and there was talk about the possibility of part of the radioactive cloud being blown directly over the islands” (DOD #20). On the eve of the Bravo test, weather reports indicated that atmospheric conditions were getting less favorable. At midnight, just six hours before the shot, the weather reports noted that there were “less than favorable winds at 10,000 to 25,000 foot levels.” Winds at 20,000 feet were “headed for Rongelap to the east” (Defense Nuclear Agency, March 1, 1954).⁵⁰ Despite the awareness produced by weather reports that the Bravo event would send fallout blasting towards the inhabited atolls of Rongelap, Rongerik and Ailinginae, the test continued as planned.

The Rongelapese residing on Rongelap and Ailinginae were exposed to what was then

estimated to be 200 roentgens of whole-body radiation (recognized then as a potentially lethal dose) with substantially greater amounts taken up by the thyroid. Children were exposed to even greater levels of radiation. More recently this exposure was recalculated to a significantly higher level by Dr. Hans Behling (outlined in Table 2 and contextualized with reference to current known health effects):

| Table 2: Adult exposure doses for the people of Rongelap from the Bravo Event | |
|--|--|
| Whole Body Doses: | 300-375 Roentgens |
| Thyroid: | 10,000-20,000 rads |
| Internal Doses (other than thyroid): | 60-300 rem |
| Current known health effects of ionizing radiation | |
| 5 to 10 rem: | changes in blood chemistry, can cause genetic damage |
| 50 rem: | can alter white blood cells, produce nausea |
| 75 to 125 rem: | can produce radiation sickness |
| 400 rem: | can kill 50% of exposed people |
| 500 to 600 or more rem: | will kill almost all exposed people |
| Sources: Reassessment of Acute Radiation Doses Associated with BRAVO Fallout, Report to the RMI Nuclear Claims Tribunal, Hans Behling, May 2000; Health Effects of Ionizing Radiation, CARD: http://www.cardnm.org/backfrm_a.html ; US Environmental Protection Agency, Radiation Protection, Health Effects: http://www.epa.gov/radiation/understand/health_effects.html#q1 | |

Exposures in previous tests in the Marshall Islands and the United States led to the development of safety precautions for minimizing exposure to fallout that were referenced in

Operation Castle planning documents. Military personnel were given radiation safety information and installations on Rongerik and elsewhere were built to minimize exposure. The United States weathermen were ordered not to eat or drink anything after the test, to wear long sleeve shirts and pants, and to remain inside their military-built shelters to reduce exposure (DOD #23).⁵¹

The people of Rongelap were not given the same level of information or access to protective shelters, had no idea that the United States Government would test the Bravo weapon on that day, and were unable to take any protective measures. The Final Report for JTF-7 Radiological Safety, Operation Castle (Spring 1954) notes:

*The significant fall-out area from large yield shots was a zone on the order of 100 miles wide and 300 miles long... Native populations were not briefed in advance on the general aspects of the operation, to include approximate starting date of the operation, gross phenomena, which would be manifested, possibilities of hazardous conditions requiring evacuation and general native preparations to centralize and anticipate evacuation.*⁵²

U.S. military personnel monitoring weather and fallout on Rongerik were evacuated on March 2, 1954. Marshallese inhabitants were evacuated on March 4, 1954. Evacuation events are described in memorandums for the record, communications records, and Operation Castle reports. Communications, daily logs, and diary entries from weathermen on Rongerik first reported fallout “over 100” at 1543, March 1, 1954. At 0030 on March 2, 1954 weathermen on Rongerik were instructed to cease all operations immediately and remain inside their metal lined concrete bunkers. They were evacuated beginning March 2 at 1250 with the final detachment departing at 1800. The memorandum for the record shows no reference to the presence of Marshallese inhabitants until the final message sent by USAF Captain Louis Chrestensen on 2 March 1954 after landing in Kwajalein at 1900:

...the final message I sent was an urgent recommendation that Rongelap be surveyed as soon as possible with the expectation that any inhabitants would very likely be subjected to the same degree of fallout that had occurred at Rongerik. This recommendation met approval by CTG 7.4.⁵³

The Rongelapese continued to eat food and drink water tainted from radioactive fallout for the days between the Bravo test and their evacuation to Kwajalein. Both the food and water supplies were obviously contaminated with radioactive fallout, but the Rongelapese had no other food and water options available. After the evacuation of the Rongelapese, the United States Government verified the contamination levels of the food and water the Rongelapese consumed before their removal. Four days after the Bravo test, the water on Rongelap was analyzed by the United States Government and found contaminated at a rate of two to twenty-five times above AEC operational tolerances (DOD #33).⁵⁴

The Rongelapese suffered near-lethal levels of radiation exposure. Fallout particles stuck to the coconut oil that people used in their hair, and stung their eyes. Children played with the fallout ash, and the entire community ate food and drank water contaminated by radioactive fallout. Several hours after the Bravo test, the people began to feel nauseated, and many vomited, and exhibited what felt like severe flu symptoms. By the evening, people's skin began to blister from contact with the fallout ash. After the people were evacuated, radiation lingered in the air and continued to deposit on the atolls.

Nerja Joseph: *When the fallout came... I used the well water that was soap-like because of the fallout dust on top of the water. I soaped my head. I put the fallout on my head. My hair fell out. I am the girl in the Brookhaven picture whose hair fell out (March 8, 1999, Holly M. Barker, Majuro).*

Aruko Bobo: *Nearly all the people on Rongelap became violently ill (after Bravo). Most had excruciating headaches and extreme nausea and diarrhea. By the time of our evacuation to Kwajalein, all the parts of my body that had been exposed that morning blistered and my hair began to fall out in large clumps. I just had to run my fingers through it and would come away with a fist full (August 27, 1994, Holly M. Barker, Ebeye).*

Jerkan Jenwor: *Our bodies hurt, we were nauseous. I was sick from the first day. I was really sick after the bomb. I had to stay in the house because I was so sick* (March 17, 1999, Holly M. Barker, Ebeye).

Aruko Bobo, Events on Rongelap: *I was living with my grandparents on Rongelap... On that March morning, my grandfather woke me while it was still pitch dark to help other girls in the cookhouse. After awhile we saw flashing lights, then a loud sound of explosion, then strong wind hit. Chickens, and roofing tins flying all over made us frightened. I ran to my grandfather and others. Grandmother immediately came out to see what was causing the children to be that frightened... There were four of us [kids who went outside on the reef]... three girls and one boy. The clouds were suddenly all around us... the sky had the most unusual color, very scary... The color went from bright white to deep red and then a mixture of both with some yellow. We jumped behind big rocks on the reef... The boy decided we should hurry [to the house]... It was the boy who finally pushed us to run... the air around us was split open by an awful noise. I cannot describe what it was like. It felt like thunder but the force from the noise was so strong that we could actually feel it. It was like the air was alive... Everything was crazy. There was a man standing outside the first hut staring at the burning sky.*

... I found my hair was covered with a white powder-like substance. It had no smell and no taste when I tried tasting it... (August 27, 1994, Holly M. Barker, Ebeye).⁵⁵

Kajim Abija, Events on Ailinginae: *I was in my late 20's at the time of Bravo. I was on Ailinginae with my husband, Jenwor Anjain, who has since died. All of the older people, like my husband, have died...*

We used all the small islands on Ailinginae. I went to Ailinginae three times, the third time is when the bomb dropped... When it dropped, we saw a light. It (the light) was to help find submarines my husband said (laughs). The 'powder' (fallout) was on the lagoon side. We were looking for birds when the powder fell. The old man was ready to take his boat to go and get birds. He told the children not to play there [on the lagoon side]. I was supposed to take care of the kids, but we all passed out on the lagoon side...

When they came to take us away from the island later, our clothes had powder on them. We saw the powder and we said it was something to reduce the poison from the bomb, the old man said. We were happy because we said we wouldn't get as much poison because that thing was a bomb [laughs].

We prepared the underground oven. We were going to split up the birds. I stayed with the kids. We saw the boats coming and we wondered why the huge boat came. We had no idea what was happening. We only thought about playing around and finishing our cooking of the birds...

On Ailinginae, they didn't stop us from eating and drinking after the powder fell. We blew the powder off of our food and ate it. We couldn't take care of each other, even the kids, because we were all sick. We ate sprouted coconut because we were really nauseous, and when we ate, we got even more nauseous...⁵⁶

On the boat, we took showers and put on trousers and sailors' underwear (March 18, 1999, Holly M. Barker, Ebeye).

Summary of Consequential Damages

The Bravo event of March 1, 1954 exposed the people and islands of Rongelap, Rongerik and Ailinginae to dangerous amounts of radiation and other toxic contaminants such as the chemicals used in each of the weapons tests to indicate the amount of fallout from each individual test. This exposure was not unanticipated. Once fallout over populated atolls was confirmed, the United States Government delayed evacuation of native inhabitants. Native inhabitants received greater levels of exposure to fallout than American service personnel because they were not provided with the same level of information, protective shelter, and risk reduction advice, and because they were evacuated two days later than American service personnel on Rongerik. By the time of their evacuation, the Rongelapese were exhibiting severe flu-like symptoms, radiation burns, and loss of hair.

5. Relocation from Rongelap to Kwajalein in 1954

The 64 residents of Rongelap and 18 residents of Ailinginae were evacuated to Kwajalein on March 4, 1954: 16 people were evacuated by plane and 66 by boat. People were forced to leave their homes, personal documents and belongings such as animals, crops, sources of income, and boats. According to the Rongelapese, they were not given time to collect any possessions at all (Almira Matayoshi, June 13, 2001).

The evacuation narrative report by G.W. Albin, commanding officer of the USS Philip, confirms rapid departure with possessions limited to a small handbag, and notes that the people had been sick. Given the severity of illness the Rongelapese experienced immediately after

Bravo, there was an urgent need to evacuate them from Rongelap, decontaminate them, and provide them with medical care.

The Rongelapese had serious medical consequences from their exposure that required immediate attention as indicated in the notes of Dr. Thomas Shipman, one of the attending physicians, who observed that people's "blistered and fissured feet" made it painful for them to walk.⁵⁷

Dorothy Amos: *The boat was fast and we arrived in Kwajalein in just one day. We got off on the dock. The bus took us-- we didn't know to where. Four pregnant women and two older people who couldn't move well arrived by airplane. They put a fence around the place where we were on Kwajalein. It was forbidden for others to enter. Only police and doctors could enter. Everyday they had us all go down to the lagoon to wash off.*

The people on Kwajalein, the Americans, helped us with clothes. On Kwajalein, we ate three times a day. We were treated well... (March 18, 1999, Holly M. Barker, Ebeye).

Kajim Abija: *The children's hair fell out. Also, the skin of the men who were fishing itched badly. Our fingernails turned black (March 16, 1999, Holly M. Barker, Ebeye).*

Dorothy Amos: *My hair fell out. It was really funny. I could pull out my hair easily from the burns. Baldness. We were really cooked like they set our heads on fire... I had burns on my arms, throat, legs. It's like I was cooked here (points to throat and arms) (March 18, 1999, Holly M. Barker, Ebeye).*

Almira Matayoshi: *I really cried when we were on Kwajalein. When it was time to decontaminate us, they gave us the men's underwear that the Navy men wore. The underwear was too small to cover us, and it was completely see-through when we got wet from the hose they sprayed us with. The water from the hose was so strong, too! Billiet Edmond was translating and assisting the Navy, and saw us all standing there naked. We had tears pouring down our faces because we couldn't believe that our custom was being violated so badly. Billiet was related to so many of the women, and it was like our culture was being ripped apart (June 13, 2001, Holly M. Barker, Honolulu).*

Lijon Eknilang: *When the U.S. Government evacuated people on March 3, 1954, the ship first evacuated the people from Rongelap Atoll. After everyone from Rongelap was on board the ship went to Ailinginae to evacuate the residents. The American personnel on the ship told all the people from Ailinginae to take all their clothes off. Men and women – fathers and daughters, mothers and sons, and relatives that it was extremely taboo to disrobe in front of – were forced to stand naked together while the ship's personnel hosed the people down with water. The evacuees from Rongelap had been through the same process and had already dressed by the time the people from Ailinginae were told to disrobe... Still today some people find it inappropriate for women to show their thighs, especially near their male relatives, but in the 1950s it was extremely taboo for women to show their thighs, let alone their entire naked bodies. Both men and women were trying to cover themselves with a small towel given to each person and with their*

hands, but they could not hide their nakedness from one another. We didn't understand at the time why we had to do this...

There were two Rongelapese who translated for U.S. Government representatives following the emergency evacuation of the Rongelapese, Billiet Edmond and Janwod Anjain. Billiet and Janwod were closely related (Janwod is deceased); Billiet's father is the younger brother of Janwod's father. After the Rongelapese were evacuated to Kwajalein, U.S. Government doctors required the Rongelapese to bathe in the lagoon three times a day in an effort to reduce their exposure to radiation. These daily baths went on for three months. Each day when the Rongelapese women rode in a bus from the camp where the Rongelapese were staying to the lagoon where they bathed. The women were instructed to wear just their underwear and a t-shirt on the bus ride to and from the lagoon. The Navy clothes didn't fit the women properly and they couldn't conceal their bodies properly. Billiet and Janwod accompanied them in order to translate. When the bus arrived at the lagoon, the women were told to stand at the water's edge and take their clothes off. Billiet and Janwod translated. Billiet and Janwod were related to most of the women there. In the Marshallese culture there are strict guidelines directing behavior between male and female relatives. Men and women who are related are not able to discuss anything even remotely sexual -- even as a nuance -- men should not know when their female relatives urinate for fear that they would think about their relatives' body parts, and under no circumstances should they view one another's bodies in anything but full clothing.

In front of Billiet and Janwod, three times a day for three months, the Rongelapese women were told to undress and stand naked at the lagoon's edge. The women would cry from embarrassment and try to cover their genitals with their hands. U.S. Government officials, all men, ran Geiger counters up and down the bodies of the naked women both before and after they bathed in the lagoon. Frequently, the Geiger counters would start clicking wildly when taking readings from the hair on the women's heads and from their pubic hair. The U.S. Government workers would tell the women to soap their pubic hair again, in front of everyone, before a second reading. Billiet and Janwod tried to avert their eyes whenever possible but their presence by their naked mothers and sisters was mortifying (March 28, 2001, Holly M. Barker, Majuro).⁵⁸

Almira Matayoshi: *The two hardest things for us to talk about are the divisions in our families caused by the bomb, and what happened to our bodies. The Rongelapese who weren't exposed wouldn't admit they were Rongelapese. This was awful because we are family, and this is the worst kind of damage to have splits in the family (June 13, 2001, Holly M. Barker, Honolulu).*

Isao Eknilang: *We were very isolated on Kwajalein. Our relatives on Ebeye were afraid of their own family members, they were afraid to visit us for fear they would get radiation from us. Even the Rongelapese who were not on Rongelap during Bravo became embarrassed to be Rongelapese. They wouldn't want to admit they were Rongelapese. They were embarrassed because we were like monkeys. Our arrival on Kwajalein caused family divisions because family did not want to help us for fear of being exposed themselves (June 13, 2001, Holly M. Barker, Honolulu).*

Summary of Consequential Damages

The Marshallese experienced cultural violations and indignities during evacuation and decontamination efforts on the ship and on Kwajalein. When Marshallese on Kwajalein saw that the Rongelapese were sick from radiation exposure, they became afraid to go near them or help them for fear they would contract the same illnesses. These reactions created lasting impressions on family members, and started the first serious divisions within families.

6. Project 4.1 Research on Kwajalein

Throughout the 1940s and 50s, accidental exposures at research facilities and test sites provided scientists with radiation-effects research opportunities. By the time of the Bravo event in 1954, U.S. researchers were well positioned to take advantage of the scientific opportunities created by human exposure to radiation. Many such research projects were underway in 1954, including studies originally proposed by the Ad Hoc Committee for Biologic Tests in June 1949 to define the research agenda for “future proof tests of atomic weapons at Eniwetok” (Operation Greenhouse Plan, Medical Tests).⁵⁹

Following recommendations outlined in a 1953 review of research programs and needs by the Advisory Committee to the U.S. Atomic Energy Commission, the Bravo event exposure of American service personnel and Marshallese natives resulted in immediate efforts to collect data to support ongoing biomedical research on the effects of radiation on a human population, including research on “the carcinogenic action of ingested or inhaled radioactive materials.”⁶⁰ After evacuating the people of Rongelap, scientists returned to the atolls to take samples of

water, vegetation, and to capture exposed animals. Sixty-six animals were brought back (chickens, pigs, cats, ducks) for study, since “if anything does show up it will be more likely to show up sooner in the animals, and would give us some idea of the prognosis for the humans over a longer period of time” (Cohn, July 1954:59).⁶¹ In addition to changes in white cell and platelet levels, radio-autographs of chicken and pig tibia showed abnormal bone morphology. Samples from two pigs indicated “two separate and distinct exposures to fallout material”...“most likely strontium and barium” (ibid:60-61). This evidence indicates that the Bravo event was not the first weapons test to produce fallout on Rongelap.

On March 9 1954, Project 4.1 scientists arrived on Kwajalein and on March 11, the Rongelapese began service as subjects in a variety of studies exploring the effects of radiation exposure on human beings. Over the three months following their evacuation, 64 residents of Rongelap, 18 residents of Ailinginae, 157 residents of Utrik, and 28 Americans from Rongerik—together with “control” groups of 117 Marshallese living in Majuro and 105 American service personnel, had their conditions monitored and emerging symptoms documented in support of “Project 4.1”.

Project 4.1 activities on Kwajalein are described in report documents as including efforts to (1) document and treat immediate affects from acute radiation exposure; (2) document the population and control groups in ways that set a “baseline” for further studies on the long term effects of radiation; (3) obtain samples, measurements and biological responses that suggest exposure levels, and (4) provide information to ongoing studies on absorption rates, elimination processes, and other questions of interest to the national security and military defense of the United States. A report was produced from data collected from March – May 1954, submitted to the Atomic Energy Commission Division of Biology and Medicine for discussion at their July

12-13, 1954 Conference on Long Term Surveys and Studies of the Marshall Islands, and formally released in October 1954 (Cronkite et al, October 1954).⁶² This final report summarized findings from “secret restricted data” developed from “a joint AEC-DOD [study] established to study the physiological symptoms of evacuated natives” (as described in DOE #30:14).

Project 4.1-- the “Study of Response of Human Beings Exposed to Significant Beta and Gamma Radiation Due to Fallout from High Yield Weapons”... “represented the first observations by Americans on human beings exposed to excessive doses of radiation from fallout” (DOE #354:71).⁶³ Conveniently, “the dosage spread of the different groups nicely cover(ed) the range of estimated operational tolerance accepted by the Department of Defense” (DOE #107:149). Project 4.1 was thought to be a valid research study for the following reasons: “the groups of exposed individuals were sufficiently large to provide good statistics... the exposures involved far exceed the normal permissible dosage... The internal dosage was due mostly to ingested material rather than inhaled material... [and because] beta activity in the urine of these exposed human beings indicated significant internal contamination” (DOE #133: 71-72).⁶⁴

Loss of hair, depressed blood cell and leukocyte counts, flu-like symptoms, fingernail discoloration, nausea and radioisotope activity in the urine were all observed in the Rongelapese following their acute external exposure (DOE #11, DOE #133, DOE #167). The skin burns experienced by the Rongelapese were of great interest as well. By examining the exposed Rongelapese, researchers found that beta radiation from fallout “can penetrate well into the body with a large portion being absorbed by the critical living layers of skin” (DOE #348:86). And, they found that it is possible to equate the observed degree of skin damage suffered by the

Marshallese natives during Operation CASTLE to known dose effect data. “The Marshallese incident has pointed up the fact that beta burns will occur at sub-lethal gamma levels only when particles come into contact with bare skin” like the Rongelapese who wore no protective clothing (DOE #348:88).⁶⁵

William Allen (Accompanied US representatives on surveys of the islands): *On one of these trips I met a Marshallese male named Hiroshi who had been severely affected by fallout. He had first degree burns covering 90% of his body and had suffered complete loss of hair. The extent to which his body was burned was such that the bones in his feet were exposed and visible to the naked eye. Tragically enough, Hiroshi died less than a year after our conversation.* (August 22, 1994, Holly M. Barker, Majuro). (Note: Hiroshi accompanied Aruko Bobo across the reef in the earlier testimony).

Researchers noted that the severity of skin burns experienced by the Rongelapese may have been exacerbated by chemical irritants present in the fallout. A United States Government document notes that irritating chemicals applied to the skin during or shortly after irradiation enhance the effects of radiation, and that the chemical nature of the fallout may have enhanced the effects of radiation on the Rongelapese (DOE #429, part II:615).⁶⁶

During their enrollment in Project 4.1, U.S. researchers did not obtain informed consent from the Rongelapese subjects for exams, procedures, and sampling, nor did they explain the procedures. Approval for research was sought and secured through U.S. military and scientific advisory committees, and the Territorial administration was notified and approved requests to collect urine samples in support of a pre-existing study of plutonium secretion (a research project established after accidental exposure of scientists at Los Alamos).⁶⁷ The people of Rongelap, however, were not involved in these discussions.

Chiyoko Tamayose: *We never knew what was going on. There was a time where they took my blood, mixed it with something, and then shot it back into me. They never asked me if they could do this, they just did it. I didn't understand what they were doing, and I still don't* (June 13, 2001, Holly M. Barker, Honolulu).

Summary of Consequential Damages

Without their consent or knowledge, on March 3, 1954 the Rongelapese were enrolled in a secret U.S. military project to study the effects of radiation exposure on human beings. The United States Government used Marshallese blood, urine, bone marrow, thyroid glands, and bodies to calculate how much radiation had been ingested from their environment following the Bravo event, to determine immediate effects of radiation exposure and to predict long-term effects. Forced and unexplained medical procedures, pain and suffering from injuries and procedures, humiliation from examination and decontamination processes, humiliation from having photographs taken while naked, and the experience of social stigmatization between “exposed” and non-exposed relatives were some of the many consequences of involvement in initial Project 4.1 exams and experiments.

7. Relocation from Kwajalein to Ejit

At the conclusion of three months of the short term-studies for Project 4.1 exams and experiments, the Rongelapese were moved from Kwajalein to Ejit, where they were told they would stay for one year until their islands were safe to return to. They stayed on Ejit from June 1954 until May 1957. The move to Ejit was documented by military films and journalists to placate global concerns, following the Marshallese filing of a petition with the United Nations requesting assistance in ending nuclear weapons tests. United States Government reports of the relocation of the Rongelapese from Kwajalein to Ejit Island on Majuro describe the relocation as

“a modern version of the American covered wagons” as “natives” were transferred on covered ships loaded with their personal possessions, children, and household items (DOE #429, part II, p.435).⁶⁸ Declassified documents describe this move as allowing the continued scientific study of the exposed population, and recognized that Rongelap, Rongerik, and Ailinginae remained too dangerous to allow human resettlement. Resettlement was consciously designed to meet bare minimal needs of the Rongelapese, as “it is the policy of TERPACIS (Trust Territory of the Pacific) ... to discourage too rapid acquisition of wealth by small groups of natives... thus, the subsidy of natives is to be held to the essential minimum” (Letter from Byars 1954:5).⁶⁹

The people of Rongelap lived on Ejit until their return to Rongelap in May 1957. During this time they encountered hardships associated with adjusting to new surroundings, inadequate access to critical resources, and anxieties over their medical and living conditions and their future. They were especially anxious over radiological conditions on Rongelap, fearing that the fallout that forced their initial evacuation might cause them to suffer the same fate as the dislocated Bikinians.

Almira Matayoshi: *We were on Ejit... All that time, we didn't have school. We didn't have knowledge from school, and we didn't learn from our parents and grandparents about how to weave and make things the way we did on Rongelap* (June 13, 2001, Holly M. Barker, Honolulu).

Norio Kebenli: *When the community was on Kwajalein after Bravo, they were fed very well and didn't have to cook... Suddenly they were moved to Ejit with no cooking utensils or appliance...*

*They used the cardboard boxes from the C-rations and K-rations to build mon tutu (a separate bathing area), and to paper the walls of their shelters to prevent rain from seeping through. Houses were studio type and it was very hard.*⁷⁰

On Ejit there was not enough water. The groundwater was bad for drinking. We went all over the island digging holes and trying to find good water, but there was none...

It was while on Ejit that life started to get hard. There wasn't enough food; there was no breadfruit and no place to fish...

We also began to get some bad habits on Ejit, like learning to smoke from the Navy guys. We would also throw away our litter on the beach because we were used to throwing our food garbage on the ground. On Ejit, kids didn't know to be careful about

garbage. I remember that several kids cut themselves on the sharp lids from the food the U.S. gave us in cans. These cuts were really deep...

We also tried sweet foods for the first time. We were given C-rations and K-rations. We liked the K-rations better because they had sweet foods in them. We used to eat the sweet stuff and throw out the rest (June 13, 2001, Holly M. Barker, Honolulu).

Summary of Consequential Damages

The people of Rongelap endured hardships from food and water shortages on Ejit, as well as anxiety about not knowing when they could return home. Social and cultural assaults included loss of opportunity to practice subsistence-oriented production, the loss of three years of formal schooling opportunities, and exposure to American consumer lifestyle and foods.

8. Establishing Long-Term Human Subject Research Plans, Priorities, and Policies

The first known experiment involving the use of Marshallese human subjects was funded by the United States Atomic Energy Commission in 1951. A series of three research contracts were issued to geneticist James V. Neel to work with a Marshall Islands population examining natural occurring mutations in a human population. This research was expected to “yield data of considerable value in our thinking about the genetic effects of irradiation in man” (Monthly Status and Progress Report for February 1951 of the Scientific Advisory Committee of the AEC).⁷¹ Dr. Neel’s expectation with this research was “that the spontaneous rate of mutation in human genes is going to be relatively high, a fact which of course would make their apparent sensitivity to irradiation of less relative importance in the overall picture of man's decline” (February 20, 1951 letter from Neel to Dr. Max Zelle).⁷²

Experimental procedures, exams, and samples collected in March-May 1954 in support of Project 4.1 represents the next known use of Marshallese human subjects by Atomic Energy Commission scientists, and it is clear from study documents that findings from the initial human radiation study were merely the first reports in a long series of anticipated studies. The initial Project 4.1 report concluded: “It is not possible at this time to give an estimate of the long term effects of internal contamination... It is expected that additional data will be available in the near future that will make possible reasonable estimates of the long term effects of internal radiation on these individuals” (DOE #429, part I:263).⁷³ Concerning the health and future of the people of Rongelap, Project 4.1 recommendations included the warning that the people “should be exposed to no further radiation, external or internal with the exception of essential diagnostic and therapeutic x-rays for at least 12 years. If allowance is made for unknown effects of surface dose and internal deposition there probably should be no exposure for [the] rest of [their] natural lives” (Cronkite, 4/21/54).⁷⁴

Data and findings from Project 4.1 were discussed by the AEC Division of Biology and Medicine in a July 1954 “Conference on Long Term Surveys and Studies of Marshall Islands” and used to shape the third major human subject research event -- the formation of an integrated long-term human environmental research program to document the bioaccumulation of fallout and the human effects of this exposure.⁷⁵ From the start, it was assumed that the people of Rongelap would be returned to a contaminated setting and that the recommendation for no further exposure for at least 12 years would be ignored. Thus, AEC Division of Biology and Medicine Advisory Committee discussion included the research needs and logistics of studying the uptake of fission products in the food chain before and after returning the people of Rongelap to their atoll:

Mr. Harris: *These people will introduce animals when they get back there. There may be a concentration of certain isotopes, such as strontium 90, for instance, in these animals or in the meat parts of these animals, which would subsequently be eaten by the natives. If you put animals back, immediately you would get an idea at measurable levels of what this translocation rate might be. Remembering that people are going to eat these animals later on (ibid:220).*

Dr. Bugher: *In this consideration, how do you feel about simply taking specimens at intervals as the islands are visited from their pigs, from their chickens and dogs, and from the people as they die too, if you can possibly get the material... wild animals might have been mentioned here... the shell fish and crabs.... In the surveys, specimen material of these various indigenous fauna would be desired to these various groups concerned with these analyses (ibid:223-224).*

To allow long-term monitoring of the degenerative effects of radiation regular interval examinations were proposed, consisting of

- 1) physical examinations and interval history;
- 2) hematological studies such as hematocrit, white blood cell count, differential count, platelet enumeration and bone marrow studies;
- 3) full body skin exams documented in color and black and white photographs, with skin biopsies if indicated;
- 4) ophthalmological studies of the lens, including a photographic record of the anterior portion of the lens;
- 5) growth studies of children including the development of dentition;
- 6) the progress of pregnancies and status of newborn infants (“I don’t think much comment is required except that essentially it will be a documentation of nothing happening in all likelihood.”) (Bugher, ibid:146);
- 7) quantitative studies of internally deposited radioisotopes by means of urinary excretion measurements, external radiological measurement and localization, and such radiography as may be useful;

- 8) environmental surveys of the affected islands and atolls and appropriate examination of the animals left on contaminated islands.

In addition to identifying the focus of long-term research, the Advisory Committee identified those areas that they were not interested in pursuing. With reference to questions of fertility, while “abnormal menses were observed in two women in the Rongelap group” and fertility studies on animals brought back from Rongelap suggested a 50 percent fertility rate (ibid:54), scientists balked at the prospect of research examining human reproductive and intergenerational effects of radiation:

Cdr. Cronkite: *My feeling toward it is very simple. We should not attempt to do any studies for fertility for obvious psychological reasons for natives themselves. It becomes a fairly personal thing for getting specimens of semen and prying into these things. It is difficult enough to get a specimen of urine, and feces, let alone inducing masturbation on a large scale of Marshallese.*

Dr. Dunham: *If properly induced. You don't know who the fathers are. You are dealing with a group where there is no control. You would have to use the Uterikans as control... Furthermore, the data in Japan suggests that as far as live births are concerned, there are pretty good data on that. A lot of it where large numbers of people studied both control and irradiated population, and there is apparently no difference (ibid:106-107).*

Agreements emerging from this conference include recognition that the “type of study which was made in the acute phase will need to be continued for an indefinite time, but with a changing emphasis from what might be called acute problems to the long term effects which are particularly likely to manifest themselves in such things as shortening of life, the occurrence of tumors, both superficial and deep, and in bone changes, which may be minor in nature” (Bugher, ibid:242). United States researchers, therefore, monitored the Rongelapese with the expectation of seeing the people contract these conditions.

Interval examinations were also recognized as opportunities to collect samples of interest to a wide range of ongoing studies:

Dr. Bugher: *Now, our feeling was, too, that various groups of people have special interests and would like to have sample material of various kinds. As far as possible, the groups concerned with the interval study should attempt to provide those samples (ibid:147).*

Some of the special interests mentioned included a request for a selection of extracted teeth to support ongoing studies on the radiation effects on growing teeth (ibid:109) and extraction of teeth during autopsies, including those done on people who die from other causes (ibid:111); bone marrow aspirations to support hematological studies and the use of radioisotopes in tagging procedures to measure red blood cell formation rates (ibid:174-175); interval x-rays of long bones to track roentgenographic changes and study radio element deposition (ibid:183-184); and the harvesting of various samples in post-mortem autopsies (ibid:189-190).

The sampling of human subject material that continued after death violated Marshallese traditions, as noted in the May 21, 1956 letter from the District Administrator of the Trust Territory of the Pacific Islands to Dr. Robert Conard, Brookhaven National Laboratory:

*Jabwe, the health aide on Ejit came over to Uliga early in the evening to announce that one man had suddenly died after a very short illness of about one hour duration. Since this was the first death among the original Rongelapese that were brought here, we were faced with the problem of an autopsy. Not to interfere with local customs of Marshallese death rituals we agreed to let the family have the body for the night. Mr. Bender and Mr. Jack Tobin (anthropologists working with the TTPI) had asked the family permission for an autopsy but the family refused. The family were reluctant with a fear that we shall mutilate the body, remove pieces and organs which according to their native belief is a very bad thing to the future afterlife of the deceased.*⁷⁶

Because long-term research plans involved an integrated study focusing on the absorption and affects of radioisotopes in ecological and human systems, medical research plans paralleled ecological survey efforts. Rongelap was resurveyed beginning in 1954, with soil and food

samples taken from Rongelap Atoll by biologists, geologists and other scientists to learn about the movements of isotopes in the environment (DOE#167:53). In 1954, United States researchers identified Cesium-137 (Cs-137) as “one of the principal radio nuclides found at Rongelap” (DOE #341:164). Cesium-137 was detected in edible portions of plants prior to the resettlement of the Rongelapese and the average counts in soils for Cs-137 appeared higher at Rongelap than at Bikini or Enewetak (DOE #298). A 1955 survey conducted by the University of Washington on Rongelap and Ailinginae indicated that: “Edible plants other than coconuts, such as pandanus, papaya, and squash, have been found to contain levels of Sr 90 which are above the tolerance level as defined in the Radiological Health handbook” (DOE #342:32).⁷⁷ In general, plants in the north had higher levels of radiation than the islands in the south with the exception of arrowroot, a staple of the Rongelapese. Arrowroot on Rongelap Island was found to have almost three times greater radiation levels than other sample areas on Rongelap and Ailinginae in 1955 (DOE #342:31). The increased radiation levels of arrowroot on Rongelap Island were attributed to the fact that the arrowroot at Rongelap was probably collected in radiation “hot spots.” Unfortunately for the Rongelapese, these hot spot “readings were highest in soil depressions and in pits such as those used by the natives for growing crops” (DOE #342:31).⁷⁸

Researchers also found that the coconut crab feeds on land plants high in Sr-90 and Cs-137 levels (DOE #342:48). In a 1955 survey of Rongelap and Ailinginae, radiation ecology studies indicated that “the highest Cs 137 levels were found in the land plants and the coconut crab” accounting for 26% to 100% of the radioactivity in the specimens that year (DOE #342:58). Researchers also noted that Stronium-90 (Sr-90) taken up by plants was deposited in the bones of humans via air, water, plants and animal products (DOE #348). Because researchers understood

that coconut crabs bioaccumulate radiation, one year before the Rongelapese returned home, a recommendation was made to resettle the people provided they do not eat coconut crab (DOE #240, DOE #458:50-51).⁷⁹ This recommendation was not implemented until several years after the people returned. The resulting exposure allowed scientists to measure the amount of radionuclides present in human beings and confirm the levels of fallout produced by the weapons since “the deposition in the human body seems roughly to parallel the levels of fallout” (DOE#361:6).⁸⁰

In 1957, the United States Government announced to the Rongelapese that it was safe to return to Rongelap. This assurance was based on assumptions that initial high levels of radioactivity had subsided, and that current levels detected from airplane readings at 200 feet in 1957 reflected on the ground conditions (DOE#356:6/13/57 memo, DOE #356:10/1/57 memo, DOE#357: 2/13/58 memo).⁸¹

The decision to repatriate the people of Rongelap to a still contaminated setting ignored medical recommendations to avoid future exposures. This decision also supported the United States scientific research and military defense agendas. In 1957, the United States Government was battling an effort at the United Nations to produce a test ban treaty. Given global concern over the plight of the Rongelapese, the United States Government worried that any future evacuation to protect the population would generate negative publicity highlighting the fallout dangers of nuclear weapons tests. Injuries from the Bravo event had been highly publicized, and United States officials worried that further injury might produce a resolution from the United Nations banning future weapons tests. These concerns are reflected in the discussion of the committee charged with responsibility for making the repatriation decision-- the AEC Advisory Committee on Biology and Medicine (ACBM):

The current low morale of the natives was pointed out and the advantages of returning them to their homes presented as a factor which should be balanced against the possible radiation hazard in their return... It was agreed that because of the already high relative exposure to which the natives had already been subjected, limiting their exposure in terms from now on was unrealistic; but on the other hand, the psychological effect of permitting them to receive more radiation than our own people, could be subject to criticism.

Further discussion resulted in adoption of a formal statement expressing the Committee's opinion:

It is moved that the ACBM approve the Division of Biology and Medicine's proposal to return the Rongelapese to their native atoll. However, it is the opinion of the ACBM that if it should become necessary to re-evacuate because of further tests there would result world opinion unfavorable to the continuation of weapons testing. (ACBM 1956b:9-10).⁸²

The ACBM statement in effect produced a non-evacuation policy where the Rongelapese were returned to Rongelap with the understanding that they would remain there regardless of the potential for hazardous exposure in future tests. As a result, the resettled Rongelapese -- exposed and "nonexposed" -- endured the ill effects from cumulative exposure to multiple weapons tests.

In July 1957 a LCU (landing craft unit) transported the Rongelapese from Ejit to Rongelap Island where some effort had been made to construct pre-fabricated housing and related improvements (see Homes and Narver 1957).⁸³ Use of Rongelap Atoll, however, was restricted to just Rongelap Island by United States Naval edict. Similarly, Ailinginae Atoll was off limits. The Rongelapese were not allowed to return to Rongerik because the environment still had not recovered from the time the Bikinians' depletion of the resource base, and because it remained contaminated from the tests. As a result, the resettled Rongelapese stopped using Rongerik Atoll.

Shortly after their return, scientists returned to Rongelap to collect foodstuff samples and analyze them for radiological contamination. The United States military wanted to conduct nuclear weapons pre-test surveys of Rongelap to determine the residual amounts of radioactivity before conducting the next series of nuclear tests. This July 1957 survey of food, soil, water and plankton indicated that radiation levels were “appreciably above background” (DOE #376:57).⁸⁴

The non-evacuation policy meant that the people of Rongelap had to contend with contamination from the Bravo event, pre-1954 tests, tests that occurred during their absence such as the 1956 Redwing Series and, because of the policy of no re-evacuation, additional contamination from later military operations. For example, the 1958 Operation Hardtack series generated additional fallout on Rongelap, producing elevated levels of plutonium noted in subsequent medical and environmental surveys (see Donaldson letter to Seymour, January 11, 1957; and Conard letter to Dunham, June 5 1958). The testing of nuclear devices in 1961-1962 resulted in increased concentrations of radioactive iron (Fe-55) in goatfish liver documented by University of Washington scientists, and subsequent increases in average Rongelapese body-burdens of Fe-55 documented by medical Survey scientists (See Beasley, Held and Conard 1970).⁸⁵

And, reports published in 1999 indicate that, in the summer of 1968, the Deseret Test Center conducted a series of tests known as DTC 68-50 from the USS Granville S. Hall, anchored off Eniwetok Atoll. This test series involved the atmospheric dissemination of “PG” -- staphylococcal enterotoxin B-- a toxin that causes incapacitating food poisoning that causes flu-like symptoms that can be fatal to the very young, the elderly, and people weakened by long term illness. Staphylococcal enterotoxin B was disseminated over a 40-50 km downwind grid, and according to the Final Report, a single weapon was calculated to have covered 2400 square km,

an area equal to 926.5 square miles.⁸⁶ The Medical Survey for 1967, 1968, and 1969 reports in the summary of health conditions, that a “rather serious outbreak of Hong Kong influenza occurred among the Rongelap people in 1968 and may have been responsible for the deaths of a 58-year old exposed woman and of an unexposed boy who died of meningitis complicating the influenza.”⁸⁷

Summary of Consequential Damages

Research plans and priorities established in 1954 by the United States Government emphasized monitoring and human subject research rather than the treatment of the Rongelap people. These plans shaped the nature of medical attention in subsequent years for the Rongelapese. Medical recommendations to avoid future exposures were offset by scientific research priorities. Human subject research included a long-term experiment involving the purposeful exposure of an entire population to hazards contained in a contaminated setting. Decisions to repatriate the people of Rongelap were made with full knowledge that environmental hazards were present and would pose some threat to an already exposed population, and with full intent to exploit the research opportunities associated with continued exposures. The people of Rongelap were returned to a contaminated setting where they remained under a policy of no re-evacuation, and were thus subject to further radioactive and toxic assaults from future weapons tests. The consequential damages of these policies and priorities include decades of medical focus on research questions rather than individual health care needs. These actions constitute systematic and long-term abuse of the Rongelapese – abuse that continues to generate

hardships for individuals, families, the broader communities of Rongelapese, and the nation.

9. Difficulties of Life in A Contaminated Setting

Dorothy Amos: *Then we went back to Rongelap. They (the United States Government) said they had cleaned the island (March 18, 1999, Holly M. Barker, Ebeye).*

When the people returned to Rongelap they found missing numerous possessions that they could not gather or bring with them during their evacuation:

Almira Matayoshi: *When they came to evacuate us after the [Bravo] bomb, they told us not to take anything at all – none of our possessions. So, I left everything behind. I left the “peba in kallimur” (papers with promises that function as contracts) signed by my grandparents that showed I had land. When we returned after a few years, everything in our houses was gone. Now I can’t go to court and prove I had land because the papers are gone. They told us not to bring anything.*

When we returned, the papers, and everything was gone. Everything was burned – papers, clothes, pictures. Our boats were gone. Our tools for working, including the “drekeinini” that is passed down from our mothers. We don’t know how to make those tools, or how to make the boats that could sail 10 people at once. We had about five of those large sailing boats, but they were all gone when we returned (June 14, 2001, Holly M. Barker, Honolulu).

The consequences of these losses were profound. In the case of Almira Matayoshi, who did not have time to collect her landowner papers, she and her offspring lost their claim to their land because they do not have the documents necessary to prove ownership.

In addition to the difficulties of adjusting to the losses of personal, household, and family property, the Rongelapese confronted significant difficulties in adjusting to their contaminated atoll. Upon their return they found an altered landscape, with “atypical plants, including trees with three to five crowns” (Davis, 1963).⁸⁸ Rongelap trees and plants were described by

University of Washington scientists in July 1957 as “mutants” because of their extra flowers and limbs and their stem abnormalities – atrophied, or “thickened, swollen” stems covered with cancerous warts (DOE #340:43).⁸⁹

From the onset the people of Rongelap began to experience a wider variety of health problems than previously known. Jorulej Jitiam, the health assistant posted on Rongelap in 1957, expressed his concern in a letter to the District Director of Public Health in Majuro, asking for treatment advice for:

*impetigo that doesn't heal... and wounds that won't heal for up to 3 months and get worse... Such things didn't occur to these people while they were in Ejit, but now many of them have gotten these diseases... What I think is that there is still radioactivity in the island because even if a person got a small laceration on his leg, etc., it will become infected and get bigger. Frequent abdominal pain is being noticed among the people... I want a doctor to come here before the AEC's visit so he can have a fairly good idea of what cause these things to be happened. Please come as soon as possible.*⁹⁰

Although radionuclides and their bioaccumulation in foodstuffs were an invisible threat to the Rongelapese, the people suspected that their problems stemmed from the high levels of radiation in their food. The Rongelapese got blisters in their mouths and food poisoning from eating certain foods. The foods that made them ill after resettlement never made them sick before the Bravo test. Because of the blisters in their mouths from the food, and because they could see the effects of radiation in the trees and plants they ate from, the Rongelapese attribute their health problems to the presence of radiation in their environment:

John Anjain: *We had no problem with our food before the testing. Afterwards, arrowroot and the plants gave us blisters in our mouths. I also think the problems with our throats (thyroids) are from the poison. After we went back, new fish gave us fish poisoning, such as paan (red snapper). Rongelap's lagoon was affected. I got fish poisoning twice after returning... As for the crabs, DOE told us not to eat them. It's forbidden to eat them. Before the bomb, we used to eat them a lot. DOE were the ones that said it was forbidden to eat them. I asked why. They told me to ask God (March 16, 1999, Holly M. Barker, Ebeye).*

Chiyoko Tamayose: *We ate foods that made our throats swell and close up, and even made us shake like we had epilepsy. I remember this after eating crab, I don't know if it became poisonous like some species of fish, or what (June 13, 2001, Holly M. Barker, Honolulu)... The people got mouth blisters from eating arrowroot, fish, clams, and coconuts... We had no choice but to go back to Rongelap [in 1957]... It is impossible to limit people's consumption once they are on their land (March 2, 1999, Advisory Committee discussion).*

Nerja Joseph: *Some coconuts had two or three heads. The arrowroot had no contents... it was empty inside (March 8, 1999, Holly M. Barker, Majuro).*

Dorothy Amos: *After returning, many things were different. The food we ate... there was a food we didn't eat, coconut crab. The fish -- our mouths were hot... we got burns. Arrowroot also gave us blisters. We saw that many things were different. We sucked on pandanus and that was all right but the other foods were bad. We saw some coconut trees that had two heads, some three. We saw they weren't good for us to eat. We understood there were differences because we grew up there and we knew. They gave us other food to help us for awhile on Rongelap. Then we ate leaves and animals (March 18, 1999, Holly M. Barker, Ebeye).*

Lijon Eknilang: *The throats (thyroids) of the birds became abnormally large and swollen in the years after the bombs. When we opened them up, they had hard, white rocks in their throats that we had never seen before (March 2, 1999, Advisory Committee discussion, Majuro).*

The resettled Rongelapese ate vegetables, fruit, and tubers grown in heavily contaminated soil. They ate coconut crabs, chickens, and pigs that had in turn consumed radioactive foods and had thus accumulated higher concentrations of radioisotopes. Radiation also affected the marine sources of food, such as the fish that consume radioactive algae and plankton. As a result, the exposure of the Rongelapese was compounded by the fact that they consumed foods that accumulated and thus intensified radiation from the environment. Ethnographic interviews suggest that fish poisoning, while not unknown prior to the nuclear tests, became an immediate and serious problem with some species and locales that were previously "safe" causing poisoning:

People got fish poisoning from types of fish that never caused poisoning in the past, such as iol (mullet), and malok. Before the tests, only the jujukop (barracuda) fish caused fish poisoning (Advisory Committee discussion, March 2, 1999).

Responsibility for the long-term monitoring of the Rongelapese was given to a United States Government weapons facility, Brookhaven National Laboratory (1954-1997), with Dr. Robert Conrad appointed Director in 1956.⁹¹ Brookhaven National Laboratory scientists embraced their duties and research opportunities, noting that on Rongelap Island “the levels of activity are higher than those found in any other inhabited location in the world. The habitation of those people on the island will afford most valuable ecological radiation data on human beings” (DOE #366:22).⁹²

Plant observations provided clear indications that radioisotopes were present in the food chain. Samples of the coconut crab -- a main source of food for the people of Rongelap -- were not analyzed and reported until February 1958, however, and it was not until June 1958 that the Rongelap people were informed by the Medical Survey team that eating coconut crabs presented a health risk from high levels of Sr-90.⁹³ As the ethnographic data indicates, the June 1958 ban on coconut crab angered and confused the Rongelapese and many people did not adhere to the restriction:

Nerja Joseph: *First they said we could eat crabs, and then they said to stop. What's the point when we already ate them?* (March 8, 1999, Holly M. Barker, Majuro).

Ken Kedi: *Culturally, you can't tell people not to eat food, like crab, they see. Even if we were hungry, they said not to eat the crabs, but we ate them anyway.* (March 1, 1999, Holly M. Barker, Barbara Rose Johnston, and Stuart Kirsch, Majuro).

Jimako Kobnij: *Even though it was bad, I ate them. I didn't think about it. The food we ate gave us blisters in our mouths.* (March 18, 1999, Holly M. Barker, Ebeye).

Jerkan Jenwor: *Rongelap was an atoll with so much food-- coconut, pandanus, and breadfruit. Now there is none. Because of the poison, it disappeared. When we returned, we ate the arrowroot. It gave us blisters in our mouths, but we had to eat it especially during times of hunger. The local doctor eventually stopped us from eating it. We also ate crabs even though we weren't supposed to* (March 17, 1999, Holly M. Barker, Ebeye).

Although people on Rongelap were eventually told not to eat the coconut crab, they were not told to avoid eating other terrestrial or marine food sources known to have high levels of

radiation, such as arrowroot. Also, United States scientists knew that despite the extremely high levels of radiation in coconut crabs, they were considered only “intermediate in their general level of radioactivity” compared to the giant clam (DOE #342:18). The United States Navy confirmed that clams concentrate high levels of Co-60 (DOE #290:19), yet the Rongelapese were never told to avoid eating clams. Researchers also reported high levels of contamination in pandanus, a Rongelapese staple food: “pandanus fruit and coconut crabs were the two food items of major concern with respect to Sr 90 content at the time of the return of the Rongelapese” (DOE #358:8/7/59 memo), yet this staple food was not restricted from their diet.⁹⁴

The radiation that worked its way through the plant and animal food chain that the Rongelapese depended on for survival provided scientists with the research opportunity to significantly expand their understanding about bioaccumulation and environmental sources of exposure to human beings. Thus, in “the long range radiation ecology study at Rongelap major emphasis was placed on studies of the soil-plant relationship, aquatic bird populations, and mineral transport, as well as evaluations of the uptake of specific isotopes by plants and animals used as food by the natives” (DOE #378, p.58).⁹⁵

While it was assumed that radioactivity would decrease over time, ecological surveys by the University of Washington found persistent radiation in the soil, terrestrial and marine organisms on Ailinginae, Rongerik and Rongelap. The 1977 study documented and measured the presence of six fallout radionuclides from soil samples taken from Ailinginae: Co-60, Cs-137, Eu-155, Am-241, Pu-240, and Sr-90, and found that Cs-137 and Sr-90 were the most abundant radionuclides (DOE #262, 1977:9-10). On Rongerik, seven fallout radionuclides were commonly found in the surface soil samples, and “pandanus and coconut samples contained fallout radio nuclides Cs-137 and Sr-90. The edible fruit of the Pandanus had the highest Cs-137

values” (DOE #262, 1977:10-11). On Rongelap, five gamma-emitting radionuclides were easily measured in samples, and radionuclides were found in the fish, plants and soil samples, including “significant fallout radionuclides” detected in the clams (DOE #262, 1977:12). This study concluded that:

Sr-90 and Cs-137 are dominant in the terrestrial environment and in addition, Am-241 and 239, Pu-240 are also important in the soil from Rongelap atoll, Cobalt 60 and 55 Fe are predominant in the marine environment” (DOE #262, 1977: 27).⁹⁶

Bioaccumulation of radioisotopes not only occurred in terrestrial realms, but in marine ecosystems as well. Surveys of the plants, animals, soil and water in 1955 indicated that some of the “highest concentrations of internally deposited activity were found in marine specimens taken from the northern Rongelap lagoon” (DOE #335:11). Based on oceanographic surveys and water sampling after the Castle series “one conclusion evident from these [surveys] is that total doses of 250R or more could have been accumulated throughout an area of about 5,000 square miles” (DOE #161:53). The movement of fish and marine foods throughout the atoll and a 5,000 square mile area of marine exposure meant that the Rongelapese consumed radiation from their marine environment.⁹⁷

United States researchers monitored open sea marine plankton and its role in transporting fallout in the marine food chain (DOE #34:17). Researchers observed that plankton was “the most sensitive indicator of radioactivity in the sea” (DOE #332:55). Radiation readings in plankton were considered “representative of that available to marine food chains” (DOE#348:64). In a 3,300-mile survey area in the Pacific Ocean, “radioactive materials were found in the plankton samples from every station” (DOE #332:9).⁹⁸

By 1958, university researchers discovered that fish may be concentrating radioactivity by as much as “a thousand fold” because of the radioactive plankton they consume (DOE #348:59)

similarly to the way that radiation bioaccumulates in the coconut crabs. Researchers also observed that “the lagoon would tend to hold radiation within its system of circulation” (DOE #380:85) and that radiation would concentrate in the lower levels of the lagoon where fish, such as the sturgeon fish -- a species routinely consumed by the Rongelapese -- would concentrate high levels of cesium (DOE #380:118).⁹⁹

According to a 1960 report by the University of Washington, “the most important sources of exposure to people living on Rongelap... are from internal deposition of radioisotopes from certain elements in the human diet, and from long term occupancy of islands having external radiation dose rates higher than natural background” (DOE #361, p.2). As plants uptake radiation from the environment and animals consume plants and small animals, radiation concentrates and moves through the food chain. University of Washington researchers involved in the radiation ecology studies at Rongelap determined that the highest concentrations of radiation were found in the herbivore and omnivore species of fish, such as the parrotfish (DOE #340, p.145), a fish frequently consumed by the Rongelapese.¹⁰⁰

Fish is one of the most critical food sources and the main source of protein. As late as 1962, “the highest levels of gross beta radioactivity were found in samples of algae, fish liver and muscles, and sea cucumber muscle” at Rongerik (DOE #299:11). Increases in gross beta radioactivity in fish were measured on Rongelap between 1954 and March 1958 (DOE #292, DOE #312). A 1982 study found that with the exception of coconut, fish was the primary food consumed by the Rongelapese because it is categorized as an atoll area with excellent fishing (LLNL, 1982).¹⁰¹

From radiation levels monitored in the bird populations, United States Government researchers concluded that the fishing area in southern Rongelap where the people were resettled

had higher radiation concentrations than fish in the restricted northern islands. Researchers also found high concentrations of radiation in birds, a terrestrial food source consumed by the Rongelapese. The birds from southern Rongelap had higher levels of radiation than birds from the north of Rongelap (DOE #342). According to researchers, this “unexpected” finding of “higher levels of radioactivity in the tissues of the southern birds suggest the availability of a supply of food fish with a higher average radioactive content in the southern area compared with that of northern Rongelap” (DOE #342:43). Unfortunately, fish and birds were staples of the Rongelapese people.¹⁰² In the mid-1990’s the RMI Nationwide Radiological Survey tested thousands of soil, plant, and occasionally marine samples collected throughout the nation and confirmed the existence of unsafe levels of radiation at dozens of islands.¹⁰³

The Rongelapese observed that many species of fish that did not cause fish poisoning before the nuclear tests became poisonous afterwards, and some species were poisonous in some locations, but not others. Some scientists have suggested a relationship between fish poisoning and nuclear testing with damaged reefs supporting abnormally high numbers of the plankton *Gambierdiscus toxicus*, a dinoflagellate that produces ciguatera toxin. Fish feeding on the reefs absorb this plankton, ciguatera toxins accumulate in the fish, which in turn are eaten by larger fish that concentrate the ciguatera toxin in their flesh. Humans who eat these fish suffer from vomiting, diarrhea, loss of balance, and, rarely, death. The Marshall Islands and French Polynesia (the area where the French Government tests nuclear weapons) have the highest incidence of fish poisoning in the Pacific (Ruff, cited in May 1989: 249).¹⁰⁴

Reports of increased incidence of fish poisoning among the Rongelapese were dismissed by United States researchers who argued that fish poisoning had been known to occur before the nuclear tests. Despite their knowledge of high levels of radioactivity in locally caught fish,

United States Government scientists consistently dismissed the possibility of a link between rising incidents of fish poisoning and radioisotopes in the marine food chain (See Robert Conard Medical Survey narrative report for March 1959; and 17 April 1961 letter from Robert Conard to Courts Oulahan).

Similarly, Marshallese reports that they experienced blisters in their mouth when they ate arrowroot were dismissed by Medical Survey scientists, who explained that it is because the people did not know how to prepare arrowroot correctly that the blistered mouths occurred (DOE #400: March 1961 memo; see also the 17 April 1961 letter from Robert Conard). Other complaints of illness from eating food reported by the Rongelapese were blamed on the fact that the Rongelapese eat non-refrigerated foods (DOE #429, part I: 231.)¹⁰⁵ Yet, the Marshallese people had been preparing and eating unrefrigerated local foods for centuries without experiencing blisters or sickness.

Ezra Riklon (former medical officer for the Trust Territory of the Pacific): *I know that during these times (after resettlement) the common complaint – because I was the one who translate – after they eat arrowroot, they always developed burning sensation of the throat, and constriction of the throat which caused them to have difficulty in breathing... and then some of them develop rash, and nausea and vomiting...*

After eating them (arrowroot) they complain to Dr. Conard (from Brookhaven). And he said: “Oh, this is not unusual.” Even – because at that time, all over the Marshall Islands there was fish poisoning – every atoll mostly. And these are the symptoms: nausea, vomiting, (inaudible) – this is normal. So, it was, I believe it was Dr. Conard that said this may be due to fish poisoning. But these people say: “I never eat fish, I eat arrowroot. And after that, I develop this. And every time I eat arrowroot, we always get sick.” And he (Dr. Conard) said: “Every people who eat arrowroot, they will all get sick.” Because he said: “Oh, maybe this is allergic to food or whatever you eat.” We said, “Well, if it was allergy, why every people who eat arrowroot always get sick? If it was around the same thing, why don’t some people [get sick] ... but not all people? Not all people are allergic to some kind of food, but not every people.” But we – every time these people eat arrowroot, they always get sick I noticed (August 18, 1994, Holly M. Barker, Majuro).

As carefully documented by government scientists, the people of Rongelap were consuming contaminated foods, and ethnographic evidence suggests that men, women, children and the

elderly were exposed differently because they eat more or less of certain local foods. For example, babies and the elderly tend to eat softer foods such as boiled pandanus. Also, women tend to suck on the bones and eat the organs of fish while men eat more of the flesh. Surveys of radiation levels in fish found high levels of radioactivity in the liver and viscera of fish (DOE #340:8)¹⁰⁶ -- the parts of the fish that are often consumed by women. This could lead to a greater consumption of organ and bone seeking radionuclides in women.

Exposure to contaminated foods was widespread, as food from Rongelap was distributed throughout the Marshalls. The Marshallese depend on their neighbors and families to exchange food. Implicit in this notion of exchange is the need for people to work together to prepare food. Most frequently, people cultivate one type of food and trade it for other types. Because food preparation in the Marshall Islands is labor intensive, people benefit from an economy of time by exchanging food sources. The presence of food resources in Marshallese communities expresses the well being of the communities. For this reason, the sharing of food is an important component of group health and in keeping the community together (Pollock, 1992).¹⁰⁷ There is an obligation for workers to share their food with their leaders at least once a year, usually at breadfruit harvesting time. Because food resources on Rongelap Island alone were not adequate to provide for the people residing on the island or for customary distribution, the Rongelapese used the small islands in the north to collect and distribute food (Advisory Committee Discussion, March 3, 1999). The northern islands of Rongelap are approximately 10 times as contaminated as the southern islands, and Cs-137 rates in coconut, pandanus and breadfruit from the northern islands can increase exposure by a factor of 8 to 32 (NRC 1994:83).¹⁰⁸ Thus, exchange of food resources from Rongelap led to the exposure of family members and *iroij* on distant islands:

Mike Kabua: *Contaminated foods from Rongelap were shared with [people on] Ebeye and Majuro. You can't ignore your relatives in the urban areas because we have to share all food...*

Iroij visits to Rongelap after 1957 were difficult. The people were required to give food to their iroij even when the food was contaminated, such as coconut crabs, because of the cultural importance. People didn't want to give contaminated food to the iroij, but they had to. By the same token, the iroij didn't want to accept the contaminated food, but had to. The iroij was scared of eating coconut crab, but it is so important to give coconut crab to the iroij that the iroij could kick people off the land for not giving it to him. The people were also afraid the iroij would reject the food (March 2, 1999, Advisory Committee meeting, Majuro).

DOE studies also documented a clear presence of radiation in the well and cistern water sources the Rongelapese depended on daily for survival. In 1957, the year the United States Government resettled the Rongelapese, researchers determined that the contamination level found in Rongelap's water was higher than reported in earlier surveys (DOE #356). In 1960, a report by the University of Washington found the highest levels of Sr-90 in the cistern algae (DOE #361:2) taken from the water sources the Rongelapese depended on for survival.¹⁰⁹

In addition to the consumption of radiation through food and water sources, inhalation is another major pathway for radiation exposure (NRC 1994:68).¹¹⁰ The Rongelapese inhaled radioactive fallout from the Bravo test in 1954. After resettlement, the Rongelapese were vulnerable to the inhalation of radioactive dust resuspended in the air from ground moving activities with different activities among men and women contributing towards different levels of exposure. For example, women often use coconut husks to fuel cooking fires, while men burn palm fronds and other vegetation in cultivation areas. In April 1999, the Rongelap community revisited their home island to find a very dusty, dry island. Walking around Rongelap Island in conjunction with this project, researchers and informants were literally covered with black dust. People pulled their shirts over their mouths for fear of breathing contaminated soil. People also noted extreme changes in the vegetation and expressed concern that observed changes were the

long-term consequence of radioactive contamination. They were surprised and dismayed to see yellow, dry, and barren plants and trees-- few fruits were found on the coconuts, pandanus and other food-producing trees.

Radiation deposited in the soil from the weapons tests leads to both internal and external exposure in human beings: “soil contamination provided the basis for human exposure in two ways. Radiation that emanated from the ground or standing vegetation led to external dose. Radiation that emanated from food and water into the human body were responsible for internal dose” (DOE #50:20). In addition to the internal and external pathways of human exposure to radiation in the soil, “intake through the skin can be either through the intact skin or through wounds. Of particular interest in the Marshall Islands resettlement is the potential for uptake from contaminated soil” (NRC 1994:65).¹¹¹ Radiation scientists were especially concerned about children and exposure to radiation from soil:

One of the key exposure pathways for plutonium may well be infants eating contaminated soil. All over the world, infants crawl on the ground and eat dirt. Since the plutonium on Rongelap does not seem to be equally distributed, an infant could ingest a small amount of soil with one bite containing what one could call a ‘hot spot.’ Another exposure pathway could be direct uptake of plutonium into the bloodstream with wounds (Franke 1989:9).¹¹²

<Insert figure 1. Levels of Transuranics on Rongelap Island as Compared to the Northern Hemisphere>.

Human ecological studies became an important component of the United States Government research on radiation effects in Rongelap, and scientists recognized that “protracted exposure of Marshallese occurred after people returned to the contaminated areas” (DOE #430). Researchers noted with concern the short transfer of radionuclides in the soil, plant and animal cycle (DOE

#348:101) that the Rongelapese depended on for survival. Clear linkages were established between the levels of radiation found in plants and the levels of radiation found in animals that consume the plants. For example, the extraordinarily high levels of found in the organs of rats on Bikini and Enewetak “were roughly in proportion to the Cesium levels in the plants on the various islands [as] Cesium-137 is apparently concentrated in the muscle, livers, kidney, gut, skin, and bone” (DOE #349:45). Concern was expressed by researchers about “the bone seeking elements likely to be the major cause of hazard for long-term internal effects” (DOE #349:97). This short transfer caused researchers to worry about their own health and safety on Rongelap, an atoll considered “dangerous to field research work” particularly because of the increased risk of future miscarriages (DOE#429, part I:372).¹¹³

In the plants exposed to radiation, at a certain point, “cell division ceased and the cells enlarged and took on an abnormally mature appearance” (DOE #340, Appendix 9). Interestingly, this corresponds with the hydatiform molar pregnancies experienced by Marshallese women after the testing. These pregnancies called “grape babies” by the Marshallese, result when cells stop dividing and swell to the size of grapes (Alcalay, ACHRE).¹¹⁴ The enlarged cells attach themselves to the uterus of the women and are often miscarried several months later, giving the impression of a birth to grapes:

Almira Matayoshi: *I was pregnant when they dropped the bomb (Bravo). I was flown off of Rongelap with the other pregnant women and the elderly people. The rest of the people left on the boat. I gave birth to Robert on Ejit, and he was normal.*

The child I had after Robert, when we had returned to Rongelap, I gave birth to something that was like grapes. I felt like I was going to die from the loss of blood. My vision was gone and I was fading in and out of consciousness. They emergency evacuated me to Kwajalein and I was sure I was going to die.

After the grapes, I had a third child. It wasn't like a child at all. It had no bones, and was all skin. When I gave birth they said: “ak ta men en?” (what is that thing?). Mama said “uror” (a term denoting exacerbation). It was the first strange looking child that people had seen. I was the first.

That time was the worst time in my life. The two times I gave birth to those things was the worst suffering of my life. I feel both angry and embarrassed. Many of the children born on Rongelap died. Now we think our children need medical attention, but they (the U.S. Government) won't take care of them (June 13, 2001, Holly M. Barker, Honolulu).¹¹⁵

While the United States government continued to assure the Rongelapese that living on their atoll presented no threat to their health, they were evidently concerned about the ill effects of short-term exposures to their own workers, as indicated in the June 27, 1977 examination and analysis body burdens of a Peace Corps worker who spent eight months on Rongelap teaching elementary school (1975-1976), three months on Majuro, and then an additional nine months on Rongelap (1976-1977):

She mentioned that she did swim in the lagoons "a bit" although this practice was generally forbidden to women. She lived in a plywood dwelling and ate rice, flour, fish, coconut meat and coconut crabs. She is 25 years old, does not smoke ("maybe occasionally") and has never had nuclear medical procedure involving the administration of any radionuclide (Cohen letter to Conard, 1977).¹¹⁶

Urine samples and measurements from the whole body counter found the presence of Cesium-137 in the Peace Corps worker (measured body burden of 45.2 nci).

In addition to information from Rongelap, researchers were also aware that human populations were ingesting large amounts of radiation from the environments of other areas in the Marshall Islands, most notably Bikini. In a 1976 letter to James Livermen, Assistant for Environmental and Safety at the Energy Research and Development Administration, Dr. Robert Conard noted:

As you know, by copy of Ed Hardy's letter to me of 7-6-76, the repeated plutonium analyses on the urine samples of people living in Bikini obtained last April again showed the same levels previously reported in his letter of March 26, 1976. Disturbing also was the finding of similar low levels of plutonium in the urines of residents of Rongelap Atoll. One wonders if perhaps people living in other areas of the Marshalls, not directly

*involved in the fallout, might also show increased levels because of proximity to the proving grounds. We intend to check this.*¹¹⁷

Despite Conard's intentions, a nation-wide survey has never been accomplished, though documents disclosed in the 1990s clearly indicate nationwide exposure to significant fallout.

Throughout their stay on the contaminated atoll the Rongelapese expressed concern that they had been returned to a contaminated setting and that they were suffering from repeated incidents of fallout from additional weapons tests. In 1959, Rongelap Magistrate John Anjain formally voiced his suspicions that people were allowed to consume foods contaminated by radiation, and recorded his concerns at that time in his Magistrate's record book. On the occasion of a 1959 visit of the United Nations Mission to Rongelap, Anjain asked:

What is the difference between coconut crabs (which became restricted in 1958) and other kinds of foods? Why are crabs bad, but not other foods? Like the crabs, pigs also eat things from the ground, so people must eat poisonous pigs! (Anjain, 1959:12, see also Conard notes on this question on page 2 of his February-March 1959 survey report).

Comments from an oral history interview with James Robertson, a doctor who examined the Rongelapese after their initial exposure to Bravo, in subsequent medical surveys, and used Rongelapese subjects in procedures and experiments at Brookhaven National Laboratory provides an after-the-fact answer to Anjain's questions:

*...we couldn't really measure the radiation exposure because the external gamma rays don't leave any residual radioactivity. So that had to be determined by more indirect methods. But what we could measure was the radioactivity that had gotten into the body from their ingesting contaminated food. We had a gamma ray spectrometer that could distinguish between the peaks, and we could tell what [peaks were signatures of what elements] and we made records of this (interview by Michael Yuffee and Prita Pillai, 1995).*¹¹⁸

Summary of Consequential Damages

Living in a contaminated setting meant cumulative exposures to individuals as radiation moved from the soil, to the plants and animals, and through the food chain. The United States Government monitored the movement of radionuclides concentrated in the marine and terrestrial foods as it moved through the ecosystem and the bodies of the Rongelapese, and purposefully failed to warn them of the presence of radiation in the food, soil, water, fish and local environs, or restrict their consumption of local foods. As a result, the Rongelapese suffered continual discomforts of consuming contaminated food, and their health continues to be affected from the cumulative effects of these exposures.

10. Degenerative Health and Healthcare Issues on Rongelap

From 1957 when the Rongelapese were resettled on their homeland to 1972, AEC and the AEC's successor, the Department of Energy (DOE), conducted annual medical exams of the Rongelapese. After the September 1972 discovery of leukemia in Leko Anjain, the teenage son of John Anjain, the DOE initiated twice-yearly exams for the population. Medical survey visits involved documentation of conditions, harvesting of samples for various biomedical research studies, and -- after thyroid problems were identified in the 1960s -- treatment for specific radiation-related ailments. As noted in the Advisory Committee on Human Radiation Experiments (ACHRE) review: "Primary case, however, remained inadequate. There were serious epidemics of poliomyelitis, influenza, chicken pox, and pertussis, all of which, according

to Dr. Conard, were imported into the Marshalls by the U.S. medical teams” (ACHRE 1995:593).

In some cases the serious epidemics were predicted and, if requests for vaccines had been met, preventable. For example Dr. James P. Nolan writes in a June 18, 2001 letter published in the New York Times:

*In the mid-1950's, as a medical officer in the Navy, I participated with a team from the Brookhaven National Laboratory in examining inhabitants of an atoll who were irradiated by fallout from a poorly planned nuclear test that left their island uninhabitable. Less well known is the occurrence of a severe outbreak of polio in the islands in the late 1950's. This outbreak occurred several years after the mass vaccination of our own population. Despite being a United Nations trust territory under United States control, the Marshall Islands natives never received the polio vaccine. And despite my inquiries to the Department of Interior at that time, no explanation for this inexcusable health oversight was given.*¹¹⁹

Review of DOE archives finds that in January 1958 several cases of polio were reported in the Marshall Islands and an order was issued for all military personnel participating in the 1958 Operation Hardtack to be vaccinated for polio. The failure to provide vaccines for the Marshallese meant that by 1963 the Medical Survey team found in Rongelap a serious epidemic of poliomyelitis Type I producing 22 paralytic cases in children, and 3 cases in adults, with one death.¹²⁰

The Rongelapese complained bitterly about the medical survey exams and procedures from the beginning, saying that they felt like guinea pigs for the United States to pry and prod rather than patients with healthcare concerns. Marshallese complaints that their healthcare needs were not being treated was acknowledged in a 1958 letter by Robert Conard, who suggested the use of placebos:

I found that there was a certain feeling among the Rongelap people that we were doing too many examinations, blood tests, etc. which they do not feel necessary, particularly since we did not treat (emphasis in original) many of them. Dr. Hicking and I got the

people together and explained that we had to carry out all the examinations to be certain they were healthy and only treated those we found something wrong with. I told them they should be so happy so little treatment was necessary since so few needed it...etc., etc. Perhaps next trip we should consider giving more treatment or even placebos (ACHRE 1995:593).

Marshallese often use songs to express difficult emotions. The callous treatment by U.S. doctors and the sense of being passed around from one doctor to another for examination was captured

by the Rongelapese in a song:

*Rube im kalikar ialin jen Robert non LoRauut
Bunrokean ko ion tol ien wot Lomejenma
Bun-Nineaan ko ion tol lanin im raan dron
Jen na ubon im ban ke kim jo ro-koean non Laukukot
Oh Lotalim ej jutak wot
Jekron bwe Labija ej watch raan im bon*

*Show the way from Dr. Robert (Conard's) examination room to "LaRaut" (Mr. Urine Collector)
Over the hill to the right is "Lomejenma" (Mr. He's So Close When He Examines Ears, Eyes, Nose, Throat That He Can Almost Kiss His Patients)
Over the hill to the left is Laninimrandron (Mr. Call the Numbers or Names of People and Escort Patients to See Doctors in the Examination Rooms)
From the chest to the back is examined by Laukukwot (Mr. Put the Patients on Rotating Equipment)
Oh Lotalim (Dr. Touching and Examining Both Internal and External Parts) is at ease while LaPija (Mr. X-ray Specialist) is processing film day and night.¹²¹*

By 1972, the Rongelapese were so angry about the experimental nature of the medical program that they refused to host a DOE medical survey visit scheduled for the spring of 1972 (J. Anjain, p. 97).¹²² Their complaints did not go unnoticed by the international community, and when exams were continued in September 1972, they included four medical observers who reported back to the Congress of Micronesia. It was during this survey that, after 18 years of intensive medical research, some effort was made by Medical Survey staff to talk to the

Marshallese about exam procedures and to advise territorial health staff about patient health needs:

*In the interest of trying to promote a better communication between examining doctors and the Marshallese examined, an attempt was made at the completion of each examination to explain to the person through an interpreter the general results of the examination and possible treatment recommended. At each island clinical conferences were held by the physicians, including the medical observers, Dr. Riklon and the health aide, to evaluate all cases examined and to recommend treatment and disposition. In some cases, the health aide was advised as to further treatment.*¹²³

It was also during the September 1972 survey that Leko Anjain was recognized as exhibiting the symptoms of leukemia. Shortly thereafter, Leko, along with other Marshallese patients who had thyroid nodule diagnoses, was sent to Brookhaven National Laboratory in New York for further study and treatment. Acute myelogenous leukemia was diagnosed. Other Marshallese patients received treatment and were sent home. Leko Anjain remained in the United States to undergo chemotherapy, transfusions, and related procedures. He died on November 15, 1972 at the National Institute of Health at Bethesda, Maryland.

A January 1995 oral history interview with Dr. James Robertson provides possible insights on the experimental nature of leukemia treatment at that time. In this interview excerpt, Robertson refers to his work with Dr. Cronkite, one of the Brookhaven National Laboratory researchers responsible for the monitoring, study, and treatment of Marshallese patients:

Robertson: *Dr. Cronkite is a hematologist. I did work with Cronkite. A thing that he got me involved with was effects of radiation on the survival of red blood cells. You asked if we treated leukemia at Brookhaven, and I'd forgotten about this. A possible way of treating leukemia was by what they call extracorporeal irradiation of the blood. So what you tried to do was, you send the blood through this machine that had a radiation source in it. I designed the radiation source for his extracorporeal irradiation machine. The idea was to irradiate the blood so that you'd kill the white cells, which are very susceptible, but then you'd also damage the red cells. So to a certain extent, a study that I got involved in was a dose and effects [study] on the red cells in connection [with] extracorporeal irradiation. I don't think extracorporeal irradiation ever developed outside of the research laboratory into a treatment for leukemia, but it was an idea.*

Yuffee: *Was it tested on humans?*

Robertson: *Oh, yes.*

Yuffee: *Without much success?*

Robertson: *Well, there was success of a sort, in that it would decrease the lymphocyte 105 population without too much red cell damage. But the thing is, the red cells then are being regenerated at such a rapid rate that it didn't have any permanent effect.*¹²⁴

A Newsweek reporter who shared a room with Lekoj prior to his death observed that:

Lekoj spends a good deal of his time curled up in a ball on his bed, wrapped in a blanket, only his curly black hair and his brown skin showing above the blanket. He speaks very little English, but he grins broadly, showing strong white teeth, when anybody smiles at him... 'How are you feeling?' I asked Lekoj this morning, as I do most mornings. 'No good. Deezy,' said Lekoj. The powerful chemicals he is taking cause an acute nausea... Lekoj gets blood transfusions...

... (W)hy should this charming young man (age 19), who should be chasing fish or possibly girls in some sparkling Pacific lagoon, suffer this lonely and outrageous fate, and by man's doing, not by God's? (Stewart Alsop, Newsweek, October 30, 1972).

A February 1974 report presented to the Fifth Congress of Micronesia by the Special Joint Committee Concerning Rongelap and Utirik Atolls summarizes some of these events and concerns, and reports the findings from a study examining the psychological effects of the 1954 incident, noting that:

*people do worry quite a lot as a result of their experience, not only for themselves, but also for their children... What is perhaps the most interesting fact is that the exposed and unexposed alike are still afraid to eat local food or live on their islands. It is as though the fear of illness from contamination persists in their minds like the residual radiation which still exists in the food chains and ecology of their islands (Compensation for the People of Rongelap and Utirik, 1974:32).*¹²⁵

The Congress of Micronesia report recommended compensation for a variety of illness caused by radiation, citing as justification:

concerning the giving of radioactive materials to patients... the prudent assumption is that all ionizing radiation to the patient is harmful. Consequently, the Committee position that whether or not 'damage' can be proven is irrelevant, since it is a fact that exposure occurred, and that since exposure to radiation is harmful, then it is highly probable that damage did indeed occur (ibid:29).

This report, and subsequent communications between the Congress of Micronesia and the United States Government prompted a number of actions by Medical Survey staff meant to diminish public attention and concern. Thus, later in 1974 Robert Conard attended a formal meeting on Rongelap Island meant to address questions raised by the Rongelap Fallout Survivors Association:

I would like to say a few words about the little bit of radiation that is left on Rongelap Island. Some of the people have been worried about radiation in the food. Some will not eat arrowroot flour because they believe that it contains "radiation poison." I would like to say that with the exception of coconut crabs from the northern islands of the Rongelap Atoll, all foods can be eaten...

... (In response to request to provide food at the time of examinations): *We had not been aware that so much time was involved in gathering food for the families... in the future, in view of this request, we shall attempt to serve prepared food to the members of the families on the day they come in for examinations...*

... (In response to questions concerning the need for thyroid operations on Shiko, a member of the "non-exposed" group): *We do not believe the unexposed Rongelap people will get any radiation sickness from living on Rongelap since there is practically no radiation left on the island.*

... (In response to questions of how much longer does the BNL team plan to continue their experiments on Rongelap): *These examinations should not be called experiments. In no way have we carried out experiments on the people* (Meeting with Rongelap People April 1974, report by Robert Conard).¹²⁶

Despite these efforts to placate fears, the Rongelap community continued to express anger and concern over their experiences as human subjects in AEC research. The sentiments of the community were captured in an April 9, 1975 letter to Dr. Robert Conard by Nelson Anjain who was Magistrate at the time:

I am writing to you to clarify some of my feelings regarding your continued use of us as research subjects.

I realize now that your entire career is based on our illness. We are far more valuable to you than you are to us. You have never really cared about us as people -- only as a group of guinea pigs for your government's bomb research effort. For me and for other people on Rongelap, it is life which matters most. For you it is facts and figures. There is no question about your technical competence, but we often wonder

about your humanity. We don't need you and your technological machinery. We want our life and our health. We want to be free.

In all the years you've come to our island, you've never really treated us as people. You've never sat down among us and really helped us honestly with our problems. You have told people that the "worst is over," then Leko died (the author's nephew). I don't know yet how many new cases you'll find during your current trip, but I am worried that we will suffer again and again.

I'll never forget how you told a newspaper reporter that it was our fault that Leko died because we wouldn't let you examine us in early 1972. You seem to forget that it is your country and the people you worked for who murdered.

... I've made some decisions that I want you to know about. The main decision is that we do not want to see you again. We want medical care from doctors who care about us, not about collecting information for the U.S. government's war makers.

We want a doctor to live on our island permanently. We don't need medical care when it is convenient for you to visit. We want to be able to see a doctor when we want to. America has been trying to Americanize us by flying flags and using cast-off textbooks. It's about time America gave us the kind of medical care it gives its own citizens.

We've never really trusted you. So we're going to invite doctors from hospitals in Hiroshima to examine us in a caring way.

We no longer want to be under American control. As a representative of the United States, you've convinced us that Americans are out to dominate others, not help them. From now on, we will maintain our neutrality and independence from American power.

There will be some changes made. Next time you try to visit be prepared. Ever since 1972 when we first stood up to you, we've been aware of your motives. Now that we know that there are other people in this world willing to help us, we no longer want you to come to Rongelap.¹²⁷

While angry about their mistreatment in the medical survey program, the Rongelapese also realized that they had no choice but to accept continued exams, as they needed access to medication, such as the thyroid replacement medication used to keep their bodies regulated:

Rokko Langinbelik: *One of the worst things for me is that they told me to take my medication for my thyroid every day and not to forget a day because it will shorten my life. This really upsets me because sometimes I forget and I don't want to shorten my life (June 13, 2001, Holly M. Barker, Honolulu).*

The Medical Survey continued to monitor biophysical change in the Rongelapese community, and began to treat some of the emerging ailments that they identified as radiation-

related. Beginning with samples taken immediately after exposure to fallout from the Bravo test, the United States Government monitored cesium-137 and other isotope body burdens present in the Rongelapese – burdens that were increasing over time. The United States Government scientists did not report the increased burden to the Rongelapese (Anjain, 1989). Their data indicate that following resettlement in 1957 “the average adult male Rongelap body-burden rose 56% for adult men and 82% for female children” (DOE #277:4). In the case of strontium-90, United States researchers determined that the human body absorbed roughly “70 percent of the concentration in the topsoil on which people live” (DOE #361:8).¹²⁸ The first measurements of plutonium in the urine of the Marshallese were identified in 1973. Because the readings were extremely high, researchers could not conclude “whether measured plutonium concentrations were excreted from the bodies or simply from some grains of the island's sand in the sample” (Franke 1989:7). Whether the plutonium was already ingested, or whether it was still detectable in the environment, plutonium exposure was still a recorded threat to the Rongelapese.

In 1982, scientists contracted by the United States Government submitted a paper to the *Journal of Health Physics* reporting that “the body burden of Rongelap people exceeded allowable levels” (cited in Franke 1989:7).

In 1989, scientists reported that the “soil on Rongelap Island contains about 430 times more transuranics (plutonium and americium) than the average transuranic levels for the Northern Hemisphere” and, on average, “one gram of soil from Rongelap Island contains more plutonium than a North US citizen carries in his body from worldwide fallout” (Franke 1989: 3, 6).

In 1994, the National Academy of Science reported the presence of five isotopes that are of concern to people residing on Rongelap Island: strontium-90, cesium-137, plutonium-239, plutonium-240, and americium-241. “Of these, cesium-137 account for more than 90% of the

estimated [human] dose, strontium-90 provides the second most significant contribution at 2-5%" (NRC 1994:1).¹²⁹ Since these isotopes were of concern in 1994, it is apparent that the presence of these isotopes would have been of even greater concern in 1957 before nearly 40 years of depletion.

The exposure to environmental sources of radiation in the group resettled in 1957 has affected their health. One physician found a 63.6% male and 76.8% female percent of 1957 resettled Rongelap adults with medical problems (Bertell 1989:1). The higher incidence of female illness in the environmentally exposed is noteworthy given the startling lack of difference between incidence of medical problems in the men and women exposed to external radiation in 1954.¹³⁰ The Nuclear Claims Tribunal currently recognizes 35 medical conditions presumed to be the result of the Nuclear Testing Program (including leukemia; multiple myeloma; lymphomas; tumors of the salivary gland, parathyroid gland, brain; cancers of the thyroid, breast, pharynx, esophagus, stomach, small intestine, pancreas, bile ducts, gallbladder, liver, colon, urinary tract, ovary, central nervous system, kidney, rectum, cecum, bone; non-malignant thyroid disease; hypothyroidism; growth retardation due to thyroid damage; unexplained hyperparathyroidism; unexplained bone marrow failure; meningioma; radiation sickness; beta burns; non-melanoma skin cancer in individuals diagnosed as having suffered beta burns).

Not surprisingly, the Rongelapese were aware of the human health consequences of their internal and external radiation exposure. Many of their illnesses were outside the narrow parameters of United States Government research, however, which tended to focus on the thyroid, and the measurement of body burdens:

Catherine Jibas: *I was away from Rongelap in 1954. I returned to Rongelap... in 1957 and I saw friends and relatives who were afflicted with illnesses unknown to us. Their eyesight deteriorated, their bodies were covered with burn-like blisters, and their hair fell out by the handful* (August 23, 1994, Holly M. Barker, Majuro).

Aruko Bobo: *[P]rior to his (Hiroshi's) death, he became insane and would wander around the island frightening everyone he met. At times he would ram his head continuously against anything near at hand and thrash around exhibiting signs of great pain. I think he finally died of the pain he felt in his head.*

Nerja Joseph: *People died of radiation but we had no doctors or charts to prove that it was radiation.... I have scars on my hands now. No medicine will take them away, Marshallese or American. They itch and they are bothersome. My thyroid is gone. I have to take medication every day. When I take too much medication I have too much energy -- I can't sleep. I walk around and around, but I can't tire myself out to rest. When I don't take enough, I gain weight and get lethargic (March 8, 1999, Holly M. Barker, Majuro).*

Jimako Kobnij: *They found something behind my stomach. They told that to the doctor. I was operated on and they showed it to me. It was kind of shiny. They removed a black, hard, shiny object from just under my stomach. Maybe it came from the poison. After my surgery, my health was bad (March 18, 1999, Holly M. Barker, Ebeye).*

Dorothy Amos: *It's really sad. Now we go to doctors. Many have thyroid problems. Some don't. Some have had operations twice [on their throats]. Some three times. We take medicine to help our thyroids. One pill every day. Don't forget one day -- keep taking it, keep taking it. Sometimes I forget, but I'm not supposed to miss a single day... Sometimes my throat really hurts, all the way down the esophagus. There are times when my head goes numb, my leg, my hand (March 18, 1999, Holly M. Barker, Ebeye).*

Because children have smaller bodies than adults, a dose of radiation causes a larger body burden in children than in adults. For this reason, as well as the fact that children's bodies are in the process of developing and growing, born and unborn children are at great risk from radiation exposure. Both the United States Government and the Rongelapese maintained concerns about Rongelapese children exposed to radiation from Bravo and children who were born and raised on Rongelap Island (DOD #26).

United States Government reports demonstrate concern about "several forms of cancer and genetic disorders in offsprings" (DOE #187:179).¹³¹ United States Government researchers also determined that genetics are affected by cumulative exposure to radiation such as exposure to fallout from multiple weapons and exposure through the air, soil, water and food on Rongelap: "It appears that the effects of radiation in the area of genetics are cumulative, that as an

individual has more and more exposure you can expect greater and greater probability of these changes -- double the dose should double the probabilities" (DOD #26:4).

A year after the Rongelapese were returned to Rongelap Island, United States Government researchers studied how "radiation to the gonads will produce invitations in germinal cells"... it was calculated that if... "a dose of 100r is delivered to the gonad of each member of the population due to fallout radiation... for 100r there will be one lethal invitation in 5 conceptions" (DOE #348: 90-91).

Despite these expressed concerns over intergenerational effects, formal response from AEC and BNL scientists to Marshallese complaints that their rate of miscarriage and abnormal births were linked to radiation exposure was met with denials, typically citing the work of James Neel. For example, an October 1976 letter to Congressman Balos from Dr. James Livermore concerning genetically-inherited radiation effects in children born of exposed Marshallese parents cites Neel: "...there is no evidence that genetic change was induced in children born of the exposed Marshallese children any more than there is unequivocal evidence of damage in the children born of the exposed Japanese."¹³²

While exposure to ionizing radiation has long been suspected to increase mutation load in humans, scientific findings from research by James V. Neel and others on atomic bomb victims seems not to have yielded significant genetic defects. However, new research emerging from post-Chernobyl studies shows that small doses of radiation do produce genetic effects on human populations. In a study published in May 2001, children born to clean-up teams for the 1986 Chernobyl nuclear plant accident in the former Soviet Union were discovered to have an unexpectedly high genetic mutation rate when compared with siblings born before the accident. Children born to clean-up team families now living either in the Ukraine or Israel and conceived

after parental exposure to radiation were screened for the appearance of new fragments using multi-site DNA fingerprinting. Siblings conceived before exposure served as internal controls. External controls (non-exposed families) were also included in the study. A sevenfold increase in the number of new bands in children born after their parents Chernobyl exposure compared with the level seen in controls was recorded. A strong tendency for the number of new bands to decrease with elapsed time between exposure and offspring conception was established for the Ukrainian families. These results indicate that low doses of radiation can induce multiple changes in human germline DNA.¹³³

Regardless of the scientific arguments over statistically reliable indications of radiation-induced intergenerational effect, the Rongelapese have certainly experienced significant problems with pregnancy and abnormal births:

Almira Matayoshi: *There are so many kids who weren't properly formed when they were born. Many of the kids were tiny – very short. Kids like Mike, Julie, Carol, Kimo and Harry. Some of these kids just lie there. They don't know how to move, like Kimo and Carol. There was another kid who would bite trees, crawl and touch fires. He didn't know the difference. All the kids who were retarded died. These kids weren't alive for the bomb, but they had so many problems. We want DOE to take care of our kids, but they won't even though they have so many problems from the radiation (June 13, 2001, Holly M. Barker, Honolulu).*

Dorothy Amos: *Some of the children who were born were deformed. Their arms and legs are short. Nothing covering their brains. Still others were like "grapes." But some were not the (offspring of) poisoned people but they were the ones who went back in 1957 and after some years they also gave birth to those kinds. Doctor Conard said: "Sometimes there will be different things in your stomachs because you were exposed." There were lots of words like these words... Some kids go right into the fire or slam into you – they're missing something. One kid they tied him up but he died because he crawled in to the ocean and drowned. He just died on Mejatto. He was older, around ten years old. He looked okay, but something was wrong with his brain. His parents aren't the bomb people but they lived on Rongelap after 1957... Some kids live for a week or so. You see their brains. Their faces are okay, but their brains are scary. Their hands and feet come out of their torsos. They know how to breast-feed. They appear to be people, but they are different. We believed what DOE said that some of our kids would be born differently. Many children were this way... We came together to bury them because we knew and expected these kinds of kids. They gave birth on Ejit. It was like what, like grapes. What kind of children were those that appeared? One kid born on*

Rongelap his feet were flipped up so the soles faced up. His head was big and soft. A different kind of child. My eldest daughter might have a heart problem. Another child has a bone problem – the bone sticks out of his back. One extra finger was also removed (March 18, 1999, Holly M. Barker, Ebeye).

One physician found a connection to reproductive problems and past exposure that "adult Rongelap women, 16 to 34 years old in 1988, are more likely to have reproductive problems such as spontaneous abortions, still births or infant deaths if their parents were in the DOE 1954 exposed or comparison groups (post 1957 exposed)" than young women whose parents were not (Bertell 1989:3).¹³⁴

Medical studies of the Rongelapese found "about twice as many abnormally terminated pregnancies" in the Rongelapese in the first six years after resettlement (DOE #50). United States scientists projected that if radiation exposure is repeated in more than one generation, as for the Rongelapese community that lived on contaminated islands for almost 30 years, radiation exposure will create a genetic effect in the population (DOE #348:92). Medical survey scientists told the Rongelapese that unsuccessful pregnancies should be expected in this generation (interviews with Jimako Kobnij and Dorothy Amos, March 18, 1999, Holly M. Barker, Ebeye). These reports and projections were confirmed by the experiences of the community.¹³⁵

Catherine Jibas: *I returned to Rongelap... in 1957... It was around this time that I had my first pregnancy. My baby had a very high fever when he was delivered, and the attending health assistant conveyed his doubts as to whether my son would survive the night. He was so dehydrated from the fever that his skin actually peeled as I clasped him to me to nurse. The only thing we knew to do was to wrap him in towels. And so it was that I held him to my body throughout the night, changing the towels and willing him to fight for his life. He lost the fight just as dawn broke...*

My second son, born in 1960, was delivered live but missing the whole back of his skull – as if it had been sliced off. So the back part of the brain and the spinal cord were fully exposed. After a week, the spinal cord became detached and he, too, developed a high fever and died the following day. Aside from the brain deformity, my son was also missing both testicles and a penis. He urinated through a stump-like thing measuring less than an inch. The doctors who examined him told me that he would not survive. And sure enough, he was dead within a week. You know, it was heart wrenching having to

nurse my son, all the while taking care his brain didn't fall into my lap. In spite of his handicaps, he was healthy in every respect. It was good he died because I do not think he would have wanted to live a life as something less than a human...

The health assistant who delivered the child sent a message to Kwajalein, and I am certain those [U.S.] doctors came for the express purpose of seeing first-hand a live nuclear baby ("ajiri ebaam"). In fact, they flew in the very same day the message was sent... They did a complete physical [of the baby], took blood samples, and lots and lots of photographs (August 23, 1994, Holly M. Barker, Majuro).

It is clear that at least some U.S. Government researchers were interested in the abnormal births of the Rongelapese women, like Catherine. After the Marshallese health officer learned of Catherine's abnormal child and informed the U.S. doctors, the U.S. doctors dispatched him from Ebeye to see the baby:

Ezra Riklon: *I wrote to Dr. Conard about this. Because they asked me that – if there was any – they even tell me to talk to the Magistrate there if there were any abnormal babies. They should notify me personally so that I can go there and do whatever I can to study these babies. And I report only one abnormal baby. After she was born, she was born -- the baby was very funny looking. The legs and arms were there, but they were kind of larger than normal, and shorter than normal. You can see the body, but there was no skull -- and there was no skull except a membrane of the brain, but you can see the brain with your own eyes, you can see the brain is moving. And the baby, the heart was beating also... and the baby was quite shorter than normal. Kind of thick and big, you know... But you cannot see the skull... This baby, I wrote a complete letter to Dr. Conard about what I found during my physical examination. I took a picture of the baby in different positions, and sent it to Dr. Conard in Brookhaven (August 18, 1994, Holly M. Barker, Majuro).*

Ezra Riklon's 1994 comments are substantiated by his August 17, 1960 letter to Dr. Conard: *On August 16, 1960, 24 yrs. old Catherine gave a normal birth to a baby monster. Miss Catherine, as you probably know, is listed among the unexposed group... The physical examination of the new born baby revealed a baby monster possessing a trunk but only an imperfectly developed head, from which a large part of the brain and skull is lacking. The testicles and the scrotum were absent. The penis appeared smaller than normal. Large upper part of the brain and meninges were visible due to lack of cranial vault. The child was still alive and breathing normally during my examination, but unable to cry when pinched hard with a sharp needle. The best and closest diagnosis that I could think of is Hemicephalus or Hemicephalic Monster... Lots of pictures of different positions of the Monster were taken and blood specimens. I sincerely hope that you will get them soon.*¹³⁶

Linguistic evidence indicates that the reproductive problems experienced by the Rongelapese women did not occur before the testing program and their exposure to radiation. Instead of using Marshallese words to describe the illnesses, the interviewees apply descriptive terms from their local environment when talking about these birth anomalies, using words such as "octopus, grapes, hermit crab, dog" to describe the deformed children. If these reproductive problems existed before the testing program, they would have proper Marshallese names like other illnesses experienced by the Marshallese before the testing program, such as normally occurring *jibun*, or stillbirths.¹³⁷

Almira Matayoshi: *One person gave birth to something that looked like a dog (June 13, 2001, Holly M. Barker, Honolulu).*

Nerja Joseph: *In the years afterwards, one kid was born with a head like an octopus. Other kids never really grew and were very short (March 8, 1999, Holly M. Barker, Majuro).*

Aruko Bobo: *I know a boy, actually a young man now, whose head is so large that his body is unable to support it and his only means of getting around is to crawl backwards dragging his head along. Like the movements of a coconut or hermit crab. (August 27, 1994, Holly M. Barker, Ebeye).*

Reproduction problems and birth defects are now so common amongst the Rongelapese that every interviewee was able to describe problems suffered by their offspring. Every woman interviewed complained about experiencing reproductive problems. The Rongelapese believe these problems are directly linked to both the parents, and the children's exposure to radiation:

John Anjain: *There were 16 kids DOE found with low blood cell counts. Some kids died, some kids have severe problems. Like Julie whose mouth kept growing bigger. There were 19 kids that moved off of Rongelap. Only 2 or 3 are alive now. Those who are alive have problems (March 16, 1999, Holly M. Barker, Ebeye).*

The accounts by the Rongelapese correspond with Dr. Rosalie Bertell's testimony to the United States Congress regarding observations from her medical examination of the Rongelapese. In 1988 the percentage of Rongelapese adults with medical problems was 88.5%

for men and 88.6% for women and “among the children who were evacuated from the Rongelap atoll in 1985, there is a very high degree of ill health, with about 42% having medical problems. Medical problems which were identified only among the evacuated children were: multiple organ systems malfunctioning, autism, anemia, arthritis, arthralgia, epilepsy, Down’s Syndrome, facial asymmetry, loss of nasal bridge, and meningitis. Heart disease was diagnosed in 9.2% of the evacuated children” (Bertell 1989:1, 3-4).¹³⁸

Brookhaven scientists also documented a range of immediate and longer-term health consequences from radiation exposure, though they typically did not pass along their findings to the Rongelapese. For example, their research led to the conclusion that fetal or infant life was expected to be most sensitive to radiation exposure, but they did not notify the Rongelapese of their concerns (DOE #348:104-106).

Assumptions that radiation-related health problems were limited to those resulting from acute exposure and immediate effects of a specific event meant that Brookhaven scientists failed to recognize some of the more systemic medical consequences from radiation exposure. For example, Brookhaven scientists assumed that the thyroid was resistant to radiation. This assumption translated to a failure to look for and treat thyroid abnormalities in the Rongelapese (ACHRE, 1994: 589). Over time, researchers observed “markedly stunted growth” in Rongelapese children and suggested possible thyroid deficiencies (DOE #50:14). Follow-up research found “unquestionable damage to the thyroid gland, especially to those exposed below the age of 10” (DOE #50:15) and found that “nearly all the people exposed on Rongelap to fallout at less than ten years of age have developed nodules (benign tumors) of the thyroid” (DOE #1023:35).¹³⁹

Almira Matayoshi: *We didn’t have any retarded or short kids before the bomb* (June 14, 2001, Holly M. Barker, Honolulu).

Isao Eknilang: *When I heard about the deformed kids, particularly the ones in my family, I felt afraid and furious, I just wanted to cut them (the US Government representatives) up with a knife* (June 13, 2001, Holly M. Barker, Honolulu).

Jimako Kobnij: *One of my kids is mentally challenged. He (gender unspecified) was born in 1963. The child didn't walk until he was 5 years old... He stays with me. He gets mad sometimes. I will have to care for him because he has to stay with me. He gets upset and agitated when I do something he doesn't like. He went to school for the challenged. He still hasn't got to the Department of Energy doctors because they say they don't take care of our children* (March 18, 1999, Holly M. Barker, Ebeye).

The problems associated with reproductive health, congenital deformities, and degenerative health conditions have been all the more difficult to endure given the difficulties in accessing health care. After the community was returned to Rongelap in 1957, their medical needs were attended to by a local health assistant, with the exception of one yearly visit by Brookhaven National Laboratory. When Brookhaven doctors did arrive, they looked for specific signs of radiation illnesses they expected to see and ignored the complaints of the people (such as illness from consuming contaminated foods). During the 51 weeks of the year that Brookhaven was absent, the health assistant had to deal with unique and complex medical care needs. As noted earlier, a 1957 document from Jorulej Jitiam reveals his concern about problems he did not know how to treat, his fear that radiation was the cause of these problems, and a request for a trained doctor to visit Rongelap immediately.

The Rongelapese were justified in their health care complaints, according to an independent physician who visited the community in 1980. A sense of the degenerative effects produced by acute and long-term exposure to fallout in Rongelap is given in a July 15, 1980 report from Reuben Merliss, M.D. (accredited by the AEC to use radioactive isotopes in medical practice for treatment of thyroid disorders) to Gordon Stemple, attorney for affected communities. Merliss notes the condition of Rongelapese subjects as being:

- Vision. “remarkable frequency of visual difficulties...”

- Thyroid. “The frequency of thyroid tumors was shown by the examination of a number of patients who demonstrated thyroidectomy scars.” There is an “epidemic” of thyroid disease. People ran out of thyroid replacement drugs. Exams show many thyroid cancers, but this conflicts with what (BNL Dr.) Conard states. “There appears to be little doubt that the tumors, benign or malignant, are radiation-induced. There are just too many of them to be anything else. Otherwise one would have to postulate that the Marshallese had a remarkably high incidence racially of tumors of the thyroid, this existing before 1946, and the old people I spoke to denied this. They denied that prior to the bombs there was any particular epidemic of lumps in the neck.”
- Reproductive problems. There are an “unusual number of stillbirths or the birth of monstrosities.”
- It is clear that there is a spread of radiation from island to island by birds and fish.
- Diabetes. “When I spoke to the old people who remember the way the islands were before the nuclear testing, they all routinely deny that diabetes was a great problem for the inhabitants.”
- Impotence. There are some sexual problems among the males of the island, or among the females. A number of men from one atoll had told me that they developed a failure of sexual interest after the explosions, this persisting, and in several cases their families did not expand after the bomb blasts.” “[T]he testicles are in an exposed position, particularly in people who so commonly sit on the ground or squat as do the people of the Marshall Islands.”
- Hypertension. High incidence. 5% in average white American males, but possibly up to 40% in the Marshall Islands. Link between “inadequate space or, inadequate food, competition between them for sustenance and living space” and hypertension.
- Conclusion. “The follow-up care of patients with total ablation of the thyroid also appears inadequate. Some had stopped their medicine because of side reactions and appear hypothyroid in my eyes. No regular follow-up has been pursued to allow change of thyroid medication, or increase or decrease of dosage. A general feeling of distrust of the Treaty Trust and Atomic Energy commission physicians is wide-spread among the Marshallese. The people of the Marshall Islands I spoke to have no great faith in these physicians, do not consider them devoted to their interests, but instead representing the interests of the Atomic Energy Commission or the Trust Treaty authorities, and were reluctant to place their health in their hands... I am also impressed by the failure of the physicians to communicate findings and prognosis to the people of these islands. Each patient is entitled to have his questions answered. He should be told the nature of the lesion discovered, and, if he asks for it, a prognosis should be given. The doctor should, when he can, inform the patient of the cause of his illness. These basic rights of a patient have been in large part ignored in the Marshall Islands, and I found very few Marshallese who were acquainted with the nature of their pathology.”
- Need for “an improvement in diagnosis of hitherto unrecognized food-chain radiation caused diseases...”¹⁴⁰

In addition to feeling angry about their treatment as subjects, rather than patients, the

Rongelapese experienced profound humiliation, marginalization, and stigmatization as a result of

their injuries, and reproductive problems. These experiences occurred when people sought medical care with the DOE doctors in the public hospitals, were summoned for their exams by Brookhaven, when they sang in public, or even when they were walking down the street.

Norio Kebenli: *Our radiation exposure was so embarrassing. Whenever we went to the hospital to get any kind of care, people would always point at us, they knew who we were. Many people used to say things like: "don't marry the Rongelapese because they are sick and your kids will be sick." When people heard that the Utrikese were sent back to their islands from Kwajalein, people said that the Utrikese were sent back because they were getting radiation from the Rongelapese. The embarrassment still continues today. Last week during graduation, many kids from Rongelap graduated [from high school], but when they were asked where they are from they didn't say Rongelap (June 13, 2001, Holly M. Barker, Honolulu).*

Kobang Anjain: *As a kid it was particularly bad when the AEC used to come and pull us out of school. I went to high school at ECES, a Christian school. The AEC would come and pull me out of my classroom for my exams. The kids made fun of me and they would say: "Etal bwe jenaaj radioactive ippem" (Get out of here because we're going to get radiation from you). I could never blend in because the kids always remembered what happened to me, especially when the AEC turned up at our school. I lost friends because of what happened (June 13, 2001, Holly M. Barker, Majuro).*

Almira Matayoshi: *People didn't want to shake our hands for fear we would contaminate them. We were embarrassed to walk around where there were other Marshallese because they would say things like: "rej kamour kiraap" (they give birth to grapes) (June 13, 2001, Holly M. Barker, Honolulu).*

Summary of Consequential Damages

Living in an isolated, contaminated setting meant dealing with the pain, suffering, and hardships of a contaminated and poisoned food supply; fear and anxiety of additional exposures; sociocultural and economic damages associated with loss of access to the material means to sustain a healthy way of life; and, the psychosocial trauma of living life with radiogenic illnesses. The people of Rongelap were further burdened with difficulties of caring for the degenerative conditions associated with radiation exposure; the pain and suffering associated with miscarriages and the birth of congenitally deformed children; the difficulties of raising physically disabled children and caring for

increasingly feeble elderly; the fear and anxiety of additional exposures; the fear and anxiety of the intergenerational and other unknown effects of radiation exposure; and, the psychosocial humiliation, marginalization and stigmatization experienced by the population as a whole as a result of their nuclear victimization. The United States Government ignored complaints about the medical monitoring program, and routinely downplayed the effects of radiation through the use of a faulty control group.

11. Human Subject Research Experiences

Policies and priorities established in 1954 by the United States scientists and military officials emphasized monitoring and human subject research rather than treatment of the Rongelap people. These policies and priorities shaped the nature of medical attention in subsequent years on Rongelap. In 1954 the Rongelapese were told that medical survey “treatments” were important and necessary to their health. However, in 1954 and in the years since, numerous procedures and exams were conducted and samples obtained for a wide range of experiments that had little or nothing to do with their individual treatment needs. (For example, see descriptions of the Thyroid Reserve Study, and the Iodine Protein study of different ethnic groups involving the administration of I-129 in the Protocol for the 1974 Medical Survey, page 3-4).

In addition to documenting the health effects of human exposure to nuclear weapons testing, U.S. Government scientists purposely exposed the Marshallese to additional radionuclides. The White House Advisory Committee on Human Radiation Experiments (ACHRE) confirmed the existence of at least two radioisotope studies where Marshallese

citizens were used as human subjects in research without their awareness or consent. Documents released since the 1995 publication of the ACHRE Final Report provide further evidence of human subject abuse.

In one study reviewed by the ACHRE, a chelating agent (Ethylene diamine tetra-acetic acid, also known as EDTA) was administered to Rongelap subjects seven weeks after exposure to radiation from weapons tests. EDTA was normally administered shortly after internal radiation contamination to remove radioactive material. Given the delay in administering the chelating agent, there was virtually no therapeutic benefit envisioned. The stated purpose of this experiment was to mobilize and detect radioactive isotopes already present in their bodies as a result of their exposure to Bravo (ACHRE 1995).¹⁴¹ There were also adverse health risks associated with this experiment, as in the early 1950s several deaths occurred from kidney toxicity after EDTA treatment (dosage used at that time was about 10 grams per infusion, current recommended dosage is 3 grams).¹⁴²

In a second experiment discussed by the White House Advisory Committee on Human Radiation Experiments, Chromium 51 (Cr-51), a radioactive tracer, was given to ten people resettled on Rongelap in 1957. The purpose of this experiment was to determine whether anemia observed among the Marshallese was an ethnic characteristic or due to radiation exposures. Researchers argued that since these people were not present during the Bravo test, they were a viable control group who were not “exposed” to radioactive contamination. Chromium 51 was given without explanation or informed consent to tag red blood cells and measure red blood cell mass.¹⁴³ The White House Advisory Committee on Human Radiation Experiments noted that in this experiment “the tracer dose used would have posed a very minimal risk, but it was clearly not for the benefit of the ten subjects themselves” (ACHRE, 1994: 592). This conclusion of

minimal risk was based on ACHRE's assumption that the subjects were non-exposed Rongelapese.

In actuality, the Cr-51 received by the ten "non-exposed" Rongelapese subjects mentioned in the ACHRE report represents an additional burden to the already considerable exposure from consuming contaminated foods and living in a radioactive environment. Furthermore, the 1959 Medical Survey plan suggests that Cr-51 was administered to a "control" group and to an "exposed" group, totaling 20 Rongelap subjects in this experiment. Review of declassified documents raises the possibility that the Cr-51 experiment was also repeated on at least two other occasions in 1964 and 1965. Laboratory reports filed with Dr. Conard report Marshall Island blood volume data findings from 21 Rongelapese samples taken in 1964 and from 18 Rongelapese samples in 1965.¹⁴⁴

The 1959 Medical Survey research plans also included instructions for the survey team to conduct additional human experiments and procedures, including:

- Study thyroid uptake by giving Iodine 131 to 25 to 30 people being tested for serum iodine values. Give small amounts of iodine 131 and 18 hours later use whole body counter to determine thyroid uptake.
- Conduct whole body gamma spectroscopy on as many of the group being examined as possible. Plant, soil, marine, and urine samples may also be analyzed in conjunction with University of Washington group.
- Give one 5-grain tablet of ferrous sulfate daily to 34 people. Comparison will determine whether iron deficiency is a factor in lowered hematocrits. Serum iron used on those not receiving iron tablets.¹⁴⁵

In addition to experiments conducted on the Rongelap people during medical survey trips, some experiments were conducted on Rongelapese during visits to United States research labs and hospitals. An April 9, 1965 letter from Dr. Leo Meyer to Dr. W. Siri reports findings from the administration of tritiated water (a form of the radioisotope tritium) and Cr-51 on six people who had traveled from Rongelap to Brookhaven labs.¹⁴⁶ Tritium was used to measure total body

water, a factor of interest in determining the relative ability of the stomach to secrete iodine, bromine and other halogens.¹⁴⁷

In 1999, the Department of Energy acknowledged that Cr-51 and tritiated water clinical tests conducted 1961-1963 by Brookhaven National Laboratory involved 28 Marshallese subjects, including 6 subjects involved in both Cr-51 and tritiated water studies. This acknowledgement was in response to a specific request by the Republic of the Marshall Islands for information on Cr-51 and tritiated water studies conducted in the early 1960s. The DOE did not disclose information about Cr-51 or tritiated water tests that might have occurred in other years, nor did they disclose information about participants in other radioisotope studies, such as the I-131 thyroid uptake studies, Sr-85 studies, and Fe-55 studies mentioned in Medical Survey planning documents.

In addition to radioisotope studies, the Rongelapese were used as subjects in population genetics and chromosome abnormality studies. In 1956, the Chairman of the Atomic Energy Commission, Lewis L. Strauss reported that genetic studies would take place with the Rongelapese: “With reference to the Rongelap people, I have been advised that genetic studies will be undertaken at the time of the next and succeeding resurveys of the medical status of these people.”¹⁴⁸ Rongelapese were also the subjects of chromosome abnormality studies. Samples collected during the 1964 survey found: “A total of 51 persons has been examined and although findings are not spectacular, it appears that there is a difference between the heavily exposed population and the controls.”¹⁴⁹

Exams also involved procedures that were difficult to endure and at times undertaken for broader research purposes, rather than monitoring and thus treating the health and well-being of the subject. In at least one instance, Rongelapese subjects endured whole body irradiation to

help scientists calibrate instruments between Brookhaven and Argonne Labs, as illustrated in the 20 January 95 oral history testimony of Dr. James S. Robertson:

Q: *When was the first group [of Marshall Islanders] brought to Brookhaven for the first studies there? Or, if you can't remember, what was the purpose for bringing them to Brookhaven?*

Robertson: *Well, for some of those body measurements we wanted to [establish absolute values by calibrating them with other instruments]. Actually, they stopped at Argonne [National Laboratory outside of Chicago] and they were measured there before they were at Brookhaven. There were more sophisticated ways to measure things in the laboratory than what we could take with us to the island. I don't know all the motives for doing it. I think the main thing was to get better quality data....*

Q: *Were any studies done on the people [who] came from the Marshall Islands? Any tracer studies or anything of that nature?*

Robertson: *I don't think so. Some of them that were brought back were developing thyroid problems, and this was studied, but I wasn't directly involved in that. Again, the main thing that we were interested in was calibrating different instruments that were involved in the field and the laboratories, using [the islanders] as standard subjects and cross calibrating between what Argonne would determine as the body content and what Brookhaven would determine as the body content.... (James Robertson, 20 January 1995 Oral History testimony).¹⁵⁰*

And, beginning in 1954 medical survey scientists collected teeth from the people of Rongelap and Utrik. Trust Territory health staff was also instructed to collect deciduous teeth of children, and to extract teeth in support of Strontium 90 studies. Brookhaven National Laboratory has charts showing whether the teeth belonged to exposed Rongelapese, children of exposed Rongelapese, matching controls, or children of matching controls. The teeth were put in bottles and shipped back to New York to assess radiological content. In some cases, good teeth, and not just decayed teeth, were removed.¹⁵¹

The assault received from radiation injuries was all the more difficult when compounded by the lack of information provided to the subject, and treatment efforts that produced unanticipated harm. For example, a 1978 letter from Dr. Conard to Dr. Walter Wyzen at the Department of Energy discussed the case of "...a complete thyroidectomy at the U.S. Naval Hospital in Guam.

During the surgery, the parathyroid glands were inadvertently removed. The parathyroidectomy presents a more serious condition than the thyroidectomy, requiring a more precise and strict treatment regimen with lack of treatment resulting in more serious consequences.”¹⁵² According to Rongelapese informants, there were two women, who were young girls at the time, that had their parathyroids mistakenly removed, Chiyoko Tamayose and Lindy Nitihara.

Lindy Nitihara described the trauma of being alone as a child for her thyroid surgery, as well as medical problems resulting from her surgery:

Lindy Nitihara: *They sent me and Tija to the Naval hospital in Guam. I was 11 years old, and I didn't speak English. There was no one with me to translate or explain what was going on. The rubber band on my underwear snapped and there was no one there to even help me mend my one pair of underwear. The people laughed at our clothes and made fun of us there. I was terrified without my mother or father, or anyone. I think the surgery I had was bad because of the problems I've had, but I don't know because up until now there is no medical record of what they did to me! I've asked DOE for my medical record and they said there isn't one (June 13, 2001, Holly M. Barker, Honolulu).*

The medical survey experience was a dehumanizing experience where the Marshallese were transformed from individual patients with specific medical needs, to subjects whose identity was reduced to a patient number. In 1963, the AEC made identification cards for each person in the study (Anjain, p. 97). As they had in 1954 when Project 4.1 first began, people were asked to remove their clothes for identification photos. People did not understand why they needed identification cards or why they had to remove their clothes:

Lijon Eknilang: *I don't know about the men, only about the women, but when it came time to get our identification cards and numbers from the Atomic Energy Commission (AEC), we had to hold up our individual numbers on a card and have our photographs taken. What I don't understand, and still don't understand to this day, is why we had to take our clothes off just to have our I.D. pictures taken. One by one, each one of the women was told to disrobe and have her photograph taken (March 28, 2001, Holly M. Barker, Majuro).*

From the onset of the medical survey, Marshallese patients have complained that doctors in the program were much more interested in studying them, rather than addressing their medical concerns. Informants noted that they would complain to the doctors about problems they experienced, but the doctors would ignore their complaints and focus on their thyroids, blood, or urine. The doctors dehumanized the people to the point that they were mere identification numbers or body parts. This dehumanization was epitomized in the researchers' lack of concern for the humility or feelings of patients. Informants were especially traumatized by photographic procedures, recounting their feeling about the repeated instances where they had to pose naked:

Almira Matayoshi: *There were at least three times when they took pictures of us naked – at the school on Rongelap and at the Majuro hospital. They had us take off every single piece of clothing and stand naked before their cameras. We were afraid. They told us to take off our clothes. I protested and didn't want to take off my underwear, but they said I had to. We had no choice. Men and women lined up for pictures, as we were told. Everyone knew what was happening. This humiliation was so powerful to me. We thought we were getting doctoring, but look what they did instead!* (June 13, 2001, Holly M. Barker, Honolulu).

Further evidence of the dehumanization of the patients is evident in the descriptions of the care the people of Rongelap received. Routinely, the doctors violated Marshallese custom (by having people undress or discuss illnesses in front of relatives), humiliated people (by pulling students out of classrooms for medical exams), by failing to explain or translate procedures and prognoses to patients, by failing to provide patients with their medical charts, and by sending them to unknown doctors and facilities in the United States and Guam for unexplained procedures:

Lijon Eknilang: *In 1981, three women from Utrik and I went to Brookhaven. It was so cold at the time because there was lots of snow outside. During this visit, we were given mammograms for the first time. We didn't understand what the doctors were doing to us or why and it was embarrassing to have them touching our breasts and putting them in the machines. There was no translator for us* (March 28, 2001, Holly M. Barker, Majuro).

Ellen Boaz: *I had a tumor. How many months and weeks they shocked my head in Washington [D.C.]! They examined us... we don't know what it is they did to us, or what they saw* (August 26, 1994, Holly M. Barker, Mejatto).

Efforts by the people of Rongelap to exercise their rights to meaningful informed consent were dismissed, dissuaded, or were met with trivial efforts to placate concerns. Medical survey reports include descriptions of efforts to entice Rongelapese participation in exams and procedures by offering hats, money, movies, ice-cream and cigarettes. Sometimes participation was encouraged through more abusive means. For example, Helena Alik, a participant in the “control” group, notes that not only did she miss school time to see AEC doctors, but medical survey exams and procedures occurred without any explanation. Sometimes the Trust Territory police physically removed Helena from her school or home to insure her to insure her presence and participation in Medical Survey exams and procedures (Interview with Holly Barker, March 13, 1998, Majuro). John Anjain records in his Magistrate’s book that when he and others from Rongelap and Utrik traveled to the United States in 1957 to be examined, the AEC doctors told them that if they spoke with anyone they would be left behind forever in Hawaii (Anjain, 1957: 97). In this case, U.S. Government researchers used intimidation to insure that no one questioned their treatment of Marshallese patients.

Summary of Consequential Damages

Exams, procedures and sampling typically occurred without meaningful informed consent. Some procedures resulted in the mistaken removal of parathyroid glands. Often procedures were painful, resulted in additional exposure to radiation, were dehumanizing, and had little or no connection to the health treatment needs of the individual. While the United States Government acknowledged culpability and accepted limited responsibility

for specific radiation-related health effects, it systematically ignored the broader constellation of health needs that were directly and indirectly related to exposure.

Decades of medical focus on research priorities rather than individual health care needs constituted a systematic and long term abuse of the Rongelapese – abuse that continues to generate hardships for individuals, families, the broader communities of Rongelapese, and the nation.

12. Evacuation of Rongelap in 1985

Despite assurances by the United States Government that Rongelap was safe, the Rongelapese believed that their health and safety was further compromised after 1957 by living in an environment contaminated by radiation. As detailed above, the food and water sources on Rongelap gave people blisters in their mouth and made them sick. Interviewees believe that their environmental exposure led to premature deaths in the populations and severe deformities in their offspring.

In 1982, the United States Government published two reports that would ultimately lead the people of Rongelap into self-exile in 1985 (Anjain 1989:10). The first report was a Defense Nuclear Agency document demonstrating that the United States Government was aware of the wind shift toward Rongelap before it detonated the Bravo shot. The second report was a DOE survey of the northern Marshall Islands. In this report, DOE concluded that Rongelap was safe for habitability. Unfortunately, this report “failed to include the information on health and medical history of the residents of Rongelap. Issues of risk to children, to pregnant women and to those in ill health were not addressed” (Bertell1989:6).¹⁵³ The report did not refer to data on

individual body-burdens from the whole-body counting done by the Marshall Islands Radiological Safety program -- these data were classified, and only released as part of the Clinton Administration study on use of human subjects in radiation research.

Former Senator Jeton Anjain (brother of John Anjain) of Rongelap disagreed with DOE's notion of habitability regarding Rongelap by countering DOE's definition of habitability with one "defined in Black's Law Dictionary as: Condition of premises which permits inhabitants to live free of serious defects to health and safety" (Anjain 1989:16). Believing their lives to be in danger from environmental sources of radiation on Rongelap, Senator Anjain worked with the RMI *Nitijela*, or parliament, to pass a unanimous resolution asking the United States Government to relocate the Rongelapese. The United States Government ignored these requests. In frustration, the Rongelapese turned to Greenpeace, an environmental non-governmental organization, for assistance. Greenpeace dispatched its ship, *The Rainbow Warrior*, to Rongelap Island in May of 1985 to assist the Rongelapese with their evacuation. The Rongelapese moved to Mejatto Island, a small island on the western side of Kwajalein Atoll. The United States Department of Energy declared that there was "no justification" for the self-evacuation of the Rongelapese (Anjain 1989:14).¹⁵⁴ The Rongelapese viewed Mejatto as a temporary relocation while waiting for independent scientific work to be conducted (Greenpeace 1986). This move was extremely difficult; people left with fear for their health and safety and the fear that, once gone, they would never be able to return.¹⁵⁵

Rokko Langinbelik: *We left Rongelap because we didn't want our children to be poisoned like we are. Even if we were sad we left. We left because we care about our children* (CMI Nuclear Institute, 1999, Majuro).

Isao Eknilang: *The throats of people from Rongelap exploded (from grief), and I, my throat, was decimated the most because of my land* (May 7, 1999, CMI Nuclear Institute, Majuro).

The Marshallese say that their emotions are in their throats, rather than in their hearts. Literally, Isao Eknilang considers the loss of his land to the explosion of his heart.

Summary of Consequential Damages

The Rongelapese decided to leave their homes because of fear and concern for their safety. Environmental contamination from the nuclear weapons testing program had forced them to abandon all that was familiar and owned by them. Some of the consequences of this involuntary displacement include the accompanying hardships of struggling to survive on other people's land; loss of the means to reproduce sociocultural traditions; and, erosion of trust regarding United States Government efforts to disseminate information and deliver medical care.

13. Current Conditions Endured by a Fragmented Rongelap Community

After leaving Rongelap in 1985, the Rongelap community dispersed to Mejjatto, Majuro, Ebeye, Hawaii and, more recently, the mainland United States. Involuntary resettlement placed hundreds of people on small bits of rented land, creating extremely dense, unsanitary, and impoverished communities.

In the urban areas, on the limited land in Mejjatto, and in Hawaii where the community now lives, people no longer have the ability to get their foods locally the way they did on Rongelap. Now, they have to purchase the vast majority of their food. The Rongelapese complain that it is exceedingly difficult to feed their families. The custom of feeding and helping others is beginning to disappear because people no longer have the means to care for

others. Furthermore, when the community was moved off of their homelands, they did not have the education or job skills necessary to seek employment and earn the money necessary to purchase food for their families.

Approximately 350 people moved from Rongelap to Mejjatto in 1985. Mejjatto is a small island approximately one mile long. It is situated on the western end of Kwajalein Atoll, approximately 60 miles from Ebeye Island, the nation's second largest urban area. Mejjatto has no airstrip and its residents are completely reliant on small boats to travel approximately 60 miles from Ebeye, a major urban area. When the Rongelapese relocated on Mejjatto there was little traditional food. The people planted pandanus, breadfruit, and coconut, but it took five years before they would produce food (Greenpeace 1986). The islands surrounding Mejjatto had food, but the Rongelapese were reluctant to gather food because they had no rights or permission to use these islands.¹⁵⁶

The interviewees clearly describe many of the difficulties in securing food, transportation, and housing on Mejjatto:

Nerja Joseph: *On Mejjatto, there was no food when we got there. We had to plant coconuts, pandanus, and other foods* (March 8, 1999, Holly M. Barker, Majuro).

Jimako Kobnij: *People literally starved on Mejjatto. There was no transport for food, no government support for food* (March 18, 1999, Holly M. Barker, Ebeye).

Ken Kedi: *When we left Rongelap, we were told everyone would have big houses on Mejjatto. We only got small houses and the guys had to sleep outside under the trees where they were rained on* (March 1, 1999, Holly M. Barker, Barbara Rose Johnston, and Stuart Kirsch, Majuro).

Because Mejjatto was uninhabited when the Rongelapese arrived, the people had to plant local food crops. Dangerous tides and rocky reefs around Mejjatto made it difficult for the Rongelapese men to fish or to pass on knowledge about fishing to the younger generation.

During the first few years of their stay on Mejatto, there was little local food to support the Rongelapese on Mejatto. Field trip boats serviced the island with supplies once every three months. The people did not have motorboats or money for gas to make the 10-hour to Ebeye Island over rough seas. These problems on Mejatto made people long for their home atolls that were too contaminated to occupy:

Johnsay Riklon: *Mejatto is really different from Rongelap. Mejatto is really small. There are scarce resources, such as fish and grown foods. In Mejatto, people fish only 2-3 times a week, but on Rongelap people fished everyday. People depend on USDA (U.S. Department of Agriculture) and imported foods. It's like a camp. People are not healthy. They have bad diets, diseases, and the health services are inadequate. It's expensive for me to visit Mejatto... It is too rough to fish in Mejatto, and there are too many sharks. People die in the current around Mejatto (February 28, 1999, Holly M. Barker, Barbara Rose Johnston, and Stuart Kirsch, Majuro).*

Boney Boaz: *I didn't want to leave Rongelap in 1985, but the elders did, so I went. Because Rongelap was no good, I left, but I didn't like Mejatto. It is pretty difficult to fish on Mejatto. Wind prevents people from fishing. On Rongelap, there were many choices: many ways to fish and many places to fish...*

Kids on Mejatto don't know how to sail an outrigger canoe. It's too low to launch there. On Mejatto it's hard to sail and hard to teach.

On Mejatto there is lots of American food. There's more food, local food on Rongelap. There was nothing at all on Mejatto in the beginning. Now it's better because we planted food.

Mejatto is bad because it's hard to get back and forth. It's dangerous on all the small islands. Some people have disappeared, some drowned. It's hard to move about (March 17, 1999, Holly M. Barker, Ebeye).

According to the Greenpeace team that helped evacuate the Rongelapese to Mejatto, teenage boys had a particularly difficult time with the transition to Mejatto: “they have little to do... They sleep, talk story, play guitar and softball and now and then go fishing or help with community jobs... They are in between cultures, exposed to the American way of life through TV and videos and the consumer goodies available in Majuro and Ebeye... Outer island life is very different and does not prepare people for the materially orientated imported lifestyle” (Greenpeace 1986:3).¹⁵⁷

The Rongelap community on Mejatto suffers from problems of isolation and lack of meaningful infrastructure. In March 1999, while conducting research on sociocultural values of land, the research team tried unsuccessfully for many days to rent a boat to travel to Mejatto. The fact that we were unable to secure a boat despite money and connections illustrates the transportation difficulties that the Rongelapese on Mejatto continue to encounter. The Rongelapese complain that it is difficult to get supplies and people back and forth between Mejatto and Ebeye and it is expensive, often costing as much as \$1,000 a trip.

The Rongelap community on Ebeye suffers from the immense problems of urbanization. Ebeye is the most densely crowded area in the Pacific Islands. With a population of approximately 15,000 people on 1/10 of a square mile of land, housing, water, electricity, employment, education, health, shade, and play areas are all difficult to come by.¹⁵⁸

The major complaints of interviewees on Ebeye are their inability to take care of their needs without money, overcrowded housing, ill-health, unemployment, lack of knowledge about Rongelap in the youth, and the burial of Rongelapese on other people's land:

Jerkan Jenwor: *What is life like now? It's filled with sickness. It was better on the island (Rongelap). I came to Ebeye because my kids have to go to school. Food is hard when you don't live on your own land. It is also hard to find enough money to pay for school tuition (March 17, 1999, Holly M. Barker, Ebeye).*

Jimako Kobnij: *Now we stay at one of the typhoon houses at Dump Town. Six of our kids are married. There are lots of grandchildren. There are thirty some people in three rooms. You would laugh if you could see us sleeping-- everyone together. I really need a house. My husband is retired but he still works because no one else has a job (March 18, 1999, Holly M. Barker, Ebeye).*

Isao Eknlang: *I have a house on Majuro, but it's not the same. I don't know the people. My freedom is gone. Gone also is the practice of taking food to people. Now it's 'kwe wot kwe im na wot na' (I take care of myself and you take care of yourself) (June 13, 2001, Holly M. Barker, Honolulu).*

Rokko Langinbelik: *Marshallese custom used to make kids behave, but now they don't respect us. Now that we're gone from Rongelap, all of our most precious customs are gone. When we were on Rongelap we practiced them all (June 14, 2001, Holly M. Barker, Honolulu).*

Malal Anjain: *My father died. There are five people in my family now. No one in my family works. We survive just from our quarterly payments (from the Rongelap trust fund). It was better when my grandfather was alive. My stepfather was good, too. He died at Christmas. I want to go to college, but it will be tough on the people at my house because no one works (March 19, 1999, Holly M. Barker, Gugeegue).*

When the Rongelap community was moved off of their homelands, they did not have the education or job skills necessary to seek employment and earn the money necessary to purchase food for their families. The Rongelapese cannot live on Ebeye or Majuro without money. All of their basic needs must be purchased:

Mwenadrik Kebenli: *On Ebeye... we buy things. We don't have pandanus leaves to make sleeping mats. I lie on the tile. We need money for everything. When it runs out, there is no more food. Our things to cook with break. I still haven't eaten breakfast today (11:15 a.m.). There's no medicine. There's no vehicle to go and get birds to eat. They are far away... My children, they grew up on Ebeye. They just hang around (March 16, 1999, Holly M. Barker, Rongelap).*

Burying family members is extremely difficult because of limited land, and because people believe their spirits will not rest properly unless they are on their own land:

Jimako Kobnij: *Even if you move to a [new] place, you still remember your true place. It's not good to die away from our land. We shouldn't have to ask permission to be buried [on other people's land]. Even if we are far away, we know the place where we should be together, and where we share lands that we should bury our loved ones together on (March 18, 1999, Holly M. Barker, Ebeye).*

Lijon Eknlang: *We shouldn't have to ask to be buried. Here on Ebeye, it's too crowded to bury. We have to look for places to bury our dead. I want to go back to Rongelap to die. Now they're starting to cremate on Ebeye because there's no place to bury now. They told us it's too full to bury. The cemetery is full. Burial areas are overcrowded, but cremation is against the custom and religion (March 18, 1999, Holly M. Barker, Ebeye).*

Obtaining access to adequate health care in all the Rongelap communities has been a major problem since initial exposure. After the evacuation from Rongelap in 1985, medical surveys continued to visit the dispersed community twice a year. This still left 50 weeks of

the year during which people did not have access to adequate medical care for their unique and complex needs. When the Compact of Free Association came into effect in 1986, the 177 Health Care Program (177 HCP) provided for the routine needs of some patients, but the program is open to all members of the Enewetak, Bikini, Utrik and Rongelap communities, and is grossly under-funded (approximately \$7-14 per patient per month to support all health treatment needs).

In 1998 the Department of Energy changed contractors from Brookhaven National Laboratory to Pacific Health Research Institute (PHRI) to assume responsibility for DOE's health care program. PHRI is in the process of trying to give the Rongelapese full-time access to medical doctors, but this is 47 years after their initial exposure. Furthermore, PHRI has been hampered by a DOE mandate that PHRI only treat the radiogenic conditions of its patients, a decision based on DOE policy and not congressionally mandated law. Exceptions to this rule are made from time-to-time when a patient's life is in danger from a non-radioactive illness, but are rare. Congress intended for DOE to provide for the radiogenic and non-radiogenic needs of the community, but DOE maintains that it needs clearly articulated Congressional language to change its policies. Because DOE is unwilling to treat non-radiogenic illnesses unless they are life threatening, and because the 177 HCP lacks funding, patients complain continually about being "ping-ponged" back and forth between medical providers that are reluctant or unwilling to care for them.

Lost in this conflict over health care responsibility have been the individual needs of Rongelapese patients. Thus, informants allege that a number of recent deaths occurred needlessly, because Rongelapese people suffering from the various effects of their exposure were

unable to receive adequate health care. As of this writing, September 2001, these deaths include George Anjain, Jabeo Jabeo, Joe Jitiam, Edmil Edmond, and Bweradrik Eknilang.

The Rongelapese also believe that their children have radiation-related health care needs related to their exposure. This is evident in the number of miscarriages, stillbirths, deformities, retardation, and stunted growth in the children of the people who were exposed to Bravo or who lived on Rongelap after the testing program. DOE's mandate does not include the offspring of the Rongelapese, and once again, the 177 HCP lacks the resources to adequately care for them.

Because health care for the Rongelapese is limited in the RMI, many Rongelapese have opted to move to Hawaii to try to get access to the U.S. public healthcare facilities. In Hawaii, people are burdened by the extremely high cost of living. The costs of renting apartments, purchasing food and clothing, and providing for the basic needs of their families are exorbitant. As a result, people often live in crowded apartments to help make ends meet.

In June 2001 interviews with Rongelapese living in Hawaii, much of the conversation focused on the difficulties of negotiating medical bureaucracies and confronting the biases and stigmatization associated with their medical conditions. A number of informants noted that political officials in Hawaii characterize all citizens of the Freely Associated States as nuisances and drains on their public resources, and do not understand the special medical needs of the Rongelapese who suffer the degenerative effects of exposure to near-lethal amounts of radiation. Conflicts over healthcare responsibility – who should pay for what services — leave the Rongelap community in Hawaii struggling to obtain medical care that is often refused for lack of payment on previous bills that they cannot and should not have to pay. Informants expressed their belief that all community members, including offspring, should have access to any and all medical care they need as a result of U.S. Government actions. They are confused by the bureaucracy of the medical establishment in the United States, and frightened about the consequences of their inability to pay their medical bills. Yet, they find this confusion and fear preferable to living in the Marshall Islands where there is extremely limited medical care available to them, and almost none for their children.

Naiki Ribuka: *If you live in the US, or if you leave the RMI to get medical care, you're not eligible for any [radiation related] assistance. All of the medical bureaucracy is hard to understand. We get billed for care, but we don't have any insurance or any means to pay for our medical care. But, we need the care; what can we do?! (June 14, 2001, Holly M. Barker, Honolulu).*

Rokko Langinbelik: *Our kids need medical care. If we die, who cares for them because we know their medical needs are beyond those of other kids?!* (June 14, 2001, Holly M. Barker, Honolulu).

Informant testimonies from all of the segments of the Rongelap community suggest a fragmented group living in extreme poverty, struggling with the comprehensive assaults resulting from their exposure and loss of land. The disbursement of the community into several main residence locations means that the Rongelapese went from a close community where everyone worked together to a geographically fractured community. The physical disbursement makes communication and group cohesion difficult for the Rongelapese. Each of the different communities where the Rongelapese now reside presents challenges for the Rongelapese that they did not encounter on their own land (Johnsay Riklon, February 28, 1999).¹⁵⁹

The consequential damages of this fragmentation are reflected in national reports and statistics. Extremely dense residential patterns created by communities of exiles living on rented land has created or exacerbated terrestrial and marine pollution. The impoverished condition of the Rongelap community has intensified local resource use (especially fishing, a commons resource). The ecosystemic viability of “host” island environs has been dramatically degraded. The Rongelap community represents some 8% of the total Marshall Islands population. While an estimated 49% of the nation is able to support household needs through agricultural production, 100% of the Rongelap community is alienated from land and the traditional resources needed to survive.¹⁶⁰

The people of Rongelap also suffer sociocultural hardships. While it is clear that the Rongelapese community would have experienced changes in diet, lifestyle, and employment over time, the weapons testing program accelerated the pace at which the people experienced these changes. The changes happened far more quickly than the people were able to adapt to.

This loss of the means to be self-sufficient impacts the people of Rongelap in complex ways:

Kobang Anjain: *Now I have to buy food all the time. I have to listen to the landowners on the land where I stay. Even if I don't like what the landowners tell me to do, I have no choice because it's not my land and I can't do what I want to. It's not the fault of the alabs of the land where I stay now – we lost our place* (June 13, 2001, Holly M. Barker, Honolulu).

Loss of land affects diet, health, and household economy and severely inhibits the Rongelapese ability to produce or reproduce cultural knowledge about the local environment — knowledge that is essential to the survival and long term well-being of the community.

Traditional and current use-rights arrangements include an implicit agreement to care for the land, including husbandry of trees, clearing underbrush, burning and improving the fertility of soil. The scant terrestrial resources in the overcrowded urban areas render it impossible for the Rongelapese to live a subsistence lifestyle or to provide the maintenance of the land that traditional rental rights require. The Rongelapese living in Ebeye and Majuro do not have rights to freely use without permission coconut, pandanus, and other material resources situated on the land, or reef heads and other marine resources adjoining the land.

One of the many consequences of the inability of the Rongelapese to access plant resources means that they have lost the means to a free, culturally appropriate means of healthcare as well as the cultural respect reserved for people who are knowledgeable about Marshallese medicine. Outer island populations rely heavily on traditional Marshallese medicine to assist them with their ailments.

Instead of traditional work on the land and in the sea, the Rongelapese are largely idle in their relocation. Suicide, malnutrition, alcoholism, smoking, and lack of physical fitness were complaints among the interviewees. The psychosocial damages associated with the hardships,

anxiety and reality of life for the people of Rongelap is reflected in apathy and misery in the younger generations:

Ken Kedi: *Here are the examples of youth activities for the Rongelapese: gather, talk, smoke, make yeast (a homemade alcohol). Increasing suicide. A number of suicides have been attempted on Mejatto. One family (the Balos family) had 3 or 5 suicides (March 1, 1999, Holly M. Barker, Barbara Rose Johnston, and Stuart Kirsch, Majuro).*

Since moving off of their land, the Rongelapese diet has changed substantially. In the place of arrowroot, breadfruit and fish, the people now subsist primarily on rice, flour, and canned meats when they are available. Fresh produce from local grocery stores is prohibitively expensive for families on a limited income. Furthermore, the younger generation has become accustomed to processed foods because of the lack of availability of traditional foods. One of the traditional means to maintaining family ties has been the sharing of food. As indicated earlier, in the urban areas, on the limited land in Mejatto, and in Hawaii where the community now lives, people no longer have the ability to get their foods locally the way they did on Rongelap:

Naiki Ribuka: *When we were on Rongelap, we would worry about everything that we ate, even if they said it was safe. We thought the foods were contaminated. Now, we always struggle with money. We don't have enough money to purchase the food we need, we can't buy what we want. "Jej jojolaer. Ainwot bao ko rej jan bujik bwe ejjelok jineer." ("We're lost and wandering. [We're] like the birds that cry out because their mother is gone.") (June 14, 2001, Holly M. Barker, Honolulu).*

Living on other peoples' land means that the people can only use the rainwater that they collect from their roofs in catchments. In some cases, people can get permission to use the groundwater, but they have to ask permission to use any and all water that they do not catch themselves. In recent years, the RMI has suffered severe droughts. The people did not have the means to gather sufficient water for their families:

Abacca Anjain-Maddison: *As a child, I remember fighting to get the hose so I could get water on Ebeye. We would also fight with each other to get on the boat to go over to Kwajalein to get water* (June 13, 2001, Holly M. Barker, Honolulu).

Loss of land not only affects the means to sustain life, but impacts severely on the traditions that accompany the end of life. In the areas where the Rongelapese are displaced, they have no connection to their ancestors. During the site visit to Rongelap in 1999 with the elders of the community, an elderly Rongelapese woman proceeded immediately to the cemetery after the airplane landed. She greeted the gravestones of her family out loud with “*yokwe kom,*” or “hello to you.” It is painful for the Rongelapese to be physically removed from their ancestors.

Furthermore, it is not customary to bury the deceased on land that does not belong to the family:

Almira Matayoshi: *My father really wanted to be buried on Rongelap when he died, but there was no way to get him there* (June 13, 2001, Holly M. Barker, Hawaii, 2001).

Ken Kedi: *Most elders died. They died wanting to go back. My great grandfather, Talekerab, said he wouldn't leave the island when it was time to evacuate. After they took him off, he started fasting and demanded to go back. Everyday he would chant, sing, and talk of the good old days. He would ask: “Why are we here [in Mejjatto]?” Because he said he wouldn't eat until he went back, he died* (March 1, 1999, Holly M. Barker, Barbara Rose Johnston, and Stuart Kirsch, Majuro).

In addition to these problems resulting from the loss of the means to sustain a self-sufficient way of life, the Rongelap community has been deeply affected by the social forces dividing a community of “exposed” and “non-exposed,” and constantly challenged by the hardships associated with obtaining some form of adequate treatment for the range of degenerative problems resulting from exposure to radiation.

The stigmatization of exposure was all the more difficult to endure because evidence of exposure is immediately apparent when someone speaks. The Rongelapese feel deep anguish at the changes in their singing voices as a result of their thyroid disorders. Singing is a vital part of Marshallese gatherings – all formal occasions, community gatherings, and church services are

singing events. Singing and dancing are often related activities that transmit stories and legends, commemorate significant events, and communicate honor and respect. Numerous informants expressed deep sadness about their inability to sing in public and their embarrassment about the loss or range in their notes:

Norio Kebenli: *We used to love singing! Christmas time was always the most important to us because we come together and sing. Now no one is interested in participating in our traditional Christmas get-togethers anymore because we can't sing. We've lost interest. People who used to sing well now have flat voices. Personally, I don't sing in public anymore because people stare at me. It's like we're in a constant state of puberty where our voices keep cracking. I feel sorry for Jia Riklon. He can't speak unless he holds a contraption to his throat to make sound – he has only one level of sound he can make so he certainly can't sing* (June 13, 2001, Holly M. Barker, Honolulu).

Almira Matayoshi: *After the bomb, we can't harmonize anymore. Everyone's voice is a base, and there are no more sopranos amongst us. We have no interest in singing anymore. People make fun of us when we do and say "etiroit men ne" (literally: that thing near you is thyroid, or that thing of a person has a thyroid problem)* (June 13, 2001, Holly M. Barker, Honolulu).

Ellen Boaz: *At the time when they cut my throat I thought they – well I don't know, I really can't sing anymore, but I want to sing again but now I can't. I really don't know. After the people cut my throat, I really can't sing at all anymore. My voice won't go high anymore. Is that not from the contamination?* (August 26, 1994, Holly M. Barker, Mejjatto).

Summary of Consequential Damages

The loss of customary lands and the means to sustain community cohesion coupled with the particular nature of degenerative disease associated with radiation exposure has produced distinct affects on diet, health, and household economy. Extremely dense residential patterns created by communities of exiles living on rented land has created or exacerbated terrestrial and marine pollution. The impoverished condition of the Rongelap community has intensified local resource use, and the ecosystemic viability of "host" island environs has been degraded. Restricted access to critical resources inhibits the ability to teach younger generations the means to sustain a self-sufficient way of life. Loss of access to customary lands further inhibits efforts to transmit key

information across the generations, knowledge that is essential to the survival of the community if they are ever to return to customary lands. Some hardships are endured by individuals, like the many Rongelapese who experienced physical pain and suffering as a result of having their thyroid glands removed or treated, continue to endure the discomforts and side effects of taking lifelong thyroid medication (nausea, lethargy or hyperactivity, hot and cold flashes), or mourn throughout their life the loss of a unique part of their personal and social identity: their ability to sing. Other hardships are endured by families, the community, and the nation, as they also struggle to care for children who were born retarded or handicapped, and an elderly population with severe degenerative healthcare needs. These social, cultural, economic, and environmental problems are linked to exposure and the loss of lands and are consequential damages from nuclear testing. These hardships are exacerbated by the fact that virtually all of the Rongelapese community -- including those alive during the testing program, those who lived in the highly contaminated environment, and their offspring-- have significant healthcare needs related to their exposure, and struggle with inadequate access to meaningful healthcare. Yet, there is no medical program to adequately address these needs and patients are frustrated and angry that the U.S. Government has failed to provide for them, and has “ping-ponged” them back and forth between inadequate programs.

⁴¹ Record Book of John Anjain, Magistrate of Rongelap. See note 5, below.

⁴² United States Department of Energy and Department of Defense documents are referenced in text by file access numbers. These documents were classified and not available to the Marshallese government or general public during negotiations for the Compact of Free Association between the Republic of the Marshall Islands and the United States. The majority of these documents were declassified as part of the Clinton Administration inquiry into the use of human subjects in radiation experiments. DOE #458: Gordon M. Dunning, editor. January, 1957. Return of the Rongelapese. Chapter VI, Radioactive Contamination of Certain Areas in the Pacific from Nuclear Tests – A Summary of Data from Radiological Surveys and Medical Examinations. Report to the General Manager of the Atomic Energy Commission by the Director of Biology and Medicine. http://worf.eh.doe.gov/data/ihp1d/1554_f.pdf, accessed December 17, 2007.

⁴³ This testimony was reviewed by the informant and minor details corrected, translation and details submitted by Senator Abacca Anjain-Madison, September 14, 2001.

⁴⁴ Jack A. Tobin, 1958. “Land Tenure in the Marshall Islands.” Land Tenure patterns in the Trust Territory of the Pacific Islands. Office of the High Commissioner of the Trust Territory of the Pacific Islands: Guam.

⁴⁵ Magistrates were elected for every atoll, and they acted as the contact person for the Trust Territory of the Pacific Islands government. John Anjain was Magistrate of Rongelap during the United States weapons tests. As Magistrate he kept record books detailing important activities, events, and decisions within the community. A total of five record books were produced by John Anjain. In April 1999, Holly Barker received permission to photocopy relevant portions of one of the books held by George Anjain, including the map of Rongerik (Map 3).

⁴⁶ John Anjain. Written record book as Magistrate of Rongelap.

⁴⁷ DOE #44: D.E. Lynch. Radioactive Debris from Operation CASTLE: Worldwide Fallout. United States Atomic Energy Commission, New York Operations Office, Health and Safety Laboratory. January 21, 1955.

<http://worf.eh.doe.gov/data/ihp1d/39683e.pdf>, accessed December 17, 2007.

⁴⁸ DOE #473: Commander, Task Group 7.1. August 17, 1953. Letter to Distribution. Subject: General Concept of Operation Castle. Los Alamos National Laboratory: New Mexico. Pg. 5.

DOE #1023: A Report on Rongelap and Utrik to the Congress of Micronesia Relative to Medical Aspects of the Incident of March 1, 1954 – Injury, Examination and Treatment. Presented by The Special Joint Committee Concerning Rongelap and Utrik Atolls (Public Law No. 4c-3) to the Congress of Micronesia. February, 1973.

http://worf.eh.doe.gov/data/ihp1a/1427_.pdf, accessed December 17, 2007.

⁴⁹ It appears that the High Commissioner assumed in modifying the mapped danger zone to exclude Ailinginae that detonation would only occur under atmospheric conditions that do not endanger inhabited atolls, nor their key resource islands. February 2, 1953 letter to Mr. James P. Davis, Director of the Office of Territories at the US Department of Interior from Elbert D. Thomas, High Commissioner of the Trust Territory of the Pacific Islands (TTPI). Electronic document, http://worf.eh.doe.gov/data/ihp1b/4060_.pdf, accessed October 25, 2007.

⁵⁰ DOD #20: Eyewitness account of the Bravo incident from a United States serviceman posted on Rongerik. Document. On file at the Embassy of the Republic of the Marshall Islands, Washington, D.C.

Defense Nuclear Agency, Pacific Command. Memorandum for the Record, Command Briefing, 0000, 1 March 1954. Midnight Weather Briefing Prior to the Bravo Test. Electronic document,

<http://worf.eh.doe.gov/data/ihp1d/18828e.pdf>, accessed October 25, 2007.

⁵¹ DOD #23: Undated eyewitness accounts of the Bravo incident from Rongerik by United States servicemen Giroux and Rollins stating that it was known the winds were headed toward Rongerik prior to the detonation of Bravo. Document on file at the Embassy of the Republic of the Marshall Islands, Washington, D.C.

⁵² DOE #167: Final Report for JTF-7 Radiological Safety, Operation Castle (Spring 1954) pg 84-85 and Appendix C. http://worf.eh.doe.gov/data/ihp1c/0402_a.pdf, accessed

⁵³ Memorandum for the Record, March 1-3, 1954. Electronic document,

<http://worf.eh.doe.gov/data/ihp1d/18828e.pdf>, accessed October 25, 2007.

⁵⁴ DOD #33: Radiological Survey of Downwind Atolls Contaminated by BRAVO. 1956.

⁵⁵ This testimony was reviewed by the informant and minor details were amended. The translated amendments and details were provided by Senator Abacca Anjain-Madison, September 14, 2001.

⁵⁶ Marshallese often eat sprouted coconut when they are sick or feeling nauseous.

⁵⁷ Evacuation of Rongelap and Ailinginae Atolls on 3 March 1954. Report of the Commander of the USS Phillip; and, April 12, 1954 letter to Dr. Alvin C. Graves from Thomas L. Shipman, M.D. Electronic document, http://worf.eh.doe.gov/data/ihp1c/0617_a.pdf, accessed October 25, 2007.

⁵⁸ As explained to Holly Barker, documented in field notes. Majuro, March 28, 2001.

⁵⁹ Operation Greenhouse Plan, Medical Tests Electronic document, http://worf.eh.doe.gov/data/ihp1b/4075_.pdf, accessed October 25, 2007.

⁶⁰ Thirty-sixth Meeting of the General Advisory Committee to the U.S. Atomic Energy Commission, August 17, 18, and 19, 1953, pages 14-16. Electronic document, <http://worf.eh.doe.gov/data/ihp1d/881e.pdf>, accessed October 25, 2007.

⁶¹ Mr. Cohn, Conference on Long Term Surveys and Studies of the Marshall Islands, AEC Division of Biology and Medicine, July 1954:59. Electronic document, http://worf.eh.doe.gov/data/ihp1c/0246_a.pdf, accessed October 25, 2007.

⁶² See DOE#429: Study of Response of Human Beings Accidentally Exposed to Significant Fallout Radiation. Cronkite et al, October 1954. Also, see the 1954 Conference on Long Term Surveys and Studies of the Marshall Islands http://worf.eh.doe.gov/data/ihp1c/0246_a.pdf; and, March 10, 1954 telex from Thomas Shipman, Health Division Director at Los Alamos Scientific Lab to John Bugher, Director of US AEC Division of Biology and Medicine <http://worf.eh.doe.gov/data/ihp1d/400045e.pdf>, accessed December 17, 2007.

⁶³ DOE #30: Manager of Santa Fe Operations. Spring, 1954. Operation Castle: Report of the Manager, Santa Fe Operations. Pacific Proving Ground. p. 14.

DOE #354: K.D. Coleman, et al. January 30, 1959. Operation Castle: Summary Report of the Commander, Task Unit 13[^] Military Effects, Programs 1-9. Armed Forces Special Weapons Project: Sandia Base, Albuquerque. p. 71.

⁶⁴ DOE #107: Joint Task Force-7, Task Group 7.4. April, 1954. p. 149.

DOE #133: Commander, Task Unit 13. January 30, 1959. Operation Castle: Military Effects, Programs 1-9. Armed Forces Special Weapons Project. Sandia Base: Albuquerque. pp. 71-72.

Over the years a number of people have publicly questioned whether the Bravo event involved the purposeful exposure of the Rongelapese, thus creating a suitable population for study on the long-term effects of radiation (see for example, the Dennis O'Rourke film "Half Life"). The ACHRE investigation into this question could find no evidence to support this contention. Its investigation, however, was limited to declassified materials made available in 1994 and early 1995, and did not include examination of pre-existing biomedical research, including the 1948-51 health survey conducted by the Trust Territory summarized in the Whidbey report (Electronic document, http://worf.eh.doe.gov/data/ihp1a/0989_.pdf, accessed October 25, 2007); and- the 1951-1953 genetic research conducted by James V. Neel (See notes 32 and 33).

⁶⁵ DOE #11: United States Government Accounting Office. April, 1955. Issues Affecting United States Territory and Insular Policy. Washington, D.C.

DOE #133: Commander, Task Unit 13. January 30, 1959.

DOE #167: Joint Task Force-7. Spring, 1954.

DOE #348: Ralph R. Palumbo and Frank G. Lowman. April 7, 1958. pp. 86-88.

⁶⁶ DOE #429: Cronkite, E.P. et al. April 1954. Study of Response of Human Beings Accidentally Exposed to Significant Fallout Radiation, Preliminary Report. Project 4.1. Submitted to the test Director, Naval Medical Research Institute: Bethesda, M.D. Part I, p. 231. Part II, p. 615. The United States Government has yet to disclose the nature of these radiation-enhancing chemicals, their persistence in the environment, or their effects on human beings.

⁶⁷ "We have local approval" TELEX. Electronic document, <http://worf.eh.doe.gov/data/ihp1d/400045e.pdf>, accessed October 25, 2007.

⁶⁸ DOE #429: Cronkite, E.P. et al. April 1954. Study of Response of Human Beings Accidentally Exposed to Significant Fallout Radiation, Preliminary Report. Project 4.1. Submitted to the Test Director, Naval Medical Research Institute: Bethesda, M.D. Part I, p. 231. Part II, p. 435.

⁶⁹ TERPACIS refers to the Territory of the Pacific Islands. Report of the Survey of Rongelap and Utirik Atolls, 30 April 1954, letter from US Army Colonel David O. Byars Jr., p. 5. Electronic document, http://worf.eh.doe.gov/data/ihp2/7636_.pdf, accessed October 25, 2007.

⁷⁰ This testimony was reviewed by the informant and additional detail added. Detail translated and submitted to the authors by Senator Abacca Anjain-Maddison on September 14, 2001.

⁷¹ Monthly Status and Progress Report for February 1951 of the Scientific Advisory Committee of the AEC, http://worf.eh.doe.gov/data/ihp1b/7717_.pdf, accessed December 17, 2007.

⁷² February 20, 1951 letter from Neel to Dr. Max Zelle, Biology Branch, Division of Biology and Medicine, US Atomic Energy Commission, National Academy of Sciences Archives, ABCC Box 19, Genetics (#3B) 1949-1955.

While this research is the first incident of human subject work involving the Marshallese, efforts to locate the formal research protocol, field journals, trip reports, or other data relating to this project have been fruitless. This research is described in AEC Committee minutes and press releases as representing the crucial first step to understanding the genetic effects of radiation in a human population. Difficulties in locating documentation on the fieldwork may be explained by the fact that this research did not involve the use of radiation, thus information relating to this experiment would not have been declassified under the Clinton Administration order. James V. Neel's 1951 descriptions of his plans for Marshallese research suggests it involved the introduction of a natural occurring agent (possibly viral vaccine) to document mutagenic response in blood proteins. Thus, blood samples before and after inoculations would have been collected. These data might have been used to establish a genetic baseline of a Marshallese population prior to the Bravo Event.

James V. Neel also requested additional data collection from Rongelapese subjects in support of his genetics research in a September 25, 1957 letter to Dr. Robert Conard. Electronic document, http://worf.eh.doe.gov/data/ihp1b/3797_.pdf, accessed October 25, 2007. The 1958 survey indicates that samples were obtained. Electronic document, http://worf.eh.doe.gov/data/ihp1a/4569_.pdf, accessed October 25, 2007. James Neel, Robert Ferrell, and Robert Conard eventually collaborated on a formal publication; see "The Frequency of "Rare" Protein Variants in Marshall Islanders and other Micronesian Populations". Electronic document, http://worf.eh.doe.gov/data/ihp1a/1320_.pdf, accessed October 25, 2007.

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- ⁷³ DOE #429: Cronkite, E.P. et al. April 1954. Study of Response of Human Beings Accidentally Exposed to Significant Fallout Radiation, Preliminary Report. Project 4.1. Submitted to the Test Director, Naval Medical Research Institute: Bethesda, M.D. Part I, p. 231. Part I, p. 263
- ⁷⁴ Eugene Cronkite. April 21, 1954. Memorandum to the Commander of Joint Task Force-7 regarding “Care and Disposition of Rongelap Natives.” Project 4.1.
- ⁷⁵ AEC Division of Biology and Medicine in a July 1954 “Conference on Long Term Surveys and Studies of Marshall Islands”. Electronic document, http://worf.eh.doe.gov/data/ihp1c/0246_a.pdf, accessed October 25, 2007.
- ⁷⁶ May 21, 1956 letter from the District Administrator of the Trust Territory of the Pacific Islands to Dr. Robert Conard, Brookhaven National Laboratory. On file at the Republic of the Marshall Islands Embassy.
- ⁷⁷ DOE #341: Lauren R. Donaldson. August 15, 1955. A Radiological Study of Rongelap Atoll, Marshall Islands, During 1954-1955. University of Washington: Seattle.
- DOE #298: H.V. Weis et al. August 15, 1956. Residual Contamination of Plants, Animals, Soil, and Water of the Marshall Islands Two Years Following Operation Castle Fallout. United States Naval Radiological Defense Laboratory: San Francisco.
- DOE #342: Staff of the Applied Fisheries Laboratory. Radiobiological Resurvey of Rongelap and Ailinginae Atolls Marshall Islands October – November 1955. University of Washington under Contract No. AT(45-1_540 for the United States Atomic Energy Commission. December 30, 1955. p. 32. http://worf.eh.doe.gov/data/ihp1c/0696_a.pdf, accessed December 17, 2007.
- ⁷⁸ DOE #342: Staff of the Applied Fisheries Laboratory. December 30, 1955. p. 31.
- ⁷⁹ DOE #342: Staff of the Applied Fisheries Laboratory. December 30, 1955. p. 58.
- DOE #348: Ralph F. Palumbo and Frank G. Lowman. The Occurrence of Antimony-125, Europium-155, Iron-55, and other Radionuclides in Rongelap Atoll Soil. Applied Fisheries Laboratory, University of Washington. Technical Information Service Extension, Oak Ridge, Tennessee. U.S. Atomic Energy Commission. April 7, 1958. p. 64. http://worf.eh.doe.gov/data/ihp1c/7866_PDF, accessed December 17, 2007.
- DOE #240: Atomic Energy Commission. February 6, 1957.
- DOE #458: Gordon M. Dunning, editor. January, 1957. Return of the Rongelapese. Chapter VI, Radioactive Contamination of Certain Areas in the Pacific from Nuclear Tests – A Summary of Data from Radiological Surveys and Medical Examinations. Report to the General Manager of the Atomic Energy Commission by the Director of Biology and Medicine. http://worf.eh.doe.gov/data/ihp1d/1554_f.pdf, accessed December 17, 2007.
- ⁸⁰ DOE #167: Final Report for JTF-7 Radiological Safety, Operation Castle (Spring 1954).
- DOE #348: Ralph R. Palumbo and Frank G. Lowman. April 7, 1958.
- DOE #361: N.A. Greenhouse and T.F. McCraw. Date not available. Marshall Islands Radiological Follow up. Brookhaven National Laboratory: Upton, New York.
- ⁸¹ The decision to return the community to Rongelap without adequate radiological assessment was criticized by Gordon Dunning, who noted in a letter to the Director of Division and Biology: “I had assumed there would be another radiological survey of the Rongelap atoll just prior to the return of the Rongelapese... It would have been highly preferable to have had a complete survey of the atoll, especially the foodstuffs, but it appears we will have to settle for the external readings only.” DOE #356: Gordon M. Dunning. June 13, 1957. Letter to C.L. Dunham, Director of the Division of Biology and Medicine, regarding a resurvey of Rongelap Atoll. DOE #356: Gordon M. Dunning. October 1, 1957. Letter to Commander P.F. Bankhardt, United States Navy, regarding a survey of Eniaetok Island. DOE #357: Gordon M. Dunning. February 13, 1958. Letter to Dr. A.H. Seymour, Environmental Sciences Branch, Division of Biology and Medicine, regarding operational responsibilities for the resurvey of Rongelap.
- ⁸² Advisory Committee on Biology and Medicine, 1956a Meeting minutes. January 13–14, 1956. US Atomic Energy Commission. ACHRE Archive, HREX document d9275; and 1956b Meeting minutes. May 26–27, 1956. US Atomic Energy Commission. HREX document 1749_f.
- ⁸³ Holmes and Narver: “Report of Repatriation of the Rongelap People” November 1957. http://worf.eh.doe.gov/data/ihp1a/2930_.pdf, accessed December 17, 2007.
- ⁸⁴ DOE #376: Joint Task Force-7, Task Group 7.1. August 1, 1958. Operation Hardtack: Report to the Scientific Director. p.57.
- ⁸⁵ “Iron-55 in Rongelap People, Fish and Soils” T.M. Beasley and E.E. Held (Laboratory of Radiation Ecology, College of Fisheries, University of Washington) and R. M. Conard (Medical Department, Brookhaven National Laboratory) September 1970.
- ⁸⁶ Deseret Test Center Final Report on DTC Test 50-68 by John H. Morrison. Cited in The Biology of Doom: The History of America’s Secret Germ Warfare Project, Ed Regis (Henry Holt and Company: New York) 1999:204-206.

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- ⁸⁷ Medical Survey of the People of Rongelap and Utirik Islands Thirteen, Fourteen, and Fifteen Years After Exposure to Fallout Radiation (March 1967, March 1968, and March 1969), Robert Conard, M.D., et al. Brookhaven National Laboratory . p. 3. Electronic document, http://worf.eh.doe.gov/data/ihp2/0991_.pdf, accessed October 25, 2007.
- ⁸⁸ Davis, T.A., *Freaks of Nature: Branching in Coconut Palms*. Central Coconut Research Station, Kayangulam. 1963.
- ⁸⁹ DOE #358: Edward E. Held. August 7, 1959. Letter to D.H. Nucker, High Commissioner, Trust Territory of the Pacific Islands, regarding a biological survey of Rongelap. This report concludes: Some plants “survived the bombing unharmed, but when they grew into mature plants, they soon succumbed. It is clearly indicated that they were suffering from persisting effects of the bombing. Continuing radiation from soil particles must be the cause.” DOE #340: Lauren R. Donaldson. July 12, 1950. Radiologic Survey of Bikini, Eniwetok and Likiep Atolls – July – August 1949 (Resurvey of Crossroads and Sandstone Areas) p.43. <http://worf.eh.doe.gov/data/ihp1d/149062e.pdf>, accessed December 17, 2007.
- ⁹⁰ Jorulej Jitiam letter to the District Director of Public Health in Majuro, November 27, 1957. Letter on file at the Republic of the Marshall Islands Embassy.
- ⁹¹ DOE #430: Ann C. Deines, et al. January 11, 1991. Marshall Islands Chronology, 1944-1990. History Associates Incorporated: Rockville, MD. http://worf.eh.doe.gov/data/ihp2/0386_.pdf, accessed December 17, 2007. This responsibility was interpreted as prioritizing medical research over treatment, and the exposed population enrolled in Project 4.1 repeatedly complained that they were given too many examinations for the sake of research, but not being treated for their health problems. In response to complaints such as these, the United States Government medical researchers proposed that “perhaps next trip we should consider giving more treatment or even placebos” (DOE #357: Robert A. Conard. Memo. June 5, 1958.). REPETITIVE – THIS QUOTE IS USED EARLIER IN THE TEXT.
- ⁹² DOE #366: Conard, Robert A. et al. June 1958. “March 1957 Medical Survey of Rongelap and Utirik People Three Years After Exposure to Radioactive Fallout.” Brookhaven National Laboratory: Upton, NY.
- ⁹³ DOE #357: Robert A. Conard. June 5, 1958. Letter to Dr. Charles L. Dunham, Director of Biology and Medicine, regarding continued exposure of the Rongelapese in 1958. Conard notes: “I must confess I didn’t know there was any difference between [a land crab and a coconut crab]. When I told them they could not eat the coconut crab, they were a little peeved since they had been told by the weather station people that they could eat them.”
- ⁹⁴ DOE #342: Staff of the Applied Fisheries Laboratory. December 30, 1955. p. 18. DOE #290: H.V. Weis, et al. August 15, 1956. DOE #358: Edward E. Held. August 7, 1959. Letter to D.H. Nucker, High Commissioner, Trust Territory of the Pacific Islands, regarding a biological survey of Rongelap.
- ⁹⁵ DOE #378: Task Group 7.1. August 1, 1958. Operation Hardtack: April-October 1958. Report to the Commander. p.58.
- ⁹⁶ DOE#262: January 1977. “Radiological Survey of Plants, Animals and Soil at Christmas Islands and Seven Atolls in the Marshall Islands. University of Washington: Seattle.
- ⁹⁷ DOE #335: National Radiological Defense Laboratory. August 12, 1955. Residual Contamination of Plants, Animals, Soil, and Water of the Marshall Islands One Year Following Operation CASTLE Fallout. p.11. DOE #161: Author not available. Operation CASTLE, Project 2.7, Distribution of Radioactive Fallout by Survey and Analysis of Sea Water, March-May 1954. April 14, 1959. p. 53.
- ⁹⁸ DOE #34: University of California. Operation CASTLE, Project 2.7A: Radioactivity on Open-Sea Plankton Samples. p. 17. DOE #332: Allyn H. Seymour, et al. March 15, 1957. Survey of Radioactivity in the Sea and in Pelagic Marine Life West of the Marshall Islands, September 1-20, 1956. Prepared for the Atomic Energy Commission. University of Washington: Seattle. p. 55. Doe #348: Ralph R. Palumbo and Frank G. Lowman. The Occurrence of Antimony-125, Europium-155, Iron-55, and other Radionuclides in Rongelap Atoll Soil. Applied Fisheries Laboratory, University of Washington. Technical Information Service Extension, Oak Ridge, Tennessee. U.S. Atomic Energy Commission. April 7, 1958. p. 64. http://worf.eh.doe.gov/data/ihp1c/7866_.PDF, accessed December 17, 2007. DOE #332: Allyn H. Seymour, et al. March 15, 1957. p. 9.
- ⁹⁹ DOE #348: Ralph R. Palumbo and Frank G. Lowman. April 7, 1958. p. 59. DOE #380: Author not available. February 6, 1961. Operation Redwing: Project 2.62a, Fallout Studies by Oceanographic Methods, Pacific Proving Grounds, May-July, 1956. Sandia Base, Albuquerque. p. 85. DOE #380: Author not available. February 6, 1961. p. 118.

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- ¹⁰⁰ DOE #361: N.A. Greenhouse and T.F. McCraw. Date not available. Marshall Islands Radiological Follow up. Brookhaven National Laboratory: Upton, New York. p. 2.
- DOE #340: Lauren R. Donaldson. July 12, 1950. Radiobiological Survey of Bikini, Eniwetok, and Likiep Atolls, July-August, 1949. University of Washington: Seattle. p. 145.
- ¹⁰¹ William L. Robison, et al. September 30, 1982. "The Northern Marshall Islands Radiological Survey: Terrestrial Food Chain and Total Doses." Lawrence Livermore Laboratory: Livermore, CA.
- DOE #299: Lauren R. Donaldson. February 15, 1962. Radioactivity in the Biota at Islands of the Central Pacific, 1954-1958. Laboratory of Radiation Biology, University of Washington: Seattle. p.11.
- DOE #292: Ralph R. Palumbo. August 31, 1959. Gross Beta Radioactivity of the Algae at Eniwetok Atoll, 1954-1956. Laboratory of Radiation Biology, University of Washington: Seattle.
- DOE #312: University of Washington. March 5, 1958. Radiobiological Studies of the Fish Collected at Rongelap and Ailinginae Atoll, July 1957. Seattle.
- ¹⁰² Staff of the Applied Fisheries Laboratory. December 30, 1955. p. 43.
- ¹⁰³ Steven Simon and James Graham. Marshall Islands Nationwide Radiological Study. Republic of the Marshall Islands. Summary Report, December 1994. The nationwide study was not comprehensive. Emphasis was placed on measuring cesium-137 in soil and plants, in some cases measurements of americium 241 and plutonium 239 in soil. Reported levels of cesium-137 in coconut crab were based on assumptions of bioaccumulation rates, rather than actual analysis from samples. Simon and Graham did not analyze fish samples in their study. Simon and Graham assert "local fish caught anywhere are safe to eat because they have almost no fallout radioactivity in them. We believe it is safe to catch and eat fish from anywhere in Rongelap Atoll" (Survey of Northern Rongelap Atoll, June 1995:25). Interpretations of dose-rate levels were based on a reported natural background rate from eating fresh marine foods that has since been revised. Total background dose was estimated at 2.4 mSv y⁻¹ and is now estimated at 1.5 mSv y⁻¹ (reported by William L. Robison, Scientific Director, Marshall Islands Program, Lawrence Livermore National Laboratory. October 21, 1998 cover letter to the RMI Nuclear Claims Tribunal, accompanying the new booklet on "the radiological situation at the northern Marshall Island Atolls"). The revised background dose suggests that a greater proportion ²¹⁰Po and ²¹⁰Pb found in marine foods can be attributed to nuclear weapons testing.
- ¹⁰⁴ Tilman A. Ruff, 1989. Study reported in The Lancet Volume 1. Cited in John May, The Greenpeace Book of the Nuclear Age. (New York: Pantheon Books), 1989:249.
- ¹⁰⁵ DOE #400: No author noted. March 1961 memorandum regarding the medical mission to Rongelap Island.
- DOE #429: Cronkite, E.P. et al. April 1954. Study of Response of Human Beings Accidentally Exposed to Significant Fallout Radiation, Preliminary Report. Project 4.1. Submitted to the Test Director, Naval Medical Research Institute: Bethesda, M.D. Part I, p. 231.
- ¹⁰⁶ DOE #340: Lauren R. Donaldson. July 12, 1950. p. 8.
- ¹⁰⁷ Pollock, Nancy. 1992. These Roots Remain: Food Habits in Islands of the Central and Eastern Pacific since Western Contact. The Institute for Polynesian Studies: Laie, Hawaii, p.195.
- ¹⁰⁸ National Research Council 1994. Radiological Assessments for Resettlement of Rongelap in the Republic of the Marshall Islands. National Academy Press: Washington DC.
- ¹⁰⁹ DOE #356: Lauren R. Donaldson. January 11, 1957.
- DOE #361: N.A. Greenhouse and T.F. McCraw. Date not available. p. 2.
- ¹¹⁰ National Research Council 1994. Radiological Assessments for Resettlement of Rongelap in the Republic of the Marshall Islands. National Academy Press: Washington DC.
- ¹¹¹ National Research Council 1994. Radiological Assessments for Resettlement of Rongelap in the Republic of the Marshall Islands. National Academy Press: Washington DC.
- ¹¹² DOE #50: Henry Kohn. March 1, 1989. Rongelap Reassessment Project Report, Corrected Edition. Rongelap Reassessment Project: Berkeley, CA., p. 19.
- National Research Council (1994), p. 65.
- Bernard Franke. November 16, 1989. Testimony to the Committee on Interior and Insular Affairs regarding safety of Rongelap Atoll. United States House of Representatives: Washington, D.C. p.9.
- ¹¹³ Jeton Anjain. November 16, 1989. Testimony to the Committee on Interior and Insular Affairs regarding the safety of Rongelap Atoll. United States House of Representatives: Washington, D.C.
- DOE #348: Ralph R. Palumbo and Frank G. Lowman. April 7, 1958. p.101
- DOE #349: Arthur Welander, et al. September 15, 1966. p. 45.
- DOE #349: Arthur Welander, et al. September 15, 1966. p. 97.

DOE #429, Cronkite, E.P. et al. April 1954. Study of Response of Human Beings Accidentally Exposed to Significant Fallout Radiation, Preliminary Report. Project 4.1. Submitted to the Test Director, Naval Medical Research Institute: Bethesda, M.D. Part I, p. 231. Part I, p. 372.

¹¹⁴ DOE #340: Lauren R. Donaldson. July 12, 1950.

Glenn Alcalay. March 17, 1995. Testimony to the White House Advisory Committee on Human Radiation Experiments regarding incidence of reproductive abnormalities and distance from ground-zero.

¹¹⁵ United States law specifies that the Department of Energy provide healthcare services only to those people who resided on Rongelap, Rongerik, and Ailinginae on March 1, 1954. Those resettled in 1957 or later, or the offspring born on those islands are not eligible for medical services from DOE.

¹¹⁶ Norman Cohen, August 30, 1977 letter to Robert Conard. Electronic document, http://worf.eh.doe.gov/data/ihp2/1618_.pdf, accessed October 25, 2007.

¹¹⁷ 1976 letter to James Livermen, Assistant for Environmental and Safety at the Energy Research and Development Administration from Dr. Robert Conard, Electronic document, http://worf.eh.doe.gov/data/ihp1a/1376_.pdf, accessed December 17, 2007.

¹¹⁸ Oral History of Physician James S. Robertson, conducted January 20, 1995 by Michael Yuffee and Prita Pillai, U.S. Department of Energy. Electronic document, <http://hss.energy.gov/healthsafety/ohre/roadmap/histories/0478/0478toc.html>, accessed December 17, 2007.

¹¹⁹ James P. Nolan, "Sad Tales of the Pacific Islands" New York Times, Letters to the Editor, June 18, 2001.

¹²⁰ See order to vaccinate U.S. military personnel visiting the Marshall Islands. Electronic document, http://worf.eh.doe.gov/data/ihp1c/8860_.pdf, accessed October 25, 2007. Reported in the 1963 Medical Survey trip report, Electronic document, http://worf.eh.doe.gov/data/ihp1a/2749_.pdf, accessed October 25, 2007.

Other incidences of immunization requests being denied are documented in the "June Quarterly Trip Report" for 1976 prepared by Konrad Kotrady who notes "The immunization clinic was limited by the fact that the Trust Territory declined a request to provide an oral supply of polio vaccine. A diabetic clinic could not be held because the Trust Territory failed to respond to a request for hypoglycemic agents." Electronic document, http://worf.eh.doe.gov/data/ihp2/2186_.pdf, accessed October 25, 2007.

¹²¹ This song was collected and translated by Senator Abacca Anjain-Maddison.

¹²² The 1972 protest is also documented in the Rongelap Reassessment Project, March 1, 1989. Eventually some of the concerns of the people expressed during the strike became the basis of a lawsuit. "In 1972 and 1973 Rongelap again began a law suit for the damage to the 'ri-bomb' (literally, the people of the bomb). The result was \$25,000 for the people who had their throats cut (thyroid surgery)" (Anjain, p. 97). Anjain also kept a record of all people who had thyroid disorders and surgeries (pp. 102-103).

¹²³ October 13, 1972 report from Robert Conard to Brian Farley, Special Joint Committee Concerning Rongelap and Utrik Atolls, Congress of Micronesia. Electronic document, http://worf.eh.doe.gov/data/ihp2/3070_.pdf, accessed October 25, 2007.

¹²⁴ Oral History of Physician James S. Robertson. Op cit, note 79.

¹²⁵ Compensation for the People of Rongelap and Utrik: A Report by the Special Joint Committee Concerning Rongelap and Utrik Atolls to the Fifth Congress of Micronesia. February 28, 1974:29-32.

¹²⁶ Meeting with Rongelap People April 1974, report by Robert Conard http://worf.eh.doe.gov/data/ihp2/2833_.pdf, accessed December 17, 2007.

Typically, when the Rongelapese complained about the medical program, the AEC and DOE doctors used data they collected to make it appear that the Rongelapese were not suffering from any medical ailments, with the exception of thyroid disorder. Time and time again, the U.S. Government would use information gathered from faulty control group to downplay the effects of radiation: The U.S. called the population that was not present on Rongelap for the Bravo test, but was resettled on Rongelap in 1957 and ingested radiation from a severely contaminated environment, "unexposed." When the "unexposed" group exhibited the same medical problems as the group "exposed" to radiation from Bravo, the U.S. Government maintained that the "exposed" group was in good health because people in the "unexposed" group suffered similar illness rates. While minimizing the effects of radiation to the Marshallese and the world, U.S. Government researchers continued to collect data from the Rongelapese. As indicated throughout this report, U.S. research plans, medical survey documents, and laboratory reports contradict each of these statements.

¹²⁷ Letter to Dr. Robert Conard from Nelson Anjain, April 9, 1975. Electronic document, http://worf.eh.doe.gov/data/ihp21976_.pdf, accessed October 25, 2007.

¹²⁸ DOE #277: Edward T. Lessard. July, 1982. Field Trip Report. Marshall Islands Radiological Safety Program, Brookhaven National Laboratory: Upton, New York. p.2.

DOE #361: N.A. Greenhouse and T.F. McCraw. Date not available. p.8.

¹²⁹ National Research Council 1994. Radiological Assessments for Resettlement of Rongelap in the Republic of the Marshall Islands. National Academy Press: Washington DC.

¹³⁰ Rosalie Bertell. November 16, 1989. Testimony to the Committee on Interior and Insular Affairs regarding the safety of Rongelap Atoll. (United States House of Representatives: Washington, DC): p.10.

¹³¹ The question of genetic effects of radiation exposure has been a heavily contested one. James V. Neel, the researcher involved in the first human subject experiment in the Marshall Islands, was also the principal architect of the Atomic Bomb Casualty Commission studies, including a five year study of pregnant women in Hiroshima, Nagasaki, and Kobe (the “control” population situated 18 miles from Hiroshima). That study found evidence of miscarriages and congenital birth defects in all populations examined, but identified the consanguineal “breeding pattern” of the Japanese as a significant factor in explaining the rate of birth defects in this population. The application of consanguinity as a discount factor assumed that first, second, and third cousin marriages would produce higher rates of defect. Rates of defect were defined in relation to each of the three study groups. Data did not exist at that time to contextualize the Hiroshima/Nagasaki experience with the national Japanese experience, or with previous pre-radiation experiences. In addition to problems in interpreting findings, a 1956 National Academy of Sciences review of the Atomic Bomb Casualty Commission study identified serious problems with the definition and use of Kobe as a “control” population, recognizing significant problems with “exposure” determinations, acknowledging that the “control” population also received exposure to radiation. In the 1960’s James V. Neel and others returned to Japan and updated their study, producing similar findings of no significant genetic effects, except changes in the sex ratio and blood protein. This restudy involved the same use of a consanguinity discount ratio, and employed the same assumptions of no radiation exposure in the “control” population. James V. Neel’s findings have been cited numerous times over the years when the Japanese and the Marshallese expressed concern over the inter-generational effects of radiation exposure, and Neel served as the chair of the Committee charged with assessing the status of Rongelap, reported in the National Research Council 1994 report “Radiological Assessments for Resettlement of Rongelap in the Republic of the Marshall Islands.” Most recently, scientific findings emerging from Chernobyl exposures conclude significant genetic effects from exposure to low level radiation. “Very high mutation rate in offspring of Chernobyl accident liquidators” by H. Sh. Weinberg; A. B. Korol; V. M. Kirzhner; A. Avivi; T. Fahima; Eviatar Nevo; S. Shapiro; G. Rennert; O. Piatak; E. I. Stepanova; E. Skvarskaja. *In* The Royal Society Proceedings: Biological Sciences (Volume: 268 Number:1471) 1001-1005.

¹³² October 1976 letter to Congressman Balos (Majuro, Marshall Islands) from Dr. James Livermore. http://worf.eh.doe.gov/data/ihp1a/2180_.pdf, accessed December 17, 2007. Neel bases this statement on work conducted for the Atomic Bomb Casualty Commission with Japanese survivors of Hiroshima and Nagasaki bombings and their offspring. A 1956 National Academy of Science Committee on Genetic Effects critically reviewed this work, noting that the Japanese study “did not prove in any sense of the word that there was no genetic effect.” Enclosure 1: Critique of the Report of the National Academy of Sciences: The Biological Effects of Radiation” 8/23/1956:4. Electronic document, http://worf.eh.doe.gov/data/ihp1c/0507_a.pdf, accessed October 25, 2007.

¹³³ The study was conducted by researchers from the Institute of Haifa in Israel and the Academy of Medical Sciences of Ukraine and was published in the May 22, 2001 issue of the Proceedings of the Royal Society of London. “Very high mutation rate in offspring of Chernobyl accident liquidators” by H. Sh. Weinberg; A. B. Korol; V. M. Kirzhner; A. Avivi; T. Fahima; Eviatar Nevo; S. Shapiro; G. Rennert; O. Piatak; E. I. Stepanova; E. Skvarskaja. *In* The Royal Society Proceedings: Biological Sciences (Volume: 268 Number:1471) 1001-1005.

¹³⁴ Rosalie Bertell. November 16, 1989. Testimony to the Committee on Interior and Insular Affairs regarding the safety of Rongelap Atoll. (United States House of Representatives: Washington, DC): p.10.

¹³⁵ According to Helena Alik, secretary to then Trust Territory District Administrator Oscar DeBrum, all of the medical files, records, and photographs of the deformed children and medical problems of the Marshallese were kept in a locked safe in Oscar DeBrum’s office. One night, in the middle of the night, some unknown person opened the safe and all the contents were burned. Medical files also disappeared from hospital facilities. Helena Alik was also one of the “control” patients when the Rongelapese were on Ejit and she was in Majuro. At one time, her medical record at the hospital was huge because she was part of the control group and involved in so many tests and procedures. Now, her chart is almost empty. She doesn’t know who removed the contents of her file. March 13, 1998 interview with Holly Barker, Majuro.

¹³⁶ August 17, 1960 letter from Ezra Riklon to R. Conard, on file RMI Embassy, Washington DC.

¹³⁷ Holly M. Barker. “Fighting Back: Justice, the Marshall Islands, and Neglected Radiation Communities” in Life and Death Matters: Human Rights and the Environment at the End of the Millennium. Barbara Rose Johnston, Ed.

(Alta Mira Press: London) 1997.

¹³⁸ Rosalie Bertell. November 16, 1989. Testimony to the Committee on Interior and Insular Affairs regarding the safety of Rongelap Atoll. (United States House of Representatives: Washington, DC): p.10.

¹³⁹ DOE #50: Henry Kohn. March 1, 1989, p.14-15.

DOE #1023: The Special Joint Committee Concerning Rongelap and Utirik Atolls. February, 1973. p. 35.

¹⁴⁰ July 15, 1980 report from Reuben Merliss, M.D. to Gordon Stemple, Esq. Electronic document, http://worf.eh.doe.gov/data/ihp1a/3081_.pdf, accessed October 25, 2007.

¹⁴¹ Advisory Committee on Human Radiation Experiments. The human radiation experiments: Final report of the President's advisory committee. Washington DC: Government Printing Office (October 1995).

¹⁴² Health concerns associated with chelation therapy are listed on the Holistic-online.com site. EDTA therapy poses a threat to patients who are elderly, have low parathyroid activity, or are suffering from heavy metal toxicity that damages the kidney. Heavy metals damage the kidneys and too rapid infusion can overload them. Heavy metals likely to produce kidney damage include lead, aluminum, cadmium, mercury, nickel, copper and arsenic. Other health effects include rapid drop of calcium in blood levels causing cramps and convulsions, and drop in blood glucose leading to insulin shock. Electronic document, http://www.holistic-online.com/chelation/chel_safety.htm, accessed October 25, 2007.

¹⁴³ Using the Rongelapese to do radioisotope studies that were unrelated to their exposure-needs was discussed and agreed upon at July 1954 AEC Division of Biology and Medicine "Conference on Long Term Surveys and Studies of Marshall Islands". Electronic document, http://worf.eh.doe.gov/data/ihp1c/0246_a.pdf, accessed October 25, 2007. Specific reference to Cr-51 studies was made (pgs. 175-176):

Dr. Bugher: Have you thought much of the possibility of tagging procedures to measure red blood cell formation rates?

Cdr. Cronkite: We thought about it.

Dr. Bond: We thought about it, and thought it could be done, but wondered what the value of the program would be and whether we were justified in doing it.

Cdr. Cronkite: The problem of a questionable nutritional status and various things that can interfere with iron uptake that would be unconnected with exposure to radiation and the difficulty to get a truly unbiased random sample of normals for comparison. I don't know whether it ought to be done or not...

Dr. Dunham: I think if it is not controlled, it will not be meaningful. If it is controlled, it is more significant than bone marrow biopsies as far as the red cell cycle is concerned.

¹⁴⁴ Lab reports with Marshall Island blood volume data findings from 21 Rongelapese samples taken in 1964 (Electronic document, http://worf.eh.doe.gov/data/ihp2/4625_.pdf, accessed October 25, 2007), and, from 18 Rongelapese samples in 1965 (Electronic document, http://worf.eh.doe.gov/data/ihp2/4609_.pdf, accessed October 25, 2007).

¹⁴⁵ 1959 Medical Survey Report. Electronic document, http://worf.eh.doe.gov/data/ihp1a/3121_.pdf, accessed December 17, 2001.

¹⁴⁶ April 9, 1965 letter from Dr. Leo Meyer to Dr. W. Siri, Electronic document, http://worf.eh.doe.gov/data/ihp2/4614_.pdf, accessed December 17, 2007.

¹⁴⁷ Oral History testimony of James Robertson, 20 January 1995.

¹⁴⁸ Letter from Lewis L. Strauss, Chairman of the AEC, to Dr. Failla on October 12, 1956. Letter on file at the Republic of the Marshall Islands Embassy.

¹⁴⁹ Letter from Hermann Lisco to George Darling, Director of the Atomic Bomb Casualty Commission, 29 April 1966, National Academy of Sciences Archives, ABBC Box 22, File Marshallese Study (AEC) with ABCC Correlation, 1955-1971.

¹⁵⁰ Oral History testimony of James Robertson, 20 January 1995.

¹⁵¹ Untitled document in the DOE declassified boxes showing what teeth were pulled from which exposed and unexposed people. On file at the Embassy of the Republic of the Marshall Islands.

¹⁵² 1978 letter from Dr. Conard to Dr. Walter Wyzen. Electronic document, http://worf.eh.doe.gov/data/ihp2/1464_.pdf, accessed October 25, 2007.

¹⁵³ Jeton Anjain. November 16, 1989. Testimony to the Committee on Interior and Insular Affairs regarding the safety of Rongelap Atoll. (United States House of Representatives: Washington, DC): p.10.

Rosalie Bertell. November 16, 1989, p.6.

¹⁵⁴ Jeton Anjain. November 16, 1989:14, 16.

¹⁵⁵ Henk Haazen and Bunny McDiarmid. 1989. Report on the Marshall Islands: 1/4/86 - 1/8/86. Greenpeace: New Zealand.

¹⁵⁶ *ibid.*

¹⁵⁷ Henk Haazen and Bunny McDiarmid. 1989:3.

¹⁵⁸ For a recent characterization of living conditions on Ebeye, see “Dark Side of Security Quest: Squalor on an Atoll” by Howard French, *New York Times*, 11 June 2001:3.

¹⁵⁹ Johnsay Riklon. February 28, 1999. Interview with Holly Barker, Barbara Rose Johnston, and Stuart Kirsch. Outrigger Hotel, Majuro.

¹⁶⁰ Data from figure 4.2 “Households engaged in subsistence activities, 1988” in *Statistical Abstracts of the Marshall Islands, 1998*. Some 48.77% of RMI households engaged in subsistence activities to grow food, 69.04% fished for food, 45.76% kept livestock, 35.97% were involved in handicraft production for household use. The Rongelap community could gain access to fishing with boats, or with coastal access permission. However, the intense household density results in severe pollution of coastal and near shore waters, habitat degradation, and localized over-fishing.

PART FOUR: SUMMARY OF DAMAGES, NEEDS, COMPENSATION CONCERNS

1. Claims by the People of Rongelap for Hardship and Related Consequential Damages of the Nuclear Weapons Testing Program

Evidence in Part Two and Three of this report support the following findings:

- ◆ The people of Rongelap experienced involuntary displacement from Rongelap and Ailinginae Atolls when physically removed from their atolls (March – May 1946; 1954-1957). They lost access to a viable healthy ecosystem (thus, displaced from their ability and rights to safely live in their environment) when returned to their atolls (1957-1985). They became exiles (1985-present) when finally informed of the life-threatening contamination levels in their homeland.

- ◆ Families were deprived of their right to live and use lands on Rongerik Atoll.¹⁶¹ Rongerik Atoll was taken for United States Naval use following World War II and used as a weather and fallout tracking station during the Nuclear Testing Program (1946-1958). The United States Navy, without permission or compensation, used Rongerik as a resettlement site for the Bikinians (1946-1948). And, in 1957 when the Rongelap community was resettled on Rongelap and Ailinginae, all access and subsistence use of Rongerik Atoll was prohibited by the United States due to severe contamination from nuclear weapons fallout.

- ◆ Exposure concerns involve much more than the exposure to radiation and fallout from a singular testing event in 1954. Exposure concerns involve the persistent presences of contamination from 67 atmospheric tests of nuclear weapons in the Marshall Islands. This contamination includes radioactive elements released through nuclear explosions, as well as tracer chemicals, such as arsenic, used to “fingerprint” the fallout from each weapon. The people of Rongelap, Rongerik and Ailinginae were not only exposed to external radiation and other toxic substances from fallout, but more significantly, from internal ingestion: breathing dust and smoke from household and garden fires, drinking water, consuming terrestrial and marine food sources, living in houses and using the material culture fashioned from contaminated materials.

- ◆ “Exposed” people of Rongelap include those living on Rongelap and Ailinginae in 1954 who were exposed to Bravo and other test fallout; those who were resettled in 1957; those who were born on the contaminated atoll; those who were exposed to materials and food originating from Rongelap, Rongerik and Ailinginae atolls; and, the descendents of people exposed to radioactive contaminants. Given the synergistic, cumulative and genetic effects of long-term exposure to radioactive isotopes and other environmental contamination from military testing, exposure is of concern to this and future generations.

- ◆ The people of Rongelap, Rongerik and Ailinginae, with other Marshallese, served as unwitting subjects in a series of experiments designed to take advantage of the research opportunities accompanying exposure of a distinct human population to radiation. Human subject research involving the Marshallese was initially funded by the AEC in

1951 in an effort to document “spontaneous mutation rates” to better estimate the genetic effects of radiation produced through the Nuclear Weapons Testing Program. Research on the human effects of radiation was intensively conducted beginning in March 1954, with efforts to document the physiological symptoms of American servicemen and Marshallese natives exposed to fallout from the Bravo test. Initial findings from this and other biological research projects helped shaped the goals and approach to an integrated long-term study on the human and environmental effects of nuclear weapons fallout that began in 1954 and continued through 1997.

- ◆ The people of Rongelap believe, and the documentary record confirms, that the United States were aware of the extraordinary levels of fallout of Bravo and subsequent tests and continuing levels of radioactivity, were aware of contamination in the marine as well as terrestrial ecosystem, were aware of the bioaccumulative nature of contamination, noted radiation-induced changes in vegetative and marine life that islanders relied upon for food, monitored the increased radiation burdens of the resettled people returned to Rongelap in 1957, and documented the human health consequences of this systematic and cumulative exposure. Medical exams, especially in the 1950s-early 1970s, were surveys meant to document bioaccumulation processes and the physiological symptoms related to radiation exposure, rather than clinical efforts to treat the various health conditions of the people of Rongelap. Periodic “Medical Surveys” also subjected the people of Rongelap to various procedures that produced biological samples in support of a wide range of experiments, many of which had little or no connection to the individual health and treatment needs of the people of Rongelap. Various human subject

experimentation also occurred during medical treatment trips to research laboratories based in the United States and Guam. Ethnographic and documentary evidence demonstrates that these human subject experiences were painful, abusive, and traumatic.

- ◆ In addition to biophysical injuries, exposure to the environmental hazards generated by the United States Nuclear Weapons Testing Program (and related biomedical research) resulted in stigmatization and other psychosocial injuries that adversely affected individuals, the community, and the nation. Nuclear testing introduced new taboos where certain lands and certain foods were off limits, where marriage to certain people involved new social stigmas, where birthing presented new fears and health risks, and where family life often involved the psychological, social and economic burden of caring for the chronically ill and disabled. The failure of the United States Government to provide the Rongelap people with accurate information concerning environmental hazards and risks, coupled with contradictory pronouncements on what is and is not safe, created taboos that were incomprehensible, yet dominated living conditions after the onset of testing in the Marshall Islands. This transformation in the loci of control over “taboos” from a Marshallese cultural realm to a United States scientific realm undermined rules and the customary power structures that shaped, interpreted, and reproduced strategies for living in the Marshall Islands. The fear of nuclear contamination and the personal health and intergenerational effects from exposure color all aspects of social, cultural, economic, and psychological wellbeing. This imposed stigmatization adversely affects the economy, society, family, and individual health and well being of the people of Rongelap, Ailinginae, and Rongerik, and to varying degrees, the entire nation.

- ◆ After leaving Rongelap and Ailinginae Atolls in 1985, the Rongelap community faced severe hardships as they struggled to rebuild some semblance of community in Mejjatto, Majuro, Ebeye, and other locations. Involuntary resettlement placed hundreds of people on small bits of rented land, creating extremely dense, unsanitary, and impoverished communities. The Rongelap community represents some 8% of the total Marshall Islands population, and while an estimated 48% of the nation is able to support household needs through agricultural production, the Rongelap community is alienated from land and the traditional resources needed to survive. This loss of access affects diet, health, and household economy.
- ◆ Extremely dense residential patterns created by communities of exiles living on rented land has created or exacerbated terrestrial and marine pollution. The extreme impoverished condition of the Rongelap community has intensified local resource use, and the ecosystemic viability of “host” island environs has been degraded. Restricted access to critical resources inhibits the ability to teach younger generations the means to sustain a self-sufficient way of life. Loss of access to customary lands further inhibits efforts to transmit key information across the generations, knowledge that is essential to the survival of the community if they are ever to return to customary lands. These social, cultural, economic, and environmental problems of “urbanization” are linked to the loss of lands, involuntary displacement, and are consequential damages from nuclear testing.

- ◆ Nuclear testing destroyed the means to sustain a self-sufficient way of life for the people of Rongelap. Customary uses of Rongelap, Rongerik and Ailinginae atolls encompassed a rich range of social, cultural, economic activities, values, and meanings that allowed a vibrant, marine-based, self-sufficient and sustainable way of life. Current and customary laws, traditions, and subsistence production patterns involve an inherited system of rights to both terrestrial and marine resources. The consequential damage and injuries of contamination from the Nuclear Weapons Testing Program affects both terrestrial and marine ecosystems, including the natural and cultural resources that sustain life. Damage assessments and compensatory actions need to include consideration of lagoon, reef heads, clam beds, reef fisheries, turtle and bird nesting grounds, as well as those resources important for sustaining the social and cultural aspects of life including family cemeteries, burial sites of *iroij*, sacred sites and sanctuaries, and *morjinkot* land. Because sustainable subsistence production requires access to multiple locations to survive without overusing the resource base, clean up and resettlement of the main island of Rongelap Atoll is not sustainable without restoration of all of Rongelap's islands and Rongerik and Ailinginae atolls. Compensatory actions should reflect a commitment to replace, restore, or create new means to sustain a self-sufficient way of life.

Conclusion

Nuclear testing created environmental hazards, health problems, hardships and other consequential damages that will persist for decades to come. Compensatory actions should incorporate principles of nuclear stewardship and provide sufficient funds, facilities, expertise, and training to allow the people of the Marshall Islands the means and ability to

conduct their own intergenerational epidemiological surveys, environmental risk assessments, develop culturally appropriate environmental risk management strategies (including monitoring contamination levels and decay rates and remediate terrestrial and marine ecosystems), and provide intergenerational medical care.

2. Consequences of these events and injuries

Stigmatization and other psychosocial injuries: Exposure to the environmental hazards introduced by the United States Nuclear Testing Program resulted in stigmatization and other psychosocial injuries that adversely affected the local economy, the community, and the nation. Customary rules and traditions are an essential component of the Marshallese psyche. Rules that restrict behavior (termed, here, as taboos) were traditionally defined and imposed by internal actors in ways that established and regulated social, political, and economic relationships. Traditional taboos made sense. Nuclear testing introduced new taboos where certain lands and certain foods were off limits, where marriage to certain people involved new social stigmas, where birthing presented new fears and health risks, and where family life often involved the psychological, social and economic burden of caring for the chronically ill and disabled. The knowledge of and control over what is and is not taboo resided in the hands of outsiders, U.S. Government scientists and the agencies that sponsored and controlled their research. The failure of the United States Government to provide the Rongelap people with adequate and accurate information concerning environmental hazards and risks, coupled with contradictory pronouncements on what is and is not safe, created taboos that were incomprehensible, yet dominated all facets of society and way of life. This transformation in the loci of control over “taboos” from a Marshallese to United

States/scientific realm undermined rules and the customary power structures that shaped, interpreted, and insured the community's ability to care for itself. Furthermore, the fear of nuclear contamination and the personal health and intergenerational effects from exposure color all aspects of social, cultural, economic, and psychological well-being. This imposed stigmatization adversely affects the economy, society, family, and the individual health and well being of the people of Rongelap, Ailinginae, and Rongerik, and to varying degrees, the nation as well. National economic development options and market response is intrinsically linked to its nuclear history and the accompanying stigmatization of radioactive contamination.

The psychological impacts of the United States Nuclear Weapons Testing Program are severe. These impacts are not based on unjustified, unsubstantiated fears, but result from decades of mismanagement of the radiation crisis by the United States Government. Prior to the testing, Rongelapese survival depended on their knowledge and understanding of the local environment. The Rongelapese knew when, where, and how to cultivate the resources necessary for survival. With the introduction of a hazardous, invisible threat to their environment and health, the Rongelapese feared the radiation they could not see or taste when they ingested it. In this sense, radiation has become the new "taboo" for the Rongelapese. The Rongelapese are forbidden to eat their traditional foods, such as the coconut crab, because of an intangible hazard. Their own lands have also become taboo as they are off limits because of radiation contamination. As a result, all members of the community experience a cultural agony from the dispossession and removal from land, the culturally important places, and the subsequent disintegration of community identity.¹⁶²

The United States Government's mismanagement of the Rongelapese radiation crisis exacerbates people's fears about radiation. The United States Government prematurely resettled the people on an island declared "safe" by the United States Government. As a result of the premature resettlement, the health of the Rongelapese was compromised. The United States Government monitored increased radiation body-burdens in the Rongelapese and failed to inform them about their risks to environmental exposure.¹⁶³

The United States Government also created conflicting directives for the resettled Rongelapese. For example, the people were told they could eat coconut crab, and then they were told they could not. Finally, the Rongelapese believe the United States Government is unwilling to take responsibility for their exposure because they will not discuss safety in terms of absolute safety. Instead of telling the Rongelapese definitively whether they are putting themselves at risk, United States Government scientists discuss the issue in terms of calculated risks in which a few people could be affected, but each person has to make up their mind whether they are willing to take that risk or not. The United States Government's wrongful resettlement of the people, the failure to disclose increased environmental exposure risk, and the refusal to talk about safety in definitive terms increases the stresses and psychological burdens of radiation exposure for the Rongelapese people.

The Rongelapese have a first-hand understanding of the effects of radiation on human health and the environment. Their experiences differ from the scientific effects of radiation that the United States Government imposes on the Rongelapese. For example, the scientific community failed to reach a decisive conclusion about the effects of radiation on the second generation. The Rongelapese have experienced changes in reproduction among women and changes in the health of their offspring since the testing program. These changes remain

underreported, however, as cultural barriers exist which prevent women from reporting or registering their experiences with either United States or Marshalllese health authorities. The United States Government's unwillingness to acknowledge the effects of radiation that the Rongelapese attribute to the testing program undermines the Rongelapese people's trust in the United States Government's willingness to reconcile all the consequences of the testing program.

The ethnographic data collected for this project reveals the anxiety of the Rongelapese about the insidious, invisible radiation threat that has taken them from good health to illness, from their homelands to exile, and from trust to skepticism:

Nerja Joseph: *I won't go back. The radiation won't go away* (March 8, 1999, Holly M. Barker, Majuro).

Dorothy Amos: *We were afraid of the powder and the explosions. We were afraid they would drop powder again* (March 18, 1999, Holly M. Barker, Ebeye).
Psychologically, you stop believing in everything around you. Your feeling of safety no longer exists when the radiation-contaminated medicine and food around you is no good, restricted, and makes you worry (Advisory Committee meeting, March 3, 1999, Majuro).

Household economic injuries: As noted earlier, on Rongelap, Rongerik and Ailinginae, the Rongelapese had sufficient resources to provide for the majority of their needs. Some provisions, such as kerosene, tin roofing, lamps, cigarettes, matches, sugar, rice, and flour were purchased. The Rongelapese would acquire these provisions by selling their natural resources to merchant ships that periodically visited their islands. The Rongelapese men sold copra, a major source of income to the outer atolls in the RMI throughout this century. Women generated an income from the sale of handicrafts or foodstuffs that they made as individuals or as part of a Rongelapese cooperative, the *White Rose*. Natural resources have value to the Rongelapese as items of exchange between families and neighbors: resources are

exchanged for other resources, for labor, or to mark important cultural occasions. Today, the Rongelapese live on small segments of other people's land, typically in dense clusters of shacks built from scavenged pieces of plywood, tin and other materials. The houses have relatively little surrounding vegetation. The few resources that may be present (coconut, breadfruit, papaya or pandanus trees) belong to the landowner and not people who live there. Environmental contamination has robbed the Rongelapese of their customary access to natural resources used to sustain households, communities, exchange for other goods, or generate an income.

Community injuries: Leaving Rongelap Island has had profound implications on the Rongelapese community. Fragmentation, for example, has made it difficult for the Rongelapese to remain unified as a community. Because people reside in different locations, and because the younger generation grows up in a lifestyle radically different than that of their parents and grandparents, community unity is a greater challenge to the local leadership. As the former City Manager for the Rongelap Local Government observed, "*I am a City Manager with no city*" because there is no capital city for the Rongelapese people in their diaspora.¹⁶⁴

While the fragmented communities still have many common interests, such as housing, health concerns, and the future of their land, the local leadership has to work harder to establish communication and a common plan of action to reach their objectives. In comparison, the Rongelapese community worked together constantly to ensure the survival and well being of all community members on Rongelap, Rongerik and Ailinginae atolls.

In addition to the problems caused by fragmentation, relocation from Rongelap has undermined cultural authority and respect for elders as people don't listen to their elders when they no longer fear the reproach of being kicked off their lands. Lacking land and resources, the people experience great difficulty generating tribute to offer to their *iroij*. Dispersed communities and expensive transportation costs mean that the *iroij*, *alabs* and *ri-jerbal* have few opportunities to meet as a group. Birth, marriage, and death -- the cycles of life in a community-- are events no longer tied to the land and are celebrated without overt reaffirmation of land rights and respect for those who confirm land rights. Landholders and elders are experiencing an erosion of their ability to hold the community together, and an erosion of their own social power since their authority is tied to use of the land and resources. The interviewees are clear about how displacement affects a sense of community:

Johnsay Riklon: *The community is scattered and splintered with no base. There are many different categories of Rongelapese now-- those who have lived there, those who have not, teenagers, etc. (February 28, 1999, Holly M. Barker, Barbara Rose Johnston, and Stuart Kirsch, Majuro).*

Wilfred Kendall: *Consider the role of individuals in a society defined by the environment. There are three tiers of rights. These rights are reciprocal. Alab and ri-jerbal roles are specific. Community life comes from the land. The movement of people from their land changes all of this: people are no longer connected to the land, or anything. When people are not on their land with its social ranks they cannot perform what is expected of them. This makes them feel insecure. Land is a privilege and it tells you who you are in the community... The role of the alab and iroij are specific in nature. Moving away really messes up things. Going to new land, new areas, you don't know what land belongs to whom. There is no iroij system there (March 2, 1999, Advisory Committee meeting, Majuro).*

John Anjain: *Sometimes today, there are problems determining who the alab is. There are more problems nowadays because there are more people, money is of greater importance, and because people marry with outsiders and mix the blood. When you marry Rongelap to Rongelap, it is in the best interest of the community to keep the conflicts down. Being moved off the land accelerates marriage to outsiders and reduces the power of landowners. It's easier for family to push you out, especially when your mother is from outside (March 16, 1999, Holly M. Barker, Ebeye).*

Displacement has resulted in the Rongelapese marrying non-Rongelapese. This attenuates the land and power a family is able to secure by marrying cross-cousins and other Rongelapese. The phenomenon of *Menonak*-- people who marry and go away with their spouse--also weakens the community.

Political impacts: The RMI national government has a constitutional responsibility to provide for the needs of the people and the protection of their environment. According to Section 5 of the RMI Constitution:

No land right or other private property may be taken unless a law authorizes such taking; and any such taking must be by the Government of the Republic of the Marshall Islands, for public use and in accord with all safeguards provided by law... [And,] where any land rights are taken, just compensation shall include reasonably equivalent land rights for all interest holders or the means to obtain the subsistence and benefits that such land rights provide.

Despite these protections of rights by the RMI Constitution, the RMI Government is forced to reconcile the United States Government's taking of private property from the Rongelapese. The RMI Government lacks the human, financial and institutional resources to provide the housing, food, water, and other needs that the Rongelapese used to provide for themselves on Rongelap, Rongerik and Ailinginae. The RMI national government does not have three spare atolls to provide the equivalent of the land the Rongelapese lost, nor the resources to enable the Rongelapese to live self-sufficiently. Rongelapese dislocation causes a drain on national resources as the RMI Government struggles to provide for the needs of the Rongelapese, especially their healthcare needs.¹⁶⁵

The displacement of the Rongelapese from Rongelap, Rongerik and Ailinginae also affects the political composition of the national government. Political representation in the

nation's parliament, the *Nitijela*, is conditioned on physical occupation of the land. Each occupied atoll or large island has the right to elect one senator, no matter how small the atoll population might be. If there are no people residing on an atoll, there is no political representation for that area in the *Nitijela*. According to the former Senator representing Rongelap Atoll, the nuclear testing disrupted politics on the three atolls by reducing three atoll communities to just one:

Johnsay Riklon: *Ailinginae and Rongerik are large atolls, but they are treated like small islands by the United States. People should have been returned to these atolls and there should be three senators representing the three areas, not one. In this regard, the testing affected the political make-up of the country...*

Now, people talk about Rongelap as if it is just one place, Rongelap Island. But, it was the fallout and testing that brought people from Ailinginae and Rongerik to Rongelap. Actually, there should be political representation from all three areas since there are people with land rights in those different places (February 28, 1999, Holly M. Barker, Barbara Rose Johnston, and Stuart Kirsch, Majuro).

Rongerik Atoll lacks representation because the Rongelapese have been denied the right to return to their land. Following WWII the United States Navy took control of the atoll, establishing a weather and fallout tracking station on Rongerik and, for a two-year period (1946-1948) using the atoll to host the displaced people of Bikini:

John Anjain: *We moved from Rongerik during the war to stay together on Rongelap. We didn't use it after the war because the Navy used Rongerik. People lived with their relatives on Rongelap, but the land rights were different than on Rongerik (March 16, 1999, Holly M. Barker, Majuro).*

Ailinginae Atoll lacks representation because in 1957 the United States Government confined resettlement to a single island in Rongelap Atoll, and declared Ailinginae off limits for permanent occupancy.

Stewardship concerns: On the island of Rongelap, and on the small islands of Mejatto, Majuro and Ebeye where the Rongelapese currently reside, the Rongelapese are unable to

practice principles of responsible stewardship, nor can they easily transmit their knowledge of sustainable access and use to the younger generations. Notions of stewardship involve care of the land and limited use of resources in multiple marine and terrestrial locations. The inability of the Rongelapese to adhere to principles of stewardship while confined to Rongelap Island during their resettlement, and currently while living on Mejatto, Ebeye, and Majuro, means that the Rongelapese are contributing to the degradation of the land they use.

Because the Rongelapese live far away from their traditional lands, no one is able to maintain the land and protect the resources and property for future generations. The Rongelapese express concern about people who sail to these now unpopulated atolls and pillage their resources:

George Anjain: *When land is evacuated, people can't protect their resources. Fishing boats and other boats steal the clams and other resources. The local government is unable to protect its resources. Foreign fishing and other vessels come and pillage the natural resources, such as the giant clams and turtles. Because there are no people living on the land, there is no one to protect the land* (March 15, 1999, Holly M. Barker, Ebeye).

Countless generations of future Rongelapese will inherit property contaminated by radiation. Unfortunately for the Rongelapese, the more time people are off the atolls, the more difficult it is for people to exercise their land rights and ensure that the land is passed on to future generations. Rongelapese who grow up away from Rongerik, Ailinginae and Rongelap lack the knowledge about essential cultivation areas and dangers that are important to survival if they return to the land. Part of the difficulty of passing land on to future generations is because some of the books of information about the lands and *wetos* were burned or destroyed.

People couldn't take all of their possessions with them [when they were evacuated]. This leads to disputes. People used to work by consensus. (Advisory Committee meeting, March 3, 1999, Majuro).

Loss of way of life: Most informants emphasized that what has been lost is the means to sustain a way of life. Contamination forced the Rongelapese to abandon their three atolls, and the Rongelapese must rent or stay on other people's land. While the Rongelapese have places to live they do not have just compensation for the United States Government's taking or rental of their atolls: they have not received from the United States Government the means to rent other people's land. They do not have access to the natural resources they need as the "means to obtain subsistence and benefits" necessary to survive (RMI Constitution, 5.5).¹⁶⁶

3. Compensation Concerns

...any Marshallese citizens who are removed as a result of test activities will be reestablished in their original habitat in such a way that no financial loss would be involved. United Nations Trusteeship Council, 1954.¹⁶⁷

In the course of our interviews one of the most common questions informants asked of us was the question of how can you possibly place a monetary value on land, or compensate for many lifetimes of suffering? How can any amount of money ever compensate for the pain and loss experienced by those who lived through the testing... by those who endured years of living in a contaminated setting... by those unwitting test subjects in a series of radiation exposure experiments... by those who struggle to retain identity and sustain family needs while enduring the socioeconomic hardships of life on Ebeye, Mejjatto, Majuro, and other

places of exile? Land represents a perpetual resource -- something that sustains this and future generations. How can a sum of money be equivalent?

For the Rongelapese what has been lost is the means to sustain a self-sufficient way of life. Towards this end, we asked our informants to think beyond individual complaints and monetary awards and imagine broader forms of compensatory action. What actions might help the Rongelap people and the nation reclaim a healthy, viable way of life? What kind of research is needed? What actions might help the displaced community regain its sense of integrity? Identity? Self-sufficiency? These questions prompted a wide range of ideas and concerns over how to proceed, in the event that some compensation is granted, and many of these ideas are summarized below.

Land compensation concerns

Many of the responses focused on issues around compensation to those current owners of *weto* rights. Informants explained that customary traditions and current practices involve a fluid, rather than fixed, system of rights to *wetos*. *Weto* rights are inherited, with women usually investing a male member of her family with the power to manage use rights. To claim the right to use a *weto*, one must know its boundaries and history. The power to recognize and validate that claim rests in the hands of customary authorities (*alabs* and *iroij*). Changes in family structures and changes in customary power structures (with, for example the death of a mother, *alab*, or *iroij*) produces a new distribution of use rights. Monetary compensation for denied use or damage to land based on use rights for a fixed point in time imposes a system of individual property rights. Under customary practice:

[T]he Marshallese system of land tenure provides for all eventualities and takes care of the needs of all of the members of the Marshallese society. It is, in effect, its social

security. Under normal conditions no one need go hungry for lack of land from which to draw food. There are no poor houses or old people's homes in the Marshall Islands. The system provides for all members of the Marshallese society, each of whom is born into land rights (Tobin 1958:1).

Monetary compensation to a primary landholder for loss of use over a fixed amount of time undermines a very complex Marshallese land tenure system. By imposing a simple compensation scheme that does not account for the multiple loss of use rights over time, this approach fails to recognize that “land in the Marshall Islands is placed in many categories, each with its own descriptive name and rules of inheritance. The Marshallese system of land tenure had developed to meet the needs of this particular group of people and is the dominant factor in the cultural configuration. Any radical change by outsiders would disturb the society and could do irreparable damage” (Tobin 1958:2). This fixed, western notion of compensation threatens traditional, fluid systems of “reciprocal rights and obligations of all classes within the framework of the society” (Tobin 1958:4) and the rights of future generations.

In addition to failing to recognize the full range of rights use, fixed compensation approaches create vulnerabilities that vary according to gender, class and age and exacerbate the displacement problems of the Rongelapese. Many informants observed that the increased incidence of lease payments to individuals (and other forms of payment to individuals, including compensation) do not result in the same patterns of distribution that customary payments in food products allowed. Monetary payments are typically transactions between individuals and much less transparent than the public presentation of tributes and redistribution of goods that occurs in customary settings. Many informants expressed the

need for compensatory and remediative actions that reflect community and intergenerational rights and needs.¹⁶⁸

Alienation of land rarely occurs in the Marshall Islands because it is the lifeline for the lineage and the basis of Marshallese culture and survival. As explained to project researchers in March 1999 by a member of the land value advisory committee:

Mike Kabua: *It is extremely rare for people to alienate their land. Traditionally, this only occurred when the iroij gave land as a gift or when it was won through war. Alienating land is so rare that there is no word for lease or borrowing land in Marshallese because that was never done. Land was never leased to another Marshallese because land is so precious (March 2, 1999, Advisory Committee meeting, Majuro).*

If compensation payment is awarded to individual owners of *weto* rights whose lands were irreparably damaged or lost, and money is exchanged for land, the land system will change in ways that cannot be predicted.

When people are forced to leave their land, the *iroij* lose their authority over the people who manage and work their land. The people lack access to the resources that they are expected to provide to the *iroij*. Since the *iroij* distributes the resources between all people, the loss of resources from the Rongelapese reduces the *iroij*'s ability to distribute goods to the *alab* and *ri-jerbal* on atolls other than Rongelap, Ailinginae and Rongerik. This reduces the *iroij*'s power and means that the people get less assistance:

Mike Kabua: *Without people occupying the land, there is no iroij. The word iroij means many people and comes from the words "er woj." What's the point of being an iroij without any land?*

When the bomb exploded, the culture was also gone, too. It is impossible for people to act in their proper roles. Our social roles are something you use everyday, 24 hours a day: You have to use it everyday or you lose it (March 2, 1999, Advisory Committee meeting, Majuro).

Traditionally, the care provided by the *iroij* was rewarded by work and gifts from the people under the *iroij*. Because the Rongelapese are unable to cultivate the land where they are currently displaced, they have no means to provide for their *iroij*. Lacking land and the means to produce customary tributes, the Rongelap community now issues \$5,000 quarterly payments to the *iroij* of Rongelap as a tribute. The Rongelap local government also pays \$3,000 per quarter to the Mejjatto alab. Compensatory damages need to be structured in ways that respect the reciprocal exchanges, obligations, and responsibilities of and between each of the three tiers of Marshallese society.

Youth concerns: The Rongelapese have expressed deep concern about the fate of Rongelap's youth whom, unlike the elders, have not had the same breadth of experience with or connection to their property on the outer islands. Furthermore, Rongelapese adults worry about the fate of their youth that will be unable to exercise or understand their full range of property rights in the future:

Johnsay Riklon: *Kids from Rongelap that live in Majuro are not involved in the Rongelap community. There aren't many community activities for them to get involved in. I don't think they feel Rongelapese. They don't know their relatives. Their friends are kids from other atoll communities. I doubt kids will want to go back to Rongelap. It will be a big adaptation from Coca-Cola to coconuts. Youth are not involved much in voting or other activities* (February 28, 1999, Holly M. Barker, Barbara Rose Johnston, and Stuart Kirsch, Majuro).

George Anjain: *When you leave home, there is no role for the kids. They used to work and contribute, but not anymore* (March 2, 1999, Advisory Committee meeting, Majuro).

Kajim Abija: *My kids are Rongelapese but they are from Kwajalein* (March 16, 1999, Holly M. Barker, Ebeye).

Jerkan Jenwor: *When I was a youth on Rongelap, I started to fish when I was about 8 years old. I knew how to make copra and do all kinds of work. 8 to 12 years of age are important learning years* (March 17, 1999, Holly M. Barker, Majuro).

Rongelapese youth also have concerns. Informants voiced worries about decisions the elderly might make regarding future resettlement of Rongelap. The youth fear that the elders

haven't had as much education as the youth and they might not have the ability to make the right decision about resettlement. Rongelapese youth also worry about the range of opportunities available to them in the urban and displaced areas:

Ken Kedi: *Rongelapese youth can't climb trees, but they are familiar with Coca-Cola. Youth used to keep busy and fit doing work in their environment, such as making copra. They can't do that in the urban areas, however, and they are unfit as a result.* (March 1, 1999, Holly M. Barker, Barbara Rose Johnston, and Stuart Kirsch, Majuro).

Compensatory strategies for damages to the people and environment of Rongelap, Rongerik and Ailinginae should acknowledge the rights and needs of Rongelap youth and future generations to survive from their property and resources. Youth also need sports equipment, education, and opportunities to learn about the unique history and survival techniques of their elders and ancestors.

Needs of the Elderly: The older community members from Rongelap suffer greatly from the testing program. They were exposed to near lethal amounts of radioactive fallout, they suffer from a range of health problems, they get ping-ponged between medical programs without adequate attention, they watch friends and children die, they were relocated many times, they are displaced from their land, they are anxious about death away from their homeland and proper burial ground, they are unable to obtain their basic needs, and they worry about the future of their children and the community. Furthermore, the elders lack the traditional respect they receive on their own land because of their ownership of property and knowledge about survival, and younger Rongelapese lack the monetary resources to adequately provide for the elderly the way they did on Rongelap, Rongerik and Ailinginae. As a result, the elderly Rongelapese are sick, often hungry, and dependent on others to provide them with their needs. Their knowledge about survival and the importance of the

land rights they pass are attenuated in their displacement. The elderly are concerned that if they die, no one will pass on the information to the youth about their property and about their experiences during the testing.

James Matayoshi: *The elders mostly want to return to Rongelap because they know no other way of life* (March 1, 1999, Holly M. Barker, Barbara Rose Johnston, and Stuart Kirsch, Majuro).

Compensation for Rongelap, Rongerik and Ailinginae must include ways for the elderly to provide for themselves to compensate for the ways that loss of land and critical resources impinges on family ability to provide traditional care for elderly. Some informants suggested that rather than providing outside assistance to support the individual needs of the elderly, compensation schemes should support families in ways that allow them to fulfill their obligations to the elderly.

Compensation issues of women: Land is passed down matrilineally in the Marshall Islands. Because the Rongelapese do not live on their land, the authority that women possess as inheritors in the land is attenuated since the Rongelapese are unable to use their contaminated property. Displacement also means that the Rongelapese women have lost their ability to make handicrafts and household supplies on Ebeye and Majuro because of lack of access to the materials they need. As a result, Rongelapese women do not have the same ability to generate an income that they did on their own property:

Timako Kolnij: *On Rongelap, young girls like me learned to make preserved pandanus and food from pandanus. We cooked it in the underground oven. We also made sitting mats, sleeping mats, and baskets. Our grandmothers taught us. We prepared shells for handicrafts. We got the pandanus leaves ready for the women. We got the pandanus leaves from the middle of the island. We didn't ask if we could cut the pandanus. We all lived together from the resources. I also prepared a lot of ripe breadfruit* (March 18, 1999, Holly M. Barker, Majuro).

Compensation schemes must be careful not to place monetary compensation for a fixed period of time solely in the hands of the Marshallese men who manage the land for the women who carry the rights to the land. It is important to recognize and not undermine the power and position in society that women retain as a result of their land stewardship. Furthermore, compensation for the loss of use of Rongelap, Rongerik and Ailinginae should include means for women to participate in the economy. Training and education will be required to help Rongelapese find new ways to contribute to family incomes.

Compensation issues of men: The Rongelapese men are proud of their fishing, sailing and navigation skills that they cultivated on Rongelap, Ailinginae and Rongerik. On their homelands, Rongelapese had a range of fishing and food gathering techniques that ensured their ability to provide food for their families, as is expected of Marshallese men. In the areas where the Rongelapese now live, the ability to survive depends largely on the ability to generate a cash income. Rongelapese believe they lack the educational and professional background required to obtain wage-earning jobs. The interviewees believe that suicide has increased dramatically among young Marshallese men, and that the increased levels of suicide are due to a perceived loss of worth of Rongelapese men.

Ken Kedi: *We have lost our knowledge, our ability, our moral standing and self-esteem in the community. What we were taught is no longer practical. To be a good fisherman, you have to know where to fish on an island. A lot has been lost, not just our land* (March 1, 1999, Holly M. Barker, Barbara Rose Johnston, and Stuart Kirsch, Majuro).

It is really hard for the men to practice fishing skills they know so well (Advisory Committee meeting, March 2, 1999, Majuro).

Compensation schemes should consider the long-term ability and qualifications of Rongelapese men to provide for their families. If the Rongelapese cannot reinhabit their

atolls because of lingering contamination, compensation should consider the training and employment needs of Rongelapese men.

4. Research Needs

Research Principles: Despite the fact that the Rongelapese express anger and resentment about being the subjects of numerous research experiments, the Rongelapese recognize that investigations still must be made into areas that are not understood.

Informants provided a number of suggestions for future research, and these are summarized below as guiding principles and specific recommendations.

1. Research conducted in the Marshall Islands should be conducted in ways that assist the Marshallese in one area or another.
2. The goal of research on living subjects should be to improve the quality of life for that person.
3. All research should be conducted in a transparent manner with community participation in every aspect of the research and reporting.
4. Epidemiological investigation and healthcare should be provided for the full range of radiation related problems that the Rongelapese feel they are experiencing-- not just the illnesses that outsiders want to consider-- including reproductive abnormalities, and problems experienced by the second and third generations.
5. Medical research and health care should be based on the wide range of individual experiences rather than efforts to establish generalizations based on “control” groups in relation to “exposed” experiences.

6. All research must be translated into Marshallese. Results of research and copies of research results must be discussed with and turned over to the community.

Research questions: Some of the specific research questions that the Rongelapese want to see addressed include:

- Is it really safe to return to Rongelap?
- If some areas are so contaminated that people can't live there, can they be safely used for short periods time?
- If some foods, such as the coconut crab, are too contaminated for regular subsistence use, can they still be consumed on special occasions?
- Many species of fish that did not cause fish poisoning before the nuclear tests became poisonous after the tests. Is there a correlation between fish poisoning (from ciguatera or other sources) and nuclear testing?
- Is it safe to consume reef fish, shellfish, and other marine resources from the northern islands?
- Is it safe to drink water from wells, or water stored in catchments or cisterns made from local materials?
- If lagoon sediments are so heavily contaminated with plutonium, is it safe to swim and bathe in lagoon waters?
- Are there times when women (because of menstruation, childbirth, and other reproductive tract changes) increase their vulnerability by swimming and bathing in plutonium-contaminated lagoon waters or squatting close to contaminated soil?
- Can "hot spots" and contaminants be monitored to let us know where it is safe?

- Environmental surveys to date have sampled for the presence of a few radioisotopes. A holistic approach to environmental contaminants in soil, water, and vegetation is lacking. Where are all the environmentally hazardous sites? In addition to “hotspots” from radioactive fallout and bioaccumulation, where are the sites where Naval ships were decontaminated and scuttled, and sites where toxics such as PCP’s were disposed? Tracer chemicals include a range of persistent radioactive isotopes and other toxins, such as arsenic-- are there current and future environmental risks from exposure to persistent tracer chemicals? Are there any other environmental hazards associated with United States military use in the northern islands?
- Is it safe for women to get pregnant and raise children in the northern islands? What are the mutagenic effects of long-term systemic exposure?
- Is it safe for people who were acutely exposed in the past to return to a setting where they will receive constant low-level exposure? Do assurances of safety consider the effects of contaminants on individuals whose health has already been compromised by long-term cumulative exposures? Do current protection standards protect people who were previously exposed?
- Does exposure to radionuclides contribute in some way to increased susceptibility to other ailments (synergistic effects)?
- How can we reduce risks by modifying behavior? How do different factors such as eating habits, exposure from cooking-fire smoke inhalation, and different work activities increase or reduce risk to radionuclides and other environmental contaminants? Are there different exposure pathways and risks for women, men, children, youth, and the elderly?

Are there ways to reduce inter-generational risks? What behavioral changes are needed to reduce risks?

- How does radiation affect the overall health of families (not just individuals)?

5. Ideas for Remedial Action

Community Healthcare Needs: Suggestions for improving community health include:

- ◆ Medical centers for all of the Rongelap community, not just the small number of people eligible to participate in the health programs defined in the Compact of Free Association.
- ◆ A women's health education and outreach program with mobile clinics staffed by Marshallese women trained to give maternity and gynecological exams, treat infections, and do breast and reproductive tract cancer screening procedures.
- ◆ Counseling services to assist the Rongelap community with domestic problems, depression, and substance abuse.
- ◆ Establishment of cancer and thyroid registries for the Rongelap community to better understand disease incidence levels and to allow the Marshallese scientific and health community the means to generate reliable statistics on the health consequences of the nuclear testing program.

Social and Cultural Health: Community health should also reflect the social and cultural health of the community. Suggestions in this area include:

- ◆ **Building a Rongelap community center** to provide a central meeting place for those scattered throughout the Marshall Islands, and for those who live in the immediate

area. The Rongelapese envision a large building constructed with local materials. Construction of the building would be part of the educational process of the center. Once erected, the structure will serve as a focal point for the older Rongelapese to meet with the younger generation to teach them about their history, their land rights, and the traditional knowledge and skills necessary for survival. Rongelapese elders could instruct the youth in fishing techniques, boat building, weaving, food cultivation, cooking, navigation, chants, dancing and so forth. Food prepared by the center could be distributed to the disabled and elderly Rongelapese in the community. Some members of the community would look after small children so more adults could participate in the community's activities. Lighting for evening classes would enable the center to operate in the evenings when it is cooler and people are not working. Solar power and computer terminals would enable the center to communicate with Rongelapese community members scattered throughout the RMI and the United States. The center could collaborate with the larger community, local schools, and the College of the Marshall Islands in various education and outreach programs.

- ◆ **Job training:** When the Rongelapese lived on their own lands, they had the skills and knowledge to provide for their families. In their displacement, Rongelapese do not have the educational background or the job skills necessary to obtain the wage earning jobs they need to support themselves. Special job training programs should be made available for the Rongelapese to prepare them for employment in the sectors of the RMI's economy that are growing, such as fisheries and aquaculture, tourism,

and construction. Job training should capitalize on customary knowledge, techniques, methods and materials.

- ◆ **National Treasures:** Similar to the designation of important historic locations as historic trusts, the Rongelapese people who are recognized masters in their command of history, customary knowledge, or traditional skills should be designated National Treasures. Master navigators, builders, dancers and singers, fishers, weavers, healers, and so forth would be honored with a title and lifetime salary, and bestowed with the responsibility of passing on their knowledge to the younger generation in meaningful ways, such as instruction in the local schools and community center and sharing their pictures, stories, records, and skills with the community.

- ◆ **Oral history:** The number of Rongelapese who were alive during the United States Nuclear Weapons Testing Program is dwindling rapidly because of illness and age. It is imperative to document the experiences and history of the community that resides with the survivors of the Bravo test and those who understand the history of the community. The oral histories of all of the Rongelapese alive during the testing program should be collected and archived. Ideally, Rongelapese youth should be trained in oral history collection techniques so they can be active participants in gathering information and learning their history from their elders. These oral histories should be video taped, transcribed, and translated. Effort should be made to capture the memories and experiences *in situ* - with stories and testimony documented on Rongelap, Ailinginae and Rongerik. This will enable the community to preserve

important source material about its history and their homeland. The oral histories will educate subsequent generations of Rongelapese as well as the larger public about the experiences of the Rongelapese.

- ◆ **Higher education:** Scholarships should be set aside for Rongelapese students to pursue collegiate and graduate studies in subjects that are important to the health and well being of the community, including its' economic future. Scholarships should support training in radiation science, medicine, marine biology, toxicology and environmental health, natural resource management, tourism, education and other academic and trade priorities defined by the community.

- ◆ **Museum:** A museum should be erected on Rongelap or another location that documents and displays the Rongelapese people's history and experiences with the United States Nuclear Weapons Testing Program. The Rongelapese who remember the events surrounding the Bravo test could give tours of the museum to patrons. The museum would educate younger Rongelapese and the Marshallese public. Furthermore, the museum would attract international visitors and provide economic assistance to the community, particularly if the community decides to return to Rongelap.

Community Infrastructure

- ◆ **Safe Food:** Rongelap informants were especially concerned about food safety. Because of concern about residual radiation and lack of space, some Rongelap

informants suggested building a community greenhouse using hydroponics to grow fruits and vegetables in a safe environment. A greenhouse would provide nutritious foods to the Rongelap community. Operation of the greenhouse would also provide educational and employment opportunities for the community. An alternative agricultural research facility might look at adopting other techniques for use in the Marshall Islands. For example, lagoons might serve as a viable location for building floating gardens, and allow the production of food for land-scarce communities such as Ebeye.

- ◆ **Realistic transportation:** Transportation is a major problem that impedes the ability of the Rongelapese community to come together and function as a community. Some informants suggested supplying all islands with free bicycles for general transportation use. Bicycles would provide a means of exercise and transportation to schools, the community center, jobs, and homes on the islands where community members reside. Inter-island ferries or boats are also needed to move resources and people between islands, especially to and from Mejjatto. Seaplanes or helicopters are needed to provide transportation for medical and other emergencies on the islands with no facilities.

- ◆ **Information Access and Communication:** Like transportation, communication is a major problem, especially when the community lives in such widely separated spaces. Community integrity would be significantly enhanced with the means to regularly communicate. Some informants suggested the need for nation-wide access to

computers, modems, satellite hook-ups, and independent power sources (such as wind generators or solar power battery packs). Computers could be made available at public school sites, community centers, or other public settings on all residential islands.

Environmental Concerns

- ◆ Environmental concerns voiced by informants included the inability to maintain a stewardship presence on their land; the inability to protect fish, clams, birds, turtles and other valuable resources from outside exploitation (especially foreign fishermen stripping unmonitored resources); the difficulty of restoring Rongerik's devastated ecosystem; the inability to utilize the plants, water, or marine resources due to contamination; and, the biodegenerative conditions of valued resources.
- ◆ Recommendations included developing a comprehensive plan for environmental assessment, monitoring, remediation and restoration;
- ◆ Implementing plans in ways that develop Marshallese capacity to effectively address the natural resource management needs of Rongelap, Rongerik, and Ailinginae;
- ◆ Integrating natural resource restoration and management work with economic development strategies such as the promotion of ecotourism.

¹⁶¹ Rongerik Atoll is the rare example of *Morjinkot* land -- land that an *iroij* gives to a warrior for heroics in battle. The story of how this land became *Morjinkot* in the mid-1800's is still told today. See Map of Rongerik.

¹⁶² The psychosocial effects from invisible environmental contaminants have been well documented. See for example H.M.Vyner, 1988. *Invisible Trauma: The psychological effects of the invisible environmental contaminants*. Lexington, MA: Lexington Books, especially the section entitled "Stigmatization and other psychosocial injuries." p.63. In Australia, dispossession and removal from land contributed to a wide range of physical and psychological health effects, including spiritual issues of health, and these have been documented in *The National Aboriginal Health Strategy*, and are currently the focus of government compensation efforts. For an extensive discussion of the psychological consequences of exposure to the atomic bomb in Hiroshima, see Robert Jay Lifton (1968). *Death in Life: Survivors of Hiroshima*. The University of North Carolina Press: Chapel Hill. Lifton documents the psychohistorical impacts of radiation exposure, such as stigmatization, fear,

health problems beyond those acknowledged by the U.S. and Japanese governments, and strain on family relations. Lifton also notes that these problems exist for Japanese born even after the two atomic bombs were dropped.

¹⁶³ See concerns raised by Tommy McCraw in his December 16, 1982 memorandum to James de Francis regarding a meeting on Majuro Atoll pertaining to the DOE northern Marshall Islands survey. It was at this meeting that the Marshallese were first informed that residence in Rongelap presented radiological risks to their health. - <http://worf.eh.doe.gov/ihp/chron/H7.PDF>, accessed December 17, 2007.

¹⁶⁴ Troy Barker. March 5, 1999. Discussion with Barbara Rose Johnston at Outrigger Hotel, Majuro.

¹⁶⁵ Constitution of the Republic of the Marshall Islands, p 5.

¹⁶⁶ Constitution of the Republic of the Marshall Islands, section 5.5.

¹⁶⁷ "Petitions Concerning the Trust Territory of the Pacific Islands." July 14, 1954, p.5. (T/L.510).

¹⁶⁸ Jack A. Tobin, 1958. pp. 1,2,4.

PART FIVE: CONCLUSIONS AND RECOMMENDATIONS

1. Violations of Trustee Relationships

The United States exerted territorial authority over the Marshall Islands by establishing a military presence in the Marshall Islands during World War II. Their presence and authority significantly increased with the onset of the Nuclear Weapons Testing Program in 1946. In 1947 the United Nations formally recognized this territorial relationship, designating the Marshall Islands as a trust territory of the United States.

International trusteeships, established by United Nations Charter, were meant to “promote the political, economic, social, and educational advancement of the inhabitants of the trust territories, and their progressive development towards self government or independence.”¹⁶⁹ Trustee relationships between the State and domestic dependent nations have been acknowledged and confirmed in constitutions, treaties, and enabling legislation. Trust relationships represent an enforceable legal acknowledgement by the State that it has taken what once belonged to trustees (native, indigenous, aboriginal) peoples and now agrees to protect what they retain.¹⁷⁰ Trust relationships involve a fiduciary relationship, where the State is legally bound to “act for the benefit of the other while subordinating one’s personal interest.”¹⁷¹

In addition to the rights and responsibilities outlined in Trusteeship Agreements, inhabitants of Trust Territories are “protected peoples” whose status and conditions are protected by rights outlined in United Nations covenants, including those outlined in the Geneva Conventions of 1949 (defining medical experiments on protected persons as a grave breach and crime against humanity); and the 1998 Rome Statute of the International Criminal Court (identifying medical experiments as war crimes, whether they occur in an

international or internal context). The 1998 Rome Statute of the International Criminal Court defines this crime as: “Subjecting persons who are in the power of an adverse party to the physical mutilation or to medical or scientific experiments of any kind which are neither justified by the medical, dental or hospital treatment of the person concerned nor carried out in his interest, and which cause death to or seriously endanger the health of such person or persons.”

Under United States law, inhabitants of a trust can sue to enforce their treaty rights. There are literally thousands of examples of this type of suit filed by Native American tribes seeking remedy for damages from violations of treaty rights. Similarly, the International Court of Justice has ruled that inhabitants of an international trusteeship can sue for violations of substantive rights and duties established in Trusteeship Agreements.¹⁷²

This report includes documentation of various violations of trusteeship responsibilities occurred as a result of the United States Nuclear Weapons Testing Program:

- Atmospheric testing in the Marshall Islands (1946-1958) demonstrated military might, but also inflicted nuclear war conditions on a fragile atoll ecosystem and a vulnerable population.
- Devastation and contamination was documented from the onset of testing, and despite requests from the Marshallese in 1954 to cease using their atolls as proving grounds, the nuclear weapons tests continued producing additional fallout on Rongelap and other populated atolls.
- Nuclear weapons testing destroyed the physical means to sustain and reproduce a

self-sufficient way of life for peoples living in the northern atolls, and produced great hardships for the nation as a whole.

- Radioactive contamination and involuntary relocation radically altered health, subsistence strategies, sociopolitical organization, and community integrity.
- Human subject research included the willful return of an exposed population to a known hazardous setting for the purpose of documenting the long-term and cumulative effects of continual exposures to nuclear weapons fallout.
- Human subject research experiments violated legal and ethical responsibilities of medical research and informed consent.
- Human subject research activities included experiments conducted without meaningful consent for purposes that had no direct benefit to individuals.
- Human subject research experiments included multiple incidents of additional exposures to radioactive materials producing pain and suffering, and further endangered the health of the human subjects by increasing the cumulative dose.
- Responding to the medical needs of an exposed population by an intensive research program, rather than a holistic health treatment program, produced otherwise avoidable incidents of pain and suffering.

2. Statements of Culpability

In addition to the careful documentation of damage and injury contained in the recently declassified medical surveys and lab reports cited in this report, culpability for radiation-related injuries has been publicly acknowledged in United States statements to the United Nations, and in treaties and agreements between the Republic of the Marshall

Islands and the United States Government.

The April 20, 1954 petition submitted to the United Nations Trusteeship Council on behalf of the Marshallese citizens of the Trust Territory of the Pacific Islands cites Marshallese concerns about the United States Nuclear Weapons Testing Program, concerns that included damage to health and the long-term implications of being removed from their land:

... We, the Marshallese people feel that we must follow the dictates of our consciences to bring forth this urgent plea to the United Nations, which has pledged itself to safeguard the life, liberty and the general well being of the people of the Trust Territory, of which the Marshallese people are a part.
... The Marshallese people are not only fearful of the danger to their persons from these deadly weapons in case of another miscalculation, but they are also very concerned for the increasing number of people who are being removed from their land.
... Land means a great deal to the Marshallese. It means more than just a place where you can plant your food crops and build your houses; or a place where you can bury your dead. It is the very life of the people. Take away their land and their spirits go also... (Petition from the Marshallese People Concerning the Pacific Islands: Complaint regarding explosion of lethal weapons within our home islands, 1954).

The United Nations Trusteeship Council response to the Marshallese petition noted

“The Administering Authority adds that any Marshallese citizens who are removed as a result of test activities will be reestablished in their original habitat in such a way that no financial loss would be involved.” United Nations Trusteeship Council:T/PET.10/28).¹⁷³

In response to this petition and the resulting international inquiry at the United Nations, the United States assured the Marshallese and the nations of the world that:

The fact that anyone was injured by recent nuclear tests in the Pacific has caused the American people genuine and deep regret... The United States Government considers the resulting petition of the Marshall Islanders to be both reasonable and helpful... The Trusteeship Agreement of 1947 which covers the Marshall Islands was predicated upon the fact that the United Nations clearly approved these islands as a strategic area in which atomic tests had already been held.

Hence, from the onset, it was clear that the right to close areas for security reasons anticipated closing them for atomic tests, and the United Nations was so notified; such tests were conducted in 1948, 1951, 1952 as well as in 1954... The question is whether the United States authorities in charge have exercised due precaution in looking after the safety and welfare of the Islanders involved. That is the essence of their petition and it is entirely justified. In reply, it can be categorically stated that no stone will be left unturned to safeguard the present and future well-being of the Islanders (Mears, UN Press Release #1932:1954).¹⁷⁴

And, in a related press release statement issued by the United States Mission to the United Nations: “*Guarantees are given the Marshallese for fair and just compensation for losses of all sorts...*” (Midkiff, UN Press Release #1932:1954).¹⁷⁵

Statements of United States culpability are also found in the 1983 Compact of Free Association (approved by United States Congress in 1986). In Section 177 of the Compact of Free Association, it states that:

*The Government of the United States accepts the responsibility for compensation owing to the citizens of the Marshall Islands, or the Federated States of Micronesia (or Palau) for loss or damage to property and person of the citizens of the Marshall Islands, or the Federated States of Micronesia, 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.*¹⁷⁶

Section 177 of the Agreement outlines United States responsibility for the consequences of the Nuclear Weapons Testing Program and provides a one-time payment of \$150 million to the Republic of the Marshall Islands to create a trust fund for addressing the past, present, and future claims arising from the testing program. Included in the Compact is a “changed circumstance” clause that allows the RMI to petition Congress to provide additional funding and assistance. Criteria include if the RMI can (1) demonstrate the existence of new and additional information about the effects of the testing program; (2) demonstrate that this new information was not known

during the negotiations of the Compact; and, (3) based on this new information, show that U.S. compensation provided in the Compact is manifestly inadequate.¹⁷⁷

The United States has also publicly acknowledged that nontherapeutic biomedical research involving the administration of radioisotopes to the Rongelapese and other Marshallese subjects occurred. Furthermore, this biomedical research program occurred with “some tension between data gathering and patient care”... where “the additional strains of language and cultural differences between the Marshall Islanders and the physicians appears to have compromised the process of informing the subjects of the purposes of the tests and of obtaining their consent.” Experiments “took place at a time (the mid-1950s) when the government rules requiring disclosure and consent in the use of radioisotopes with healthy subjects were established and public; the available documented evidence suggests that these rules were not followed” (ACHRE 1995:585).¹⁷⁸

Following the published results of the Advisory Committee on Human Radiation Experiments review of documents and testimony, the Rongelap Atoll Local Government (RALGOV) asked the DOE to review their patient records and identify Rongelapese participants of the anemia experiment referred to by ACHRE, involving Cr-51 and tritiated water. In April 1999, DOE disclosed to the Rongelap local government (RALGOV) their ability to identify all 21 participants who received radioisotopes in the 1963 BNL anemia studies, and “less than complete information” for the 1961 and 1962 studies involving 13 Marshallese participants, including six patients used in at least two studies (see April 29, 1999 letter to Mayor James Matayoshi from Paul Seligman at the end of this report).¹⁷⁹

3. Reparations

In the years since the initial Compact was signed, thousands of documents have been declassified demonstrating a much broader area of contamination and greater numbers of affected people than previously acknowledged. Also, since the Compact of Free Association was first crafted, scientific research has further demonstrated a wide range of health risks associated with low-level radiation exposure, including the cumulative effects of low-level exposure over time. This report has presented evidence drawn from new information that has come to light demonstrating a broad range of physical hardships and sociocultural, economic, political and psychosocial consequential damages experienced by individuals, the community, and the nation. This evidence suggests that United States efforts to address their breach of obligation, by providing medical treatment, environmental cleanup, and other remedial actions were not only insufficient, but these actions in a number of instances produced further harm.

Broader levels of compensatory actions are needed to address the much greater injury to people and the environment suggested and substantiated by this new information. One strategy for broadening the approach to compensation is to consider compensatory payments as one of a wide range of remedial actions that provide remedy, or reparations, for damages.¹⁸⁰

Reparation is defined as being action or processes that repair, make amends, or compensate for damages.¹⁸¹ In a legal sense, there are three generally recognized forms of reparation: restitution, indemnity (or compensation), and satisfaction. The term reparation is generally used to refer to remedial actions meant to repair a breach of

obligations established in international law.

Restitution is designed to put the offended state back in the position it would have been had the breach not occurred, and may include performance of the obligation, revocation of the offending act, or abstention of the unlawful conduct. Restitution, with reference to this case, should include United States actions that seek to restore a healthy ecosystem and sustainable way of life, including efforts to mitigate adverse socioenvironmental impacts by reducing individual and household risk, improving degraded marine and terrestrial ecosystems, increasing awareness and involvement in risk management activities, and providing education and training opportunities that ensure Rongelapese control over the knowledge and health of their environs.

Indemnity, also termed compensation, involves the payment of money to the offended party for any losses incurred by the illegal act, including any lost profit or value of lost property. As it has been used within the Republic of the Marshall Islands Nuclear Claims Tribunal, “compensation” refers to indemnity payments to affected peoples to compensate for bodily injuries, and the loss of assets and property. Indemnity payments as part of reparations agreements have been used to provide individual cash awards as well as fund a variety of remedial actions, including resettlement plans, development programs, and the like. However, in many cases compensation has only been granted to those who can demonstrate (1) legal ownership and (2) individual claim with loss value calculated according to prevailing market rates as an average of registered sales prices (of land and other economic assets) in the recent past. Thus, this form of reparation generally represents indemnity payments based on market values, rather than replacement values.

Satisfaction includes almost every other form of reparation and is meant to address any non-material damage. Examples of satisfaction include public acknowledgements that a wrong was committed, formal apology, and discipline of guilty individuals.¹⁸² Satisfaction also may include damage awards for hardships encountered as a result of the long term and cumulative affects from the original breach of obligation.

4. Relevant Case Precedents

Until recently, the majority of cases involving reparations acknowledged and compensated victims of war-related atrocities, especially those surrounding the events of World War II. These cases include acknowledgement and efforts to seek some sort of remedy for injuries suffered by protected persons as unwilling subjects in medical experiments. With the creation of post-World War II human rights treaties and the expansion of international and national human rights and environmental law, a broader range of rights has been acknowledged, abuses or violations of rights documented, and increasingly, reparations are being made to redress violations of international and domestic law committed in the name of colonial expansion and related violations of trustee relationships, economic development, and national security. Some examples of restitution, indemnity, and satisfaction relevant to this hardship and consequential damages claim are briefly summarized below.

In 1948, the United States Congress passed the Japanese American Evaluation Claims Act which provided funds to pay claims for real and personal property losses to the 120,000 people of Japanese ancestry who were forced to abandon their property and reside in federal internment camps during World War II. Some \$38 million has been paid

under this Act. In 1988, as part of the Civil Liberties Act, the United States Congress established a \$1.65 billion restitution program authorizing reparations of \$20,000 for hardship and indignity experienced by some 60,000 eligible persons of Japanese ancestry who were forced to relocate to internment camps from March 1942 to January 1946.

The 1988 Civil Liberties Act also provided some \$12,000 each to 450 surviving Aleutian Islanders who were removed from their homeland by the U.S. Navy in 1942 and relocated to abandoned canneries and mines in southern Alaska for three years. An additional \$1.4 million was authorized to establish a trust fund to be used for health, education, cultural preservation, community development, and other projects meant to improve the condition of Aleut life. Another \$15 million was allocated to compensate for the loss of Attu Island used as a Coast Guard station during and after the war, and later designated as a wilderness area in 1980.

Loss of critical resources and damages to a Way of Life

Examples of restitution, indemnity, and satisfaction for the consequential damages accompanying violations of trusteeship responsibilities are also found in Native American case law. These cases often produce reparations awards for violations of trusteeship responsibilities that result in loss of land and other critical resources, producing significant damage to social structures, cultural institutions, and customary ways of life. Thus, in many cases, remedial actions for “loss of a way of life” have included compensation for the loss of the means of subsistence, efforts to restore damaged human and environmental systems, as well as efforts to provide the means to develop community capacity to regain meaningful and self-sufficient ways of life. These

means can incorporate a range of actions including appropriations, trust funds, program assistance, and other forms of technical assistance. These considerations are present in the Zuni Land Claims case outlined below.

The aboriginal territory that supported the Zuni way of life originally stretched from the Grand Canyon to the Rio Grande River in central New Mexico. Today the Zuni control some 750 square miles of trust lands, the bulk of which are located in New Mexico, with a smaller non-contiguous section in Arizona. To reclaim treaty-protected lost lands, the Pueblo of Zuni filed a series of lawsuits in federal courts. In the case filed in U.S. Claims Court on May 27, 1987 the Zuni Tribe of New Mexico claimed that their land was taken without compensation when the United States acquired the land from Mexico. Oral histories with Zuni elders provided initial documentation of traditional land use, and this information was corroborated by scientific and historical documents. Contested issues included whether the Zuni claim to a large area of land and resources contained within could be substantiated lacking individual title and based on a record of subsistence-oriented use, and whether damages could be awarded for injuries and loss of a sustainable a way of life. The tribe used historic records and informant testimony to "... demonstrate how Zuni land use involved a core area of permanent and seasonal settlements, where agriculture was intensively practiced, surrounded by a larger sustaining area...with extensive grazing, hunting, and gathering of numerous plants and minerals." The court ruled in favor of the Zuni finding that lands were taken by the U.S. Government without adequate compensation.¹⁸³ The ultimate finding of the court was that while the Zuni resided in specific locations "This entire claim area was used by the Zuni for one purpose or another including: habitation...and life-sustaining activities including

farming, hunting, grazing, gathering, and religious worship.”¹⁸⁴

The result of the Court's finding was "The Zuni Land Conservation Act of 1990" P. L.101-486. In this Act, the Zuni and the U.S. Department of Interior were instructed to formulate a Zuni resource plan for:

- a methodology for sustained development of renewable resources;
- a program of watershed rehabilitation;
- a computerized system of resource management and monitoring;
- programs for funding and training of Zuni Indians to fill professional positions that implement the overall plan;
- proposals for cooperative programs with the Bureau of Indian Affairs and other private or public agencies to provide technical assistance in carrying out the plan; and
- identification and acquisition of lands necessary to sustain Zuni resources development.

Congress established a \$25 million trust fund to formulate and implement the plan.

Portions of the trust are also set aside to pay outstanding debts of the Tribe, to construct a public elementary school and increase educational opportunities, and to purchase land for the community. It was recognized that this action is essential to "the preservation of the Zuni history, culture, tradition, and religion..."¹⁸⁵

Findings in the Zuni cases reinforce earlier court rulings on Native American claims which recognized that compensation for material losses experienced by individual property owners does not adequately encompass the corporate losses experienced by a group whose way of life revolves around subsistence oriented use of natural resources.

For example, when the Southern California Soboba band of Mission Indians went to court to claim compensation for damages from lost water resources, economist Raul Fernandez used ethnographic material compiled by anthropologist Joe Jorgensen to demonstrate that impoverishment and sociocultural disintegration was linked to the building of the Colorado River aqueduct, when tribal water resources began to dry up and eventually disappear. Compensation had been initially offered to individual landowners, and this was contested as inadequate by the tribe. The court found that the tribe as a whole had experienced damage from the loss of “natural capital” represented by naturally occurring water resources on their reservation. Court rulings acknowledged that compensation to individuals for the loss of water and agricultural production did not adequately compensate for broader sociocultural losses. Thus, court rulings included mandates to restore water and restitution granted to the entire tribe to support social reconstruction of the Soboba community.¹⁸⁶

Other relevant Native American case precedents include those awards for consequential damages of actions that damage or destroy subsistence and commercial fisheries. For example, construction of the Grand Coulee Dam in 1933 displaced an estimated 5000 people, including 1,500 Colville Indians and 100-250 Spokane Indians. Neighboring Nez Percè, Coeur d’Alene, Warm Springs and Yakama tribes were also affected. Displaced peoples received inadequate compensation for land and goods, and no financial support or assistance for resettlement. Many inhabitants of submerged towns were relocated to areas lacking basic utilities such as a water source, public telephones and electricity. Some rejected the government’s compensation offers as being too low, and the government responded by condemning their land to obtain the title. Subsequent

efforts in court to secure just compensation were not successful. Native Americans objected to failures to live up to compensatory promises, such as the promise from Secretary of the Interior Harold Ickes to the tribes that they would receive a share of hydroelectric power revenues. Dam construction hampered inter-tribal communication, resulted in the loss of sacred sites and cemeteries, and caused a significant decline in native fish populations including five species of salmon and two species of trout. The loss of fish resulted in the loss of the tribal way of life.

In 1951, the Colville Confederated Tribes filed suit against the United States. The Indian Claims Commission divided the suit into two cases. Docket 181C contained claims for the loss of fisheries and the elimination of salmon run populations as a result of dam construction. Docket 181D covered compensation for annual power share revenue from tribal land that had been promised to the tribes. In 1978, the Commission ruled on Docket 181C that the United States government was obliged to guarantee tribal fishing rights. The tribes were entitled to reparations for the difference between the fish they were able to catch between 1872 and 1939, and the value of what their normal subsistence catch would have been. This reasoning produced an award of only \$3,257,083, which did not include damages. In Docket 181-D, after two federal court rulings in 1990 and 1992 (20 Ct.Cl 31; 964 F.2nd 1102), the United States and the tribe negotiated a settlement. This was the first time the United States provided partial compensation to the tribe for the damages suffered from the dam. The tribe received a \$53 million lump sum settlement for previous years, from funds appropriated by Congress in 1944. The act also provided that, thereafter, the Bonneville Power Administration (BPA) -- the hydroelectric producer that benefited from dams placed on

the Columbia River -- would make annual payments to the tribe of approximately \$15 million.

Natural Resource Damages

In addition to case precedents awarding compensation for past experiences involving the loss of critical resources and related damage to a way of life, case precedents relevant to the Rongelap claim include those awarding damages for current and future conditions involving contaminated or destroyed natural resources.

Some of the relevant sources of United States law and implementing policy framing the assessment of environmental contamination and the valuation of natural resource damage include:

- Final Guidance For Incorporating Environmental Justice Concerns in EPA's NEPA Compliance Analyses” released by the US Environmental Protection Agency, Office of Federal Activities, April 1998;
- Council on Environmental Quality, March 1998, Guidance for Addressing Environmental Justice under the National Environmental Policy Act (NEPA);
- Council on Environmental Quality, January 1997, Considering Cumulative Effects Under the National Environmental Policy Act;
- Executive Order 12898 on Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations with accompanying Memorandum, February 11, 1994;
- The Oil Pollution Act of 1990 (OPA);
- The National Environmental Policy Act of 1969 as amended, 42 U.S.C. 4321-

- 4347, January 1, 1970;
- U.S. General Accounting Office, June 1, 1983, Siting of Hazardous Waste Landfills and Their Correlation with Racial and Economic Status of Surrounding Communities;
 - The United States Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (CERCLA).

These statutes and implementing policy define "injury" to natural resources and establish procedures for the valuation of damages on the direct and indirect costs for restoring, rehabilitating, replacing, and/or acquiring the equivalent of injured natural resources. For example, in CERCLA (also known as SUPERFUND) the natural resources covered include land, fish, wildlife, biota, air, water, groundwater, drinking water supplies, and other government- or privately-owned resources. Damages may also reflect the value of the services lost to the public between the time of release (polluting act) and the time the resources and services those resources provide are returned to baseline conditions (i.e., those conditions which would have existed had the release not occurred). EPA guidelines on Environmental Justice Assessment procedures state "in considering direct, indirect, and cumulative impacts on natural resources, analysts must identify and assess the patterns and degrees to which affected communities depend on natural resources for their economic base (e.g., tourism and cash crops) as well as the cultural values that the community and/or Indian Tribe may place on a natural resource at risk. Damages are calculated and used as supporting evidence in federal, state, tribal and civil court cases against polluting parties, with awards used to fund remediative actions

(such as environmental restoration programs, individual and community compensation for lost wages and income from fishing, and so forth).

These statutes have also been used by local and state agencies and nongovernmental agencies in their efforts to force federal agency attention and resources to address the problems relating to nuclear waste contamination. Thus, suits filed against the United States Department of Energy resulted in the current DOE effort to develop “long-term stewardship” management plans for all sites where long-lived wastes and contaminants relating to nuclear energy and weapons production and use remain in place. As per a settlement agreement negotiated in 1999 DOE has established a \$6.25 million fund to assist citizens’ groups and tribes in conducting independent technical and scientific reviews of environmental management activities at DOE sites. Over \$6 billion dollars per year is spent by DOE’s Office of Environmental Management to meet its responsibility for cleaning up the contamination, wastes, nuclear materials, and contaminated structures resulting from nuclear weapons production at over 100 sites in thirty states around the United States. Estimates for total cleanup of these 100 sites range from \$150 to 250 billion. Despite the acknowledgements of culpability by the United States Government in creating severely contaminated radioactive sites in the Marshall Islands, little effort has been made to meaningfully include Marshall Islands sites in the assessment, monitoring, and development of remediation plans, as is the case for all other nuclear weapons testing sites under DOE’s management.

United States environmental protection statutes and implementing policies identify strategies to determine the damage to biological and human systems, and these methods are regularly employed in a variety of lawsuits involving contamination and

natural resource damage. In the United States compensation for environmental damage has been awarded in tens of thousands of “toxic torts” cases including those dealing with oil spills; chemical contamination of soil, water, and air from oil refineries, gas stations, various manufacturing industries, and military base activities; and, mining and the downstream effects from mining. Compensatory awards have acknowledged direct and indirect damages to natural ecosystems, loss of land and damage to land (including economic, social, and culturally valued land and property contained within), socioeconomic damages resulting from the stigmatization of contamination, and damages associated with loss of a way of life.

Perhaps the most significant case of compensation for natural resource damage involves the 1989 Exxon Valdez 11 million gallon oil spill in the Prince William Sound of Alaska, polluting some 1,000 miles of shoreline, killing tens of thousands of birds and marine mammals, and causing socioeconomic damage to local communities, fishing industries, and native peoples. In October 1991, the U.S. District Court approved a settlement between the State of Alaska, the United States Government and Exxon resolving various criminal charges against Exxon as well as civil claims brought by the federal and state governments for recovery of natural resource damages resulting from the oil spill (United States of America vs. Exxon Corporation et al, 1991). The 1991 settlement had three distinct parts:

1. Criminal Plea Agreement: Exxon was fined \$150 million, the largest fine ever imposed for an environmental crime. The court forgave \$125 million of that fine in recognition of Exxon’s cooperation in cleaning up the spill and paying certain private claims. Of the remaining \$25 million, \$12 million went to the North

American Wetlands Conservation Fund and \$13 million went to the national Victims of Crime Fund.

2. **Criminal Restitution:** As restitution for the injuries caused to the fish, wildlife, and lands of the spill region, Exxon agreed to pay \$100 million. This money was divided evenly between the federal and state governments.
3. **Civil Settlement:** Exxon agreed to pay \$900 million with annual payments stretched over a 10-year period. The settlement has a provision allowing the governments to make a claim for up to an additional \$100 million to restore resources that suffered a substantial loss, the nature of which could not have been anticipated from data available at the time of the settlement.¹⁸⁷

Other fines and settlement agreements brought Exxon's total liability to \$3.5 billion by 1994. In 1994 an Alaskan jury awarded \$5.3 billion in punitive damages in a class action suit representing 20,000 commercial fishermen, American Indians, and others harmed by the natural resource damage caused by the Exxon Valdez oil spill. Exxon appealed the jury award in the 9th U.S. Circuit Court. In August 1998, Exxon Corporation's request for a new trial on the grounds of jury tampering was rejected. Exxon appealed this ruling, and on October 2, 2000 the U.S. Supreme Court upheld the Exxon Valdez punitive damage award.¹⁸⁸

Stigma Damages

Stigma damage is a reduction in the value of property caused by increased risk associated with the historical presence of contamination on the property or belief that the

property is contaminated. Stigma simply makes the property less desirable to a prospective purchaser, tenant, or visitor. Stigma is independent of the actual remediation costs to clean up the property, and remains even after the property is cleaned up to meet governmental requirements. Stigmatized asset valuation is a common strategy used to develop compensatory awards in court cases involving environmental contamination.

For example, in a California case, *Bixby Rance Co. v. Spectrol Electronics Inc.*, a jury awarded stigma damages to the owner of contaminated property even after the tenant at the property who was responsible for the contamination, had paid for the cleanup (Cal. Super. Ct., Los Angeles County, No. BC052566, December 1993).

In a Minnesota case damages were awarded for nuisance to proximity to landfill (*Frank v. Environmental Sanitation Management Inc.*, 687 S.W. 2d 876, 883 (Mo. 1985)). Findings in this case established that demonstration of physical damage to the property is a precondition to the award of stigma damages. In addition to damage awards to cover the costs to repair and restore the environment to its pre-contaminated setting, the court awarded damages to compensate for the loss in value of the property due to the stigma of contamination.

In a recent Indiana Court determination (June 2001 decision in *Terra Products, Inc. v. Kraft General Foods, Inc.*) involving PCB contamination, the court ruled that where a plaintiff can demonstrate that repairs to real property do not restore the land to its former value, the plaintiff may recover both the costs of restoration and damages for any reduction of value that remains after remediation. In this case the cost to remediate the property far exceeded the value of the property. The court also noted that legal requirements to remediate contaminated land apply without regard to cost. A plaintiff in

Indiana now may be able to recover damages for the stigma attached to property following remediation if it can establish that the cleanup did not restore the property to its pre-contamination value.

Stigma damages have also recently been valued in relation to the storage of nuclear wastes. When the United States Congress passed the Nuclear Waste Policy Act of 1982 and the amendments to the Act of December 1987, it recognized the potentially significant socioeconomic dimensions of siting, constructing, and operating facilities for the storage and disposal of high-level radioactive wastes. Specific provisions were written into the Act to enable prospective host states, tribes, and local governments to carefully and comprehensively assess socioeconomic impacts associated with waste disposal activities. Studies associated with the impact analysis assessment for locating a high-level radioactive waste facility at Yucca Mountain found significant negative effects relating to loss of income from an actual or potential tourist industry.

In one recent study by the Nevada Agency for Nuclear Projects the repository was compared in economic terms with a representative economic initiative that could be at risk if negative impacts do occur. A model of projected revenues associated with the Yucca Mountain repository was compared to a representative sample of the state's tourist industry, namely the visitor/gaming industry. Research addressed the questions of "What would be the effects on the state economy if, as a result of the repository, one large hotel/casino project were canceled or chose not to locate in Las Vegas? What are the costs of losing such a project compared to with the jobs and revenue associated with the proposed Yucca Mountain repository?" The analysis showed that, should the repository cause just one hotel/casino project not to locate in Nevada in the future, the immediate

impacts to southern Nevada could be upwards of 14,200 jobs and almost \$500 million in revenue lost to the local economy annually. This includes jobs directly associated with the repository project and the secondary jobs generated in the wider economy.

Human Subject Experimentation

The above case summaries are a few of the precedents that support the people of Rongelap and their claims for hardships and related damages relating to involuntary resettlement, and the various damages associated with loss of land and other critical resources, and the long term impacts of environmental contamination of natural resources. With reference to the hardships, indignities, pain and suffering associated with human subject experimentation a number of settlements in United States cases are relevant.

In a negotiated settlement announced in November 1996, the United States government agreed to pay \$4.8 million to 12 plutonium experiment subjects or their descendants (\$400,000 a piece). These subjects had received an injection of plutonium in experiments where University of Rochester patients were deliberately not informed about their involvement in a medical research experiment and the contents of injections.¹⁸⁹

In December 1997, the Massachusetts Institute of Technology and Quaker Oats announced a \$1.85 million settlement in a class action suit representing the claims of over 100 people who, as institutionalized students in the early 1950s, were between the ages of 12 and 17. While living at the Fernald School in Waltham, Massachusetts, they were given radioactive iron in their breakfast cereal once a month for three months.¹⁹⁰

On May 27, 1998 U.S. District Court Judge John Nixon gave preliminary approval to a \$10 million settlement in a class-action lawsuit against Vanderbilt

University brought by 829 pregnant women who unknowingly ingested radioactive iron.¹⁹¹ The 1946 Vanderbilt University nutrition study involved 1600 pregnant women, with 829 receiving a single dose of Fe-59 during the second prenatal visit before receiving routine therapeutic iron. On the third prenatal visit blood was drawn and a test performed to determine the percentage of iron absorbed by the mother. The infant's blood was also examined at birth to determine the percentage of radioiron absorbed by the fetus. The doses were later estimated in a March 1951 American Journal of Obstetrics and Gynecology article by Dr. P. Hahn to be between 5 and 15 rad. Contemporary estimates of the fetal doses by the ACHRE and others suggest that the fetal dose was a few hundred millirems. While a 1963-1964 study by Vanderbilt researchers found no significant differences in malignancy rates between mothers in control and exposed groups, they reported a higher number of malignancies among exposed offspring with four children dying of childhood cancers, and researchers concluded a causal relationship existed between prenatal exposure to Fe-59 and cancer.¹⁹²

On May 5, 1999 a settlement was announced in the Cincinnati Radiation Litigation case in which defendants paid \$5.4 million but admitted no wrong doing. In this case, in the years between 1960 and 1972 cancer patients (mostly African Americans who were categorized as below-average intelligence and were charity patients) were exposed to large doses of whole body radiation as part of an experiment sponsored by the U.S. military. None of the subjects gave informed consent, and they were told that they were receiving treatment for their cancer. Subjects experienced nausea and vomiting from acute radiation sickness, pain from burns on their bodies, and some died prematurely as a result of radiation exposure.¹⁹³

In the case of human radiation experiments on Alaskan Indians and Eskimos (1955-1957) involving administration of one single oral dose of Iodine 131 to 102 native men, women and children, public acknowledgement by the United States Advisory Committee on Human Radiation Experiments that a wrong was committed eventually produced a formal apology from U.S. Air Force Secretary F. Whitten Peters, who personally signed apology letters that were presented to Alaskan subjects and their families in October 2000. An announcement of a damage award settlement of \$7 million dollars accompanied public apologies (awards were made through the U.S. Department of Defense appropriation for 2001). This award includes payments of \$67,000 to each study participants or their descendents as compensation for perceptions of health risk associated with an oral dose of Iodine 131-- especially the anxiety and stress caused by learning of the radioactive dosage. The North Slope Borough will also receive some \$1.36 million as an award to the community.¹⁹⁴

Establishing the “Value” of Life

Awards for damages in these cases generally acknowledge the difficulties of identifying an appropriate monetary value for the pain, suffering, and hardships of a life fundamentally altered by medical research abuses. Recently, the United States Environmental Protection Agency (EPA) established the value of statistical life -- that is the monetized benefit from regulations that protect citizens from environmental risks known to produce cancers with high mortality rates. In studies supporting newly established regulations for levels of arsenic in drinking water, EPA conducted wage-risk studies using national income data. Assuming a 26% mortality rate for bladder cancer

and an 88% mortality rate for lung cancer, the current value of statistical life used by the Environmental Protection Agency is \$6.1 million per person, in 1999 dollars. This value does not reflect any adjustments to account for national real income growth that occurred subsequent to the completion of those studies. Were the Agency to adjust the VSL to account for this growth in real income, the VSL would be approximately \$6.77 million (assuming a 1.0 income elasticity).

The U.S. EPA arsenic regulations also establish a willingness-to-pay value for those cancer cases that do not result in mortality. The willingness-to-pay value for avoiding a non-fatal condition was based on economic research that established a willingness to pay to avoid a case of chronic bronchitis. EPA noted that use of this proxy might understate the true benefit if the willingness-to-pay to avoid a nonfatal cancer is greater than the willingness-to-pay to avoid a case of chronic bronchitis. The mean value of this willingness-to-pay estimate is \$607,000 per person (in 1999 dollars).¹⁹⁵

5. Recommendations for Categories of Concern in this Claim

Some might argue that the social and cultural changes, physical injuries, and economic hardships experienced by the people of Rongelap during evacuation periods and after leaving their atolls in 1985 reflect the broader experience of modernization and development in the Pacific. Modernization and development has swept through the entire Pacific region, and accompanying these changes has been erosion of traditional customs and relationships in the face of market economy and consumer lifestyle, dietary shifts and increased health problems associated with a western diet. Since World War II the Pacific region has seen demographic shifts, with the population of many island nations living in

densely populated urban settings. Environmental degradation, dietary changes and resulting degenerative health conditions (including diabetes, hypertension) have accompanied these changes.

However, as a direct result of the United States Nuclear Weapons Testing Program, the pace of change and the nature of change are radically different for the Rongelapese, as compared to the broader Pacific region. The events that resulted in involuntary evacuation in 1946 and 1954 were sudden systemic assaults that forcibly evicted the community from a traditional way of life to a life forever bound to western culture, food, medicine, and technology. The 1982 disclosure that subsistence lifestyles in Rongelap posed serious threats to the health and safety of the people of Rongelap produced an immediate fear and led to the 1985 exile of the community, against United States Government wishes and without United States Government assistance. Loss of a healthy environment, loss of all access to Rongelap, Rongerik and Ailinginae, coupled with the difficulties of life in fragmented communities on leased land further increased community reliance on western food, culture, and technology, and produced a redefined notion of what is good and bad in the world around them. The Rongelapese adjusted to these events and conditions without the luxury of time, community integrity, and the related resources that other Pacific Island nations enjoyed in the last half of the 20th century. Today, the Rongelapese live in fragmented communities characterized by anxiety and melancholy for what has been lost, and what, for future generations, may never again be enjoyed. Other Pacific Islanders share some of their conditions and experiences, however the Rongelapese experience is one of extremes.

Reparations — meaningful efforts to repair or make amends for the individual

assaults and cumulative injuries experienced by individuals, the Rongelap community, and the nation over many decades—could be addressed through various actions designed to provide restitution, indemnity, and satisfaction under four general categories of concern. These general categories of concern include:

- The hardships, injuries and consequential damages of the loss of a healthy self-sufficient way of life;
- Natural resource damage and related socioeconomic stigmatization;
- Consequential damages of human exposure to fallout from the U.S. Nuclear Weapons Testing Program; and,
- Negligence, negligent misrepresentation, battery and related consequential damages of involuntary participation in human subject research.

Category of Concern #1: Loss of a Healthy, Self-Sufficient Way of Life.

One of the major consequences of the United States Nuclear Weapons Testing Program was the eventual loss of a healthy, self-sufficient way of life previously enjoyed by the people of Rongelap, Rongerik, and Ailinginae. The loss of the material basis to sustain a healthy, self-sufficient way of life produced social, cultural, economic, and political hardships and injuries. Damages include -- and specific remedial actions are needed to address:

- a. Social, cultural, economic, and political hardships, indignities and other injuries resulting from evacuation of Rongelap and Ailinginae and involuntary resettlement in 1946.

- b. Social, cultural, economic, and political hardships, indignities and other injuries resulting from evacuation of Rongelap and Ailinginae and involuntary resettlement in 1954-1957.
- c. Social, cultural, economic, and political hardships, indignities and other injuries resulting from evacuation of Rongelap and Ailinginae in 1985 and involuntary resettlement in Majuro, Ebeye, Mejjatto, Hawaii and other communities beginning in 1985 and continuing through an unknown future date.
- d. Social, cultural, economic and political injuries resulting from loss of access, use, and the extensive contamination of sacred land (Rongerik Atoll) from 1946 through an unknown future date when the environment (lagoon, reefs, islands and all the resources within contaminated by radioactive and other toxic materials used in U.S. nuclear weapons tests) has been restored.
- e. Social, cultural and economic injuries resulting from the loss of access and safe use of terrestrial resources in Rongelap and Ailinginae from 1954 through an unknown future date when the environment -- soil, water, vegetation, and other life on all atoll islands contaminated by radioactive and other toxic materials used in the U.S. Nuclear Weapons Testing Program-- has been restored.
- f. Social, cultural and economic injuries resulting from the loss of access and safe use of marine resources in Rongelap and Ailinginae from 1954 through an unknown future date when the marine environment (lagoon, reefs, and all the resources within contaminated by radioactive and other toxic materials used in U.S. Nuclear Weapons Tests) has been restored.

In the Marshall Islands land is not a commodity that can be bought or sold, but is an integral component in the “natural capital” that sustains a way of life.¹⁹⁶ In western property law, loss of land means loss of income. But for the Marshallese, and for many traditional cultures where power, authority, status, and meaning is shaped by kinship and the meaningful use of communally-owned resources, loss of land represents the loss of the means to sustain social institutions, to reinforce kinships systems, and to survive and thrive as a self-sufficient entity. And, while Marshallese generally refer to inherited rights as “land rights” – land includes the lagoon, reefs, clam beds, and broader atoll ecosystem, as well as the marine, arboreal and terrestrial life within. Thus, assessment of damage and compensatory actions need to reflect the contamination and consequential damages resulting from the loss of “natural capital” that sustained a way of life.

The RMI Nuclear Claims Tribunal has established an approach for compensating for loss of land based on dry land acreage estimates and “market” assessments of lease value. This valuation represents one portion of the economic value of damaged and destroyed atoll ecosystems. In the cases of Enewetak and Bikini, the Tribunal ruled that land value awards include compensation for the loss of access and use of natural resources contained within (palm trees, pandanus, and so forth). Missing from the equation are marine resources, cultural resources, and the sociocultural consequences resulting from the loss of land.

To adequately compensate for damage and loss of marine resources, acreage estimates for loss of land could be expanded to include lagoon and surrounding reef acreage, with damage awards paid to the entire community in the form of a trust. Income from the trust could be used to develop the internal capacity to study, improve, reduce

environmental risks, and eventually restore degraded ecosystems. Subsistence use value has been partially determined via the formula used to calculate lease value in the loss of land. Applying the same formula to include lagoon, reef fringe, and broader marine acreage surrounding the seamount just north of Rongelap would produce a value representing loss of marine resources.

Calculations for lagoon areas are:

- Ailinginae lagoon area = 105.96 km² or 26,183.14 acres
- Rongerik lagoon area = 143.95 km² or 35,570.62 acres
- Rongelap lagoon area = 1004.32 km² or 248,171.49 acres¹⁹⁷

Loss of access to Rongerik and subsequent involuntary relocation from Rongelap and Ailinginae generated significant political consequences by reducing representation of three atolls to one senator, and because the community was so dispersed, the atolls did not receive the same level of economic development in subsequent years. Benefits of representation include increased services provided by the RMI Government. To adequately compensate for this and other damages, including the loss of cultural resources and the sociocultural consequences resulting from loss of a healthy way of life, remedial awards should reflect a commitment to restore the community to a self-sufficient and meaningful way of life, with damage awards paid to the community in the form of a trust. Income from the trust could be used to address the sociocultural, job training, economic development, and related needs of the community identified in Part Four of this report. Such an award could be based on the combined estimated cost of capital infrastructure common to other atolls (electricity, telephones, schools, medical clinics, transportation facilities, public water systems).

Category of Concern #2: Natural Resource Damage and Related Stigmatization.

Natural resource damage from the U.S. Nuclear Weapons Testing Program is severe, toxic, and persistent, representing permanent damage that reduces the value and potential future use of Rongelap, Rongerik and Ailinginae. Contamination from nuclear weapons testing fallout -- including tracer chemicals such as arsenic, cadmium, and other mineral isotopes used to “fingerprint” the fallout from each weapon -- has damaged natural resources and generated socioeconomic stigmatization. Degenerative and stigmatized conditions that affect current and future resource values and economic development potentials have not been addressed in awards for loss of property and cost to restore.

It is recommended that compensatory actions incorporate principles of nuclear stewardship and provide sufficient funds, facilities, expertise, and training to allow the people of the Marshall Islands the means and ability to conduct their own intergenerational epidemiological surveys, environmental risk assessments, and develop culturally appropriate environmental risk management strategies (including monitoring contamination levels and decay rates and remediating terrestrial and marine ecosystems). Shaping an effective program of nuclear stewardship implies local control of funds, and a level of effort that reflects the best practices and strategies currently used to assess, remediate, and/or manage waste sites in the United States. Fiscal responsibility to initiate and implement a meaningful nuclear stewardship program should lie in the hands of those who transformed the Marshall Islands from a healthy, viable atoll ecosystem to a nation pockmarked with nuclear waste sites.

A nuclear stewardship program should assess the broad range of environmental hazards persistent in the terrestrial and marine ecosystem, address natural resource damages, and provide some measure of remedy for socioeconomic stigmatization.

Natural resource damage includes injuries resulting from involuntary resettlement and the inability to defend commercially significant resources from foreign exploitation, as well as stigma damages associated with the radioactive contamination of the region. Stigma damages relevant to the nuclear weapons contamination of Rongelap, Rongerik, and Ailinginae atolls include perceptions of hazard with reference to locally produced foods, handicrafts, and locally harvested marine resources, and perceptions of hazard discouraging ecotourism industry growth.

One strategy to determining the value of natural resources is to consider market, nonmarket, and subsistence values for natural resources in similar settings. A 1997 study of "The Economic Value of Majuro Atoll's Coastal Resources" prepared for the Majuro Atoll Local Government and the Coastal Management Program by economist Philip King provides a proxy example. King identified a range of market values for coastal zone resources including pelagic and reef fisheries, tourism, handicrafts (shells and pearls), copra, agriculture, sand and gravel mining, totaling \$161,976,377.25. The resources of three atolls would be worth considerably more, as would the value of localized resources (giant clam beds, valuable golden cowry shells, and the major source of arrowroot). Values would need to be adjusted to reflect lost opportunity over the past 50 years, as well as lost future opportunities (for example, 30 years, at which time environmental contamination could be reassessed and projected losses recalculated).

A relevant case example of assigning a value to nonmarket uses of a beach is contained in the September 1999 final settlement in the Huntington Beach, California oil spill. In 1997 a jury verdict set legal precedent by awarding a total of close to 13 million in damages for the loss of public recreation. The award set a \$13.19 per capita value of the lost enjoyment for one day at the beach.¹⁹⁸ Applying this example to the Rongelap claim, and using the California figure as a proxy for recreational value damages for the entire Rongelap population for past, current and future loss of recreational value can be calculated. If, for example 100 people lost a total of 1,760,000 days over the past 50 years @\$13.19 per day, the total value of lost recreational access comes to \$23,214,400. If 4,000 people will lose 4,224,000 days over the next 30 years @\$13.19 per day the total projected value of lost recreational access comes to \$557,145,600.

A "subsistence" value of natural resources was suggested in the 1994 Marshall Islands report "Strengthening of Agricultural Support Services" by Ray Shaw, for the Asian Development Bank. His figures suggest that the average value of household production = approximately \$2,585 (1997 values).¹⁹⁹ This subsistence value represents the value of household production to put food on the table. This value does not incorporate the value of other subsistence activities that provide housing, medicine, household, artisanal and craft supplies including baskets, mats, shell necklaces, toys, nets, boats, and tackle.

In calculating appropriate awards for stigma damages, it is important to identify the monetary value of the highest and best use of the land. Possible categories include agrarian and residential use, tourist use, and – given the level of contamination – temporary storage of nuclear waste.

Sustainable subsistence production requires access to multiple locations to survive without overusing the resource base. Cleanup and resettlement of the main island of Rongelap Atoll is not sustainable without restoration of all of Rongelap's islands and Rongerik and Ailinginae atolls. However, current scientific knowledge limits the ability to safely decontaminate and restore natural environs. To address the current and future losses associated with “off-limit” islands, cost to replace atoll islands might be extrapolated from the sale of islands in other parts of the Pacific.

An alternative approach would be to consider atoll areas, including lagoons, islands and reefs that cannot be restored to pre-testing condition with existing technology as de-facto nuclear waste storage facilities. Compensation for this de-facto status is warranted. Several measures of value could be used to determine the appropriate compensatory award. These measures include:

- a) Estimation of the total quantity of contaminated areas designated as too contaminated to restore,
- b) Estimation of the quantity of low-level, mid-level, and high-level radioactive waste.
- c) Rates charged at temporary storage facilities for these types of materials.
- d) Damages to reflect the socioeconomic stigma associated with hosting radioactive storage facilities in the Northern Marshall Islands.

Category of Concern #3: Consequential Damages of Human Exposure to Radiation.

“Exposed” people of Rongelap include those living on Rongelap and Ailinginae in 1954 who were exposed to Bravo and contamination from earlier tests; those who were

resettled in 1957; those who were born on the contaminated atoll; those who were exposed to materials and food originating from Rongelap, Rongerik and Ailinginae atolls; and, the descendents of people exposed to radioactive contaminants. Given the synergistic, cumulative and genetic effects of long-term exposure to radioactive isotopes and other environmental contamination from military testing, exposure is of concern to this and future generations. Psychosocial stigmatization, pain, indignities and other suffering resulting from exposure to radiation and other contaminants from the United States Nuclear Weapons Testing Program were endured by the community in the past, continue to trouble them in the present, and, given the nature of these injuries, will assuredly present hardships in the future. Given the synergistic, cumulative, and mutagenic effects of long-term exposure to radioactive isotopes and other environmental contamination from military testing, exposure is of concern to this and future generations.

The United States Nuclear Weapons Testing Program effectively took the land and health of the Rongelapese, and altered the future of the community of Rongelap (and other Marshallese) by creating a severely contaminated environment. This taking occurred without just compensation. In returning the Rongelapese to a contaminated setting and failing to notify them of the risks associated with residence in Rongelap the United States Government failed to perform their public duty to protect the health and way of life of their trustees. At the same time, the United States Government and its citizens benefited from their use of the Marshall Islands as a nuclear testing site, including the development of their national security system and the achievement of nuclear detente.

Exposure to the environmental hazards generated by the United States Nuclear Weapons Testing Program resulted in stigmatization and other psychosocial injuries that adversely affect individuals, the community, and the nation. Nuclear testing introduced new taboos where certain lands and certain foods were off limits, where marriage to certain people involved new social stigmas, where birthing presented new fears and health risks, and where family life often involved the psychological, social and economic burden of caring for the chronically ill and disabled. The failure of the United States Government to provide the Rongelap people with adequate and accurate information concerning environmental hazards and risks, coupled with contradictory pronouncements on what is and is not safe, created taboos that were incomprehensible, yet permeated all aspects of life. This imposition of new taboos effectively transformed the loci of control over taboos: undermining the rules and the customary power structures that shape, interpret, and reproduce strategies for living in the Marshall Islands. Furthermore, the fear of nuclear contamination and its adverse effect on the health of current and future generations color all aspects of social, culture, economic, and psychological well-being. Nuclear taboos orchestrate people's behavior and use of their land and resources.

This social stigmatization adversely affects the economy, society, family, and individual health and well-being of the people of Rongelap, Ailinginae, and Rongerik, and to varying degrees, the nation as well. Broadening the recognized categories of "exposed" and the recognized modes of exposure will increase the number of potential claimants for personal injury damage and medical treatment. Awards for consequential damages of radiation exposure should reflect the experiences, damages, and treatment needs of individuals, households, the community, and the nation. Damages could be

calculated with consideration of the benefits that the United States received from the testing program and subsequent creation of this “nuisance.”

Category of Concern #4: Negligence, Negligent Misrepresentation, Battery and the Related Consequential Damages of Involuntary Participation in Human Subject Research.

The complex biophysical, sociocultural, and psychological assaults on the people of Rongelap outlined in this report are problems that no single community can surmount without intensive assistance that is first and foremost focused on the needs and concerns of those who have been harmed. This report not only documents United States culpability for damages and loss, but also presents evidence in support of the argument that the United States Government was negligent in providing adequate and meaningful remedies. This negligence includes sponsoring and implementing a biomedical research program involving the purposeful exposure of Rongelapese to radioactive and toxic hazards that further compromised already damaged immune systems and further inhibited individual and community abilities to adapt and adjust. This research was based on questions of scientific interest and military concern, rather than a holistic approach to individual therapeutic needs of a severely exposed population.

The elements of negligent misrepresentation are: (1) a duty by the defendant to the other party to communicate accurate information; (2) a false statement of material fact or carelessness in ascertaining the falsity of the statement by the party making it; (3) intention to induce the other party to act; (4) action by the other party in reliance of the statement; and (5) damage to the other party from such reliance (546 N.E. 2d at 591).

Negligent misrepresentation occurred with the repeated false assurances by the United States that:

- Nuclear weapons tests between 1954 and 1957 did not result in an increased contamination of the islands;
- The Rongelapese were being returned in 1957 to a safe environment;
- Nuclear weapons tests after 1957 represented no danger of additional fallout to the Rongelapese;
- A subsistence-oriented way of life on Rongelap (1957-1985) did not threaten the health of the population;
- Arrowroot, clams, coconut, pandanus, fish and other foods were not contaminated and were safe to consume;
- Incidents of poisoning from exposure to contaminated foods were the normal results of inadequate food storage or preparation and not the result of contaminants;
- Reproductive health problems, including the high rates of miscarriage and gross birth defects, were not related to radioactive exposure and were normal occurrences for a Marshallese population;
- Chronic incidents of degenerative disease appearing after 1954, including diabetes, cataracts, and various immune system problems (such as skin lesions that failed to heal) were not related to initial or cumulative exposure, and thus not the treatment responsibility of the medical survey (and later) 177 health programs;
- Radioactive exposures produced no genetic effects;

- Medical survey exams, procedures and various experiments were necessary elements of a therapeutic treatment program and in the best interest of individual patients.

Misrepresentations were made to insure continuation of experiment conditions -- a bounded unit of analysis living in a controlled, isolated, intensively studied setting -- and continued access to valued research subjects.

Misrepresentations resulted in Rongelapese compliance with the 1957 resettlement and their extended stay on Rongelap until the 1985 evacuation.

Misrepresentations resulted in the continued involvement of Rongelap subjects in medical “survey” exams, procedures, harvesting of samples, and various human subject research experiments.

These involvements contributed to an establishment of minimum dose thresholds, furthering understanding of the way radionuclides move through the food chain and through the human body, furthering the understanding of the various human effects of prolonged exposure to radiation. The United States military needed this information during the Cold War so it could ascertain how well troops and its citizens would survive in the event of nuclear war.

Misrepresentations induced significant injury, indignities, and other harm on the people and community of Rongelap, and produced findings of intense scientific interest and value to the U.S. military.

Returning an acutely exposed population to a contaminated setting for the purpose of documenting the long-term effects of previous and repeated exposures to radioactive

substances constitutes battery or purposeful physical assaults on the people of Rongelap, Rongerik and Ailinginae. Using this population in various non-therapeutic human subject experiments that involved exposures to radioisotopes, whole body irradiation and other procedures, constitutes battery or purposeful physical assaults on the people of Rongelap, Rongerik and Ailinginae.

Conducting research exams, failing to share findings, withholding medical records, harvesting samples, and subjecting the Rongelapese to invasive procedures as part of human subject experiments constituted abusive indignities that violated cultural norms and violated individual rights to informed consent. These assaults constitute physical battery.

Nuclear testing created environmental hazards and health problems that will persist for decades to come. Remedial actions are needed to address the consequential damages of United States Government negligence in providing a medical treatment program that adequately and effectively meets the acute, chronic, and degenerative health care needs of the people of Rongelap, and other communities exposed to radiation and other toxic materials produced by nuclear weapons tests. Compensatory damages for abuses associated with experiments on human subjects should be awarded to provide some measure of remedy for the pain, suffering and indignities endured by the Rongelap community as a result of their

- 1) Involvement in long-term human ecology studies on the effects of radiation beginning in 1954 and extending through 1997.

- 2) Individual, community, and national injuries resulting from willful misrepresentation of the level of contamination, extent of contamination, and safety of living, eating, and reproducing in a contaminated setting,
- 3) Use as human subjects in a range of isolated experiments, including Chromium 51 and other radioisotope experiments that had little or nothing to do with individual health and treatment needs,
- 4) Inability to exercise their rights to meaningful, informed consent.

6. Concluding Remarks

The RMI Nuclear Claims Tribunal has established parameters for compensating the hardships and related consequential damages of the United States Nuclear Weapons Testing Program in their Memorandum of Decision and Order in the class action claim for and on behalf of the people of Enewetak, and in their Memorandum of Decision and Order in the class action claim for and on behalf of the people of Bikini. In these cases, consequential damages were awarded for hardships consisting of severe food shortages and hunger, disease, loss of culture, and other types of pain and discomfort, with damages reflecting the cumulative total of individual awards that do not exceed existing bodily injury awards granted by the Tribunal.

This report has presented evidence to support claims of hardship and consequential damage experienced by individuals and the corporate community of Rongelap. Evidence has been presented to demonstrate a wide range of abuses in addition to the hardships of loss of land and involuntary resettlement (severe food shortages and hunger, disease, loss of culture, and other types of pain and discomfort).

These additional damages include natural resource damages, socioeconomic stigmatization, intergenerational and psychosocial damages of exposure, and the physical and psychological damages accompanying human subject experimentation.

This report also presents evidence where similar instances of damage and abuse have produced compensatory awards in the United States that far exceed the existing ceiling set by the Tribunal. In many of these cases, especially those pertaining to human subject experimentation, awards represent remedy for single acts of abuse, as opposed to this case of multiple and cumulative abuses experienced by individuals and the community over the span of many decades. It is our contention that compensatory actions are warranted for each of the individual incidents and abuses outlined under four general categories of concern, and that these damages should reflect the individual as well as corporate experience of:

1. The hardships, injuries and consequential damages of the loss of a healthy self-sufficient way of life;
2. Natural resource damages and related socioeconomic stigmatization;
3. Consequential damages of human exposure to radiation and fallout from the U.S. Nuclear Weapons Testing Program;
4. Negligence, negligent misrepresentation, battery and related consequential damages of involuntary participation in human subject research.

¹⁶⁹ United Nations Charter, Article 75 and 76.

¹⁷⁰ See Mary Christina Woods, Fulfilling the Executive's Trust Responsibility Toward the Native Nations on Environmental Issues: A Partial Critique of the Clinton Administration's Promises and Performances, 25 Environmental Law Journal 733,742 (1995). Discussed in Hyun S. Lee, Post Trusteeship Environmental Accountability: Case of PCB Contamination on the Marshall Islands, Denver Journal of International Law and Policy: 26 (3) Spring 1998: 424-425.

¹⁷¹ Black's Law Dictionary 626 (6th Edition 1990).

¹⁷² Case Concerning Certain Phosphate Lands in Nauru (Nauru v. Australia), 1992 International Court of Justice 240 (June 26). During its trusteeship period Australia mined phosphate, removing approximately

one third of the island, and leaving the remainder in a degraded state. The ICJ ruled that it had jurisdiction to hear the case, but Australia and the Republic of Nauru settled their claims before the ICJ could issue a ruling. Australia agreed to pay Nauru \$107 million (Australian) to facilitate post-phosphate economic development.

¹⁷³ United Nations Trusteeship Council. "Petitions Concerning the Trust Territory of the Pacific Islands." July 14, 1954, p.5. (T/L.510).

¹⁷⁴ Statement by Mr. Mason Sears, United States Representative to the Trusteeship Council, United States Mission to the United Nations Press Release #1932, July 7, 1954). Electronic document, <http://worf.eh.doe.gov/data/ihp1d/400107e.pdf>, accessed October 25, 2007.

¹⁷⁵ Statement by Mr. Frank E. Midkiff, High Commissioner of the Trust Territory of the Pacific Islands, United States Mission to the United Nations Press Release #1932, July 7, 1954. Electronic document, <http://worf.eh.doe.gov/data/ihp1d/400107e.pdf>, accessed October 25, 2007.

¹⁷⁶ P.L.990239, Compact of Free Association Act of 1985.

¹⁷⁷ P.L. 990239, Compact of Free Association Act of 1985.

¹⁷⁸ Advisory Committee on Human Radiation Experiments: Final Report U.S. Government Printing Office, Washington DC. 1995:585.

¹⁷⁹ While this letter acknowledges culpability in one incident of Cr51 exposure, documents subsequently released through the Clinton Administration declassification order demonstrate that exposure to Cr51 and other radioisotopes were not isolated incidents. For example, the 1959 medical survey includes references to the use of Cr51 to tag plasma volume in "10 exposed and 10 nonexposed people." Lab reports sent to Dr. Conard in 1964 report Marshall Island blood volume data derived from Cr51 from 21 Rongelapese samples (Electronic document, http://worf.eh.doe.gov/data/ihp2/4625_.pdf, accessed October 25, 2007), and data derived from 18 Rongelapese samples in 1965 (Electronic document, http://worf.eh.doe.gov/data/ihp2/4609_.pdf, accessed October 25, 2007).

¹⁸⁰ This discussion of reparation and the case summaries of precedents for compensation for loss of a way of life experienced by Native Americans and awarded by United States courts are drawn from the July 2000 briefing paper "Reparations and the Right to Remedy" by Barbara Rose Johnston, prepared for the World Commission on Dams, published on the World Commission on Dams website at <http://www.dams.org/docs/kbase/contrib/soc221.pdf>.

¹⁸¹ American Heritage Dictionary, version 3.0.1 1993.

¹⁸² Examples of public apology as reparation include written apologies issued by the United States Government to Japanese families imprisoned in U.S. internment camps during World War II; or, apologies from President Clinton to the indigenous people of Hawaii for unlawful seizure of a the lands and resources of a sovereign nation by past administrations of the United States government. Examples of criminal investigations and prosecution include the February 25, 2000 sentencing of the former director of the district construction bureau in Fengdu, China who received the death sentence for stealing 12 million yuan (1.44 million dollars) from the Three Gorges Project accounts. "Chinese Official Sentenced To Death For Three Gorges Corruption" <http://www.beijingscene.com/v07i009/inshort.html>, accessed December 17, 2007.

¹⁸³ Boyden, Stephen G. "The Zuni Claims Cases." Zuni and the Courts: A Struggle for Sovereign Land Rights. E. Richard Hart, ed. Lawrence: University Press of Kansas., 1994::225.

¹⁸⁴ Appendix A. Docket 161-79L, Aboriginal Area (p. 245 – 277) in E. Richard Hart, ed. Zuni and the Courts: A Struggle for Sovereign Land Rights. E. Richard Hart, ed. Lawrence: University Press of Kansas, 1994.

¹⁸⁵ Boyden, 1994: 225

¹⁸⁶ Fernandez, R. 1987. "Evaluating the loss of kinship structures: A case study of North American Indians." Human Organization 46:1-9. See also J. Stephen Lansing, Philip S. Lansing and Juliet S. Erazo, 1998. "The Value of a River." Journal of Political Ecology, vol 5 (1998):1-23. Lansing et al apply Fernandez ideas on natural capital in their assessment of the damages experienced by the Skokomish Indian Reservation in western Washington with the building of the Cushman Dam on the north fork of the Skokomish River in 1930. They argue that the biological productivity of a river ecosystem is an essential component of the "corporate estate" of the Skokomish tribe. Losses to the biological productivity of the river ecosystem can be seen as reductions in immediate income derived from the river as natural capital. Since 1930 each individual member of the tribe has experienced loss of access to diverse riverine resources, and the "costs to the tribe are analogous to losses in capital rather than immediate income." Thus,

compensation for this loss should include investments in the social and economic infrastructure of the tribe to help restore the depleted value of tribal institutions, in addition to the restoration of the natural systems that formed the basis of the tribe's cultural traditions and "enabled the steady accumulation of natural capital." (1998:18).

¹⁸⁷ United States of America vs. Exxon Corporation, et al United States District Court, District of Alaska, Civil Action No. A91-082 CIV. Electronic document, <http://www.evostc.state.ak.us/History/Downloadables/GovMemo.pdf>, accessed October 25, 2007.

¹⁸⁸ The oil company has other appeals pending on other issues related to the question of whether punitive damages are warranted or the \$5 billion award is excessive. "Judge rejects Exxon's request for a new trial in spill trial" by Jim Clarke, Associated Press, August 2 1998. Electronic document, <http://www.cnn.com/2000/LAW/scotus/10/02/scotus.exxonvaldez.01/>, accessed October 25, 2007.

¹⁸⁹ Experiment summarized in ACHRE 1995: 243-246. Award settlement reported in "U.S. Reaches \$4.8 Million Settlement with Radiation Victims" by Melissa B. Robinson, Associated Press, November 19, 1996.

¹⁹⁰ Experiment summarized in ACHRE 1995: 342-344. Award settlement reported in "MIT, Quaker Oats to settle radiation experiment suit" posted on the CNN website, December 31, 1997.

¹⁹¹ "National News Briefs; \$10 Million Settlement in Radiation Suit" New York Times, May 29, 1998. Accessed December 18, 2007. <http://query.nytimes.com/gst/fullpage.html?res=9801EEDD1138F93AA15756C0A96E958260&n=Top/Reference/Times%20Topics/Subjects/T/Tests%20and%20Testing>.

¹⁹² ACHRE 1995:348-349.

¹⁹³ Cincinnati Radiation Litigation, 874 F. Supp. 796 (S.D. Ohio 1995).

¹⁹⁴ The study involved 200 administrations of I-131 to 120 subjects including 19 Caucasians, 84 Eskimos, and 17 Indians (ACHRE 1995: 598-603). Award settlement reported in "Feds, Natives settle over '50s iodine experiments" by Sam Bishop, Fairbanks Daily News-Miner, 26 October 2000.

¹⁹⁵ United States Environmental Protection Agency National Primary Drinking Water Regulations; Arsenic and Clarifications to Compliance and New Source Contaminants Monitoring; Final Rule [40 CFR Parts 9, 141, and 142]. Federal Register: January 22, 2001 {Volume 66, Number 14: 6975-7066}.

¹⁹⁶ As discussed in J. Stephen Lansing, Philip S. Lansing and Juliet S. Erazo, 1998. "The Value of a River." *Journal of Political Ecology*, vol 5 (1998):1-23.

¹⁹⁷ Lagoon area figures are taken from maps posted RMI Embassy website, <http://www.rmiembassyus.org/Indiv%20Atolls/Republic%20of%20the%20Marshall%20Islands%20-%20Rongelap%20Atoll.htm>

¹⁹⁸ Attranco (owner of the tanker) appealed, lost, and agreed to settle for \$16 million in damages paid to the State of California. Attranco will also pay California State Department of Fish and Wildlife \$5.3 million for harming plankton and other "tiny sea creatures" that live along the coastline. In addition, BP America and the Trans-Alaska Pipeline Liability Fund previously paid \$7 million to settle their role in the case, and the owner of the dock, Golden West Refining Co., paid \$4.5 million to settle. BP America also spent \$12 million to clean up the oil spill.

¹⁹⁹ Shaw examined primary production by households for consumption between the years 1994 - 1997. Categories considered include agricultural products (banana, breadfruit, pandanus, green and mature coconut, taro, other vegetables, fruits); meat products (pork and chicken); fish and shellfish (including crabs). Estimated value (using 1991 and 1992 national income estimates, and the 1988 Census of Population and Housing) is: \$1,372,425 agricultural products; \$2,050,540 meat products; \$3,747,476 fish and shellfish. These figures assume a national total of 2,401 households growing food; 3,399 households engaged in fishing; and 2,253 breeding livestock.

Epilogue

In late October 2001, the Rongelap community assembled on Majuro, the capital of the Marshall Islands to attend the Nuclear Claims Tribunal hearing and to collect their personal injury awards, which are paid out each year in annual pro-rata payments. The Rongelap community traveled from their homes on Mejjatto, a small island in Kwajalein Atoll, and Ebeye, across from the main island of Kwajalein, from other outer islands, and from Hawaii, staying with Rongelap family and friends who had settled on Majuro.

We arrived in Majuro a few days before the October 29 – November 2 hearing to meet with the community and prepare our presentation of the case. At the Rongelap Local Government offices we found the corridors and rooms filled with people who were catching up, getting help for various problems, working on baskets and jewelry, and cooking food for community meals. Outside the Rongelap Local Government office, the women of Rongelap met each evening to sing and dance, practicing song and movement that told their story of struggle and survival. Alab John Anjain had brought his community record books from his home on Ebeye, and, using the Rongelap Local Government copy machine we reproduced his maps depicting land claims and land use history to use as exhibits. Other exhibits were prepared: We made copies of a series of maps for each atoll that had been previously marked up to illustrate the names and locations of sacred sites and critical resources such as fresh water wells, giant clam beds, and significant reefs, to demonstrate that "land" from a Marshallese perspective includes the lagoon and surrounding reefs. To put a human face to the history and the numbers, lists of names were typed up identifying the original 82 people (of whom 4 were pregnant) severely exposed and evacuated in 1954, the 20 people in that group who have

since died from radiation-related illnesses, the 8 women who have gone on record as suffering miscarriages or giving birth to children with severe congenital defects (such matters are generally taboo, and it is a difficult topic to discuss publicly), the names and parentage of 35 children born with severe congenital defects, and the names of 19 people who suffered from a preventable epidemic of polio. Copies of photographs were also made: images of children, the elderly, life on Rongelap, and examples of congenital defects. These images were posted on the NCT hearing room walls to remind us of those people who had suffered greatly, and who could not be there to tell their story. And, we met with individual members of the Rongelap community, talking with people for hours on end about their knowledge and experiences, answering their questions, and identifying who, in the Rongelap community might best be able to articulate their understandings and expertise and, thus demonstrate the elements of our expert witness report.

The Tribunal hearing on the Rongelap claim took place over a three-day period beginning on Halloween, and extending through All Saints Day and All Souls Day. Halloween and the Christian holy days of obligation, All Saints and All Souls Day, have relatively little social meaning in the Marshalls (a few kids go trick-or-treating on Majuro, but this is a relatively recent activity). But for those raised in a Catholic tradition it seemed entirely appropriate to consider the horrific consequences of nuclear war games in the Marshalls, on days such as these, days devoted towards honoring and remembering the dead.

Before the hearing a reverend member of the Rongelap community offered prayers and blessed the gathering. The proceeding was formally opened with remarks by the NCT Judges. The Rongelap community was then welcomed by Iroij Mike Kabua, a

statement written by former magistrate John Anjain was read by Senator Abacca Anjain-Maddison, and Councilwoman Rokko Laninbelik read the names of those in the Rongelap community who survived the 1954 exposure and those who have since died. The expert witnesses for the Public Advocate and the Defender of the Fund were introduced, expertise was established, we were sworn in, and our reports were formally received into the evidentiary record. We were then invited to present our case.

The room was hot, with bright florescent lights, and hard plastic seats. A big room full of people, and every chair seemed to be occupied. This modern realm seemed miles away from the Pacific reality outside our doors: ocean, sand, palm trees, a balmy breeze over reef and lagoon. But from the moment we began to present the case, all ears tuned in, time shifted, and some 75 or so people -- anthropologists, lawyers and advocates, judges, clerks, translators, technicians, the press, and the Rongelap community-- were immersed in an intense, and at times, intensely surreal, experience.

We began our case with a request: it was our intent that Dr. Barbara Rose Johnston would present several summaries of the core issues and events. And, Dr. Holly Barker would ask questions of 14 Marshallese witnesses to illustrate and further contextualize our summations. We asked the Tribunal to accept Marshallese testimony as evidence, rather than anecdotal material, arguing that their testimony was both substantiated by the documentary record cited in our report *and* represented direct evidence of the oral history and customary traditions of a nonliterate society. To support this request, we cited the Zuni land claims case, a United States federal court precedent that allowed oral history testimony to be entered as material evidence in a land claim. We also asked the Tribunal to consider the nature of Marshallese customs, especially the need

when exploring taboo subjects for questions be phrased in the Marshallese language, with nuanced respect, and, when addressing a woman, for questions to be presented by a woman. Thus, we asked the Tribunal to allow us, the anthropologists, the opportunity to directly question Rongelap witnesses who, we argued, were cultural experts. Other Marshallese witnesses testifying about current conditions, or recollections of a non-intrusive or traumatic nature, were to be interviewed directly by Public Advocate Bill Graham and Rongelap Local Government counsel John Masek. All witnesses appearing in support of the Rongelap claim would be available for cross-examination by Defender of the Fund Phil Okney. The Tribunal expressed concern that questioning of Marshallese witnesses by anthropological experts may violate procedural rules but allowed us to proceed, acknowledging the opportunity for us to demonstrate our ethnographic methods as well as the need to proceed with proper respect for customs and taboos. Counsel was asked to provide the Tribunal with a post-hearing brief further outlining the rationale and legal precedents for this approach.²⁰⁰

The proceedings took place in English and, with the help of translators, all questioning and testimony from Marshallese witnesses occurred in Marshallese with English translation. The hearings were tape-recorded and videotaped to insure as complete a record as possible. Senator Abacca Anjain-Maddison also videotaped the proceedings.

Our summations and the testimony from Marshallese witnesses allowed us to establish a sense of what was -- a culturally-vibrant traditional way of life based on access to and stewardship of critical terrestrial and marine resources -- before moving to the broader questions concerning what happened, to what effect, and with what

consequences. We heard testimony on land rights and stewardship, and the many ways that regular access and use of critical resources allowed the elders to teach and transmit a way of life to the next generation. We heard testimony about the hardship of being forced to leave Rongelap during weapons tests. Testimony was given about the historical importance of Rongerik, its role in sustaining the Rongelap community, the damages that resulted when the Navy (the trust territory administrator at the time) decided without permission of Rongerik landowners to resettle the Bikini community there, and the efforts that the people of Rongelap took to help the Bikinians as resources dwindled and they faced starvation. And, we heard poignant testimony about the psychosocial and economic stigmatization resulting from radiation exposure, the personal hardships and injuries associated with radiation exposure, and the personal hardship and injuries associated as serving as human subjects in medical experiments and research programs that lasted for decades.

A great deal of new information came out in the memories shared by our Marshallese experts. Two areas are worth elaborating upon here, as this information was not addressed in any exhaustive form in *The Rongelap Report*.

First, the long-term medical research involved some 73 excursions to the Pacific to examine, document, and collect samples for human radiation research. This research involved the Project 4.1 people who were on Rongelap during the Bravo Test and were considered “exposed” and the people from Rongelap who were not there in 1954 but moved back there after 1957 (the “non-exposed” Rongelapese used as research “controls”). And, the human subject research involved hundreds more people from Utrik, Likiep, Majuro and other atolls in the Marshall Islands who were selected as age-matched

and “non-exposed” controls for various biomedical studies. As was the case for the people of Rongelap, “control” exams were conducted with little or no information given to the subject, and until the mid-1980s no effort was taken to obtain informed consent. The traumatic nature of this experience is emphasized in the following excerpt from the testimony of Helena Alik, who was enrolled in the study as a control subject at age eleven.²⁰¹

Holly Barker: When you participated in these medical programs, did you understand the medical procedures or treatment that you were receiving?

Helena Alik: I have no idea. I only know that when the time comes for the people of Rongelap on Ejit to be examined, I am sure that I will also be called on to attend the examination.

Holly Barker: Have you ever had any fears or concerns about participating in this program?

Helena Alik: Sometimes I was afraid and hide, I would run away because I heard that, they say that I am going to attend the medical examination of those contaminated people.

Holly Barker: What would you want to do? Would they come and find you?

Helena Alik: I was always get caught. Sometimes I am in school in the classrooms and they send police officers.

Holly Barker: Did you ever feel embarrassed when the police came to the school, confused about why they were there?

Helena Alik: Yes, because there were children asking: “Are you also a victim of the fallout?”

This and other testimony illustrated several facts about the medical research program that had not been previously considered within the Tribunal, or in the earlier ACHRE review. The Rongelap study was structured in ways that required the involvement of children from other atolls, especially children in the southern part of the nation. Such involvement extended over decades. Control subjects were selected at the direction of authorities. Being singled out resulted in social stigmatization (people were shunned because of the social perception that all people studied by the medical survey team were people damaged by the radiation). Control subject experiences included thorough

examinations with photographs and x-rays, measurement of internal radiation with whole body counters, the sampling of blood, bone marrow, skin and other tissue samples, and, on a number of occasions the injection of radioisotopes, vaccines, and other non-explained substances. While the United States had formally acknowledged that Chromium-51 and tritiated water had been given to Marshallese subjects as a part of a non-treatment related research program, medical technician testimony during the Tribunal hearing noted that these and other radioisotopes were administered at various times to small groups of people prior to whole body counts.²⁰² Radioiodine, for example, was administered as part of iodine-uptake studies. Testimony supported ACHRE findings that some of the biomedical procedures had no relationship to the medical needs of the individual. And, testimony made clear how the experience of serving as research “control” was intrusive, painful, and potentially harmful to the health of the participant. The second major area of new evidence examined at this hearing involved the fact that damages from the nuclear militarism of the United States were borne by the entire nation, not just individuals, atoll populations, or specific land owners, and the damages associated with the United States military testing includes much more than radioactive elements. These points – nation-wide exposure and the broader array of damages associated with Cold War militarism – were most effectively made by the anthropologist who testified on behalf of the Defender of the Fund, Dr. Nancy Pollock, in her comments to the Tribunal following our presentation of damages associated with a no-re-evacuation policy. To illustrate some of the damages associated with leaving the people of Rongelap on their atoll, exposing them to future tests -- for the purposes of serving as long term research subjects, as well as demonstrating to the world that they suffered no lasting harm

from their exposure -- we presented the Tribunal with details from a 1968 series of biochemical weapons tests known as DTC 68-50, or, Project Shad. This test series took place in the waters off Enewetak and involved the atmospheric dissemination of "PG" -- staphylococcal enterotoxin B -- an anthrax-simulating agent that produces immediate and extreme "flu-like" symptoms that can be fatal to the very young, the elderly, and people with compromised immune systems (from long-term illness, or exposure to radiation). Staphylococcal enterotoxin B was disseminated by planes over a 40-50 km downwind grid, and according to tracking records, a single weapon was calculated to have covered 2400 square km (an area equal to 926.5 square miles). While no effort was made by the United States military to officially document the affects of this agent on the local Marshallese population, the Rongelap Medical Survey did visit before and after the test series, and reported "a rather serious outbreak of Hong Kong influenza occurred among the Rongelap people in 1968 and may have been responsible for the deaths of a 58-year old exposed woman and of an unexposed boy who died of meningitis complicating the influenza."²⁰³

Elsewhere in the 1968 report it was noted that anti-body tests for Asian influenza had been conducted, with negative results. In the questioning that followed this testimony, Dr. Pollock offered an impromptu story in support of our testimony. In 1968 Dr. Pollock was conducting anthropological fieldwork on Namu Atoll in the southern Marshall Islands. At the time of the military exercise involving staphylococcal enterotoxin B, she was attending a baseball game with much of the island population. Part way through the game everyone was hit with cramps, and the game abruptly ended when everyone -- athletes and fans -- began vomiting. She later learned that there was a

nation-wide outbreak of this severe flu. She described the experience as food poisoning-like symptoms, with extremely rapid onset. Her personal experiences confirmed that the weapons tests held off Enewetak could indeed adversely impact people on Rongelap and in the southern part of the nation, and some of those impacts were related to biochemical weapons tests.²⁰⁴

During the hearing we undertook lengthy questions about the acute exposure from Bravo fallout and the experience of suffering radiation burns. At the break, one of judges took Holly Barker aside to ask why there were so many questions about this topic when the Tribunal already provides compensation for radiation burns under the personal injury program. What the judge had not realized years before during the personal injury phase of the tribunal process, and what was evident in new testimony at the hearing, is that the people did not receive any pain medication or treatment for their burns. This hearing was different because there was an opportunity to hear survivor recollections in a forum and setting that allowed the judges to understand the radiation burn injury involved more than the physical suffering from a burn that goes bone-deep. Injuries also included the physical and psychological trauma associated with a medical response that documented in careful, clinical terms, but did not treat any of the injuries. Testimony made clear that in the initial exams, and in the subsequent three months of medical care, U.S. government doctors and researchers measured and photographed people and their burns, took samples of blood, skin, urine and feces, supervised public decontamination scrubbing in the lagoon, but, according to survivor memories, did not give any medication to treat injuries and relieve pain.²⁰⁵

Over the course of three days, some fourteen and half hours of testimony fleshed

out a history and chain of events and allowed a small glimpse of the huge consequential damages incurred by the people of Rongelap as a result of the United States nuclear weapons testing program, and the related opportunistic research program. For those in attendance -- the Rongelap community, lawyers, expert witnesses, judges and court officials -- this hearing was, in a sense, “our Nuremberg” tribunal, and more. The expert witness report and the tribunal hearings served as a truth and reconciliation commission, with Marshallese experts providing the testimony, and the declassified narratives of scientists and scientific findings providing the damning substantiation. The participatory nature of the hearing allowed us all to engage in the struggle to understand the history of a people, their exposure to nuclear fallout, their struggles to survive radiogenic disease and sustain life in a contaminated environment, their difficulties in securing comprehensive medical treatment while serving as radiation research subjects, and the many problems of a people displaced from their traditional homeland. After decades of denial by the United States government this was truly an historic hearing. Substantiated testimony was presented in a formal court setting and received with clarifying questions and respectful instances of shared emotion.²⁰⁶ In defense of the claim, the expert witness for the Defender of the Fund presented a summary that further substantiated claimant concerns.²⁰⁷

At the end of the hearing, after the three judges, clerks, translators, press, and lawyers had left the room, the people of Rongelap announced to us and to each other their own conclusions: “We won! We do not need to hear the judges’ findings, we know we have won.” The women sang, and danced, and we shared food and gifts. It was a rare honor to be in that room with these courageous, generous, and determined people who

have struggled to have their story heard and acknowledged by the United States government for more than 50 years. The power of these moments cannot be understated.

Post-hearing ...

While the NCT hearing on the Rongelap claim had power to affect the moment, many years would pass before the Tribunal rendered its' judgment. In these years, from 2001 to 2007, additional aspects of the claim were explored, new claims for other atolls were filed, and people carried on with their lives in a rapidly changing, increasingly militarized world.

As suggested by the nation-wide outbreak of "Asian flu" following biological weapons test in the northern Marshalls and documented in the declassified military reports, the entire Marshall Islands were subject to fallout and numerous other atolls in the Marshall Islands have their own unique histories related to the testing program -- Kwajalein, Ujae, Likiep and Ailuk to name a few. The opportunity to file claims with Nuclear Claims Tribunal and the participatory and transparent nature of the claims proceedings, has prompted efforts to revisit and reclaim local histories. This broader public engagement, in turn, is allowing the nation to come to terms with the fact that damages and injuries resulting from the nuclear weapons testing program involves not just the four communities recognized by U.S. public law, but the nation as a whole.

The people of Ailuk Atoll, for example, were not evacuated immediately after the 1954 Bravo incident, despite the fact that radiation levels on the atoll were high enough to warrant removal of the people. The rationale given for this decision by the United States Navy was logistical: it was simply too cumbersome to evacuate the 401 Ailuk

residents from their home islands. As a result, the U.S. government decided to leave the people of Ailuk in their contaminated setting without medical care or information about how to reduce their exposure to contaminants from the Bravo test fallout, or protect themselves from further exposure during subsequent tests in the 1954 series, in 1956, and 1958.²⁰⁸

The United States government's policy on nuclear damage and injuries to Marshallese communities reflects fixed notions of space and time: They assume dangerous levels of exposure to radiation occurred through one detonation in 1954, rather than the entire series of 67 atomic and thermonuclear tests. Their definition of the dangerous fallout zone encompasses only four atolls in the northern Marshall Islands, rather than the entire nation. And, because current policy is derived from circa 1954 disclosures of contamination and understanding of risk, they have effectively limited their liability. Only those people who were present on Rongelap and Utrik during the 1954 Bravo event are considered dangerously exposed (and thus eligible for U.S. provided healthcare for radiation-related illnesses).²⁰⁹

These assumptions fail to recognize many other groups of people exposed to dangerous levels of contamination through their customary movement throughout the islands for childcare, schooling, marriage or employment, and groups of people who lived in less contaminated settings but consumed fish or crops harvested in heavily contaminated settings. For example, Marshallese workers from around the trust territory were hired by the Department of Energy to clean-up the ground zero locations of Bikini and Enewetak. These workers were exposed to considerable hazards and received little to no radiation safety information, yet, because they fall outside the temporal and spatial

categories constructed by the United States government, they have historically been excluded from the healthcare monitoring and treatment programs provided by the United States for RMI populations exposed to radiation.²¹⁰

These are just a few of the examples of communities whose injuries from the testing program were ignored and effectively silenced over the decades when the United States retained administrative control of the islands. As mentioned, their histories are now beginning to emerge within the context of the Nuclear Claims Tribunal proceedings, and these hearings and the Tribunal findings challenge the official U.S. government account of the activities and consequences of the U.S. nuclear weapons testing program in the Marshall Islands.

What outsiders can never appreciate is how profoundly cancer and radiogenic illnesses have permeated the fabric of life in the Marshall Islands. Virtually every single family in the Marshall Islands knows first-hand the struggle to find care for their family members with cancer, and the grief and loss that occurs when loved ones succumb to the illnesses. For example, Holly Barker lived on Mili Atoll when she was in the Peace Corps. This atoll is in the southeastern portion of the country, and is literally as far away from the ground zero locations in the RMI as possible. Her Marshallese mama, a woman who adopted her during her Peace Corps service had a sister, Manuwe, who was married to a man employed by a DOE contractor to clean-up Bikini Atoll after the testing program. Manuwe moved with her husband to Bikini in the 1970's where she ate and drank from a contaminated environment. Manuwe died of cancer, but she was from Mili and her death is not counted or considered part of the official burden experienced by the Marshallese because she is not from one of the four atolls (Bikini, Enewetak, Utrik

and Rongelap). Manuwe's husband is plagued by illnesses and he is confined to a wheelchair. Because his exposure to radiation occurred while working on remediation projects, rather than the 1954 Bravo event, he is not eligible to participate in medical monitoring or treatment programs. Furthermore, he is also not eligible to participate in a U.S. Department of Labor compensation and medical care program for DOE workers exposed to radiation because he is not a U.S. citizen.

If this report is any indication of the regularity of cancer deaths in the Marshall Islands, we need look no further than the case of George Anjain, one of our advisors in the land value study conducted in 1999, passed away from an unexplained hemorrhage in the hospital on Ebeye (the 80-acre islet where some 12,000 Marshallese live across the lagoon from the U.S. missile testing facility on Kwajalein island). George Anjain's death at the age of 49 was especially traumatic as he was unable to receive the emergency care he needed because of a provision in U.S. law specifically stating that the Department of Energy cannot pay for any medical conditions considered "non-radiogenic."²¹¹ Given George's exposure on Rongelap to radioactive fallout from Bravo test as a three-year-old child, and subsequent exposures due to life in an environment heavily contaminated by radiation it is difficult, if not impossible, to establish a clear cut distinction between the "direct" and indirect health consequences of the testing program.

Beyond George Anjain's death in 2000, we have lost the Marshallese judge on the Nuclear Claims Tribunal who had responsibility for the Rongelap land claim, Chairman Oscar deBrum. Oscar was a Marshallese Ambassador and statesman and former District Administrator for the Trust Territory Government whose work had him traveling to all

the contaminated atolls for meetings with communities or to monitor the progress of environmental remediation. Oscar died in 2002 from prostate cancer.

In 2004, we lost John Anjain, who was Mayor of Rongelap during the Bravo event, and a key spokesman for the community who carefully documented all of the illnesses and changed experienced by the Rongelapese in his private journals. John was George Anjain's father. He was also the father of Lekoj Anjain, who as a 1-year old baby at the time of Bravo and the first Marshallese to contract leukemia. Lekoj died at the age of 19. John also died complaining of stomach pain. He died from an undiagnosed cancer.

And, in 2005, we also lost Almira Matayoshi, an important matriarch who shared her experiences and the stories of the Rongelap people on several occasions as formal testimony in United States congressional hearings, to the United Nations, at forums in Japan, and elsewhere in the world. Almira was a key witness during Rongelap's hearing before the Tribunal. In addition to her own personal experiences with exposure, evacuation, loss of land, medical exams, thyroid surgery, and reproductive health problems, she testified about the stereotypes imposed upon the Rongelapese and their feelings of being ostracized in the broader Marshall Islands community by people who were fearful that they would catch radiation illnesses from the *ri-baam* (people of the bomb), before they understood the linkage between exposure and illness. Almira died from bladder cancer.

These are just a few of the many Marshallese involved in this research whose lives were constantly compromised by their struggles with radiogenic illness. The Marshallese have suffered more illness, death, and grief than any population should endure and historical wrongs resulting from the nuclear weapons testing program have

been compounded by the inadequate and under-funded approach to providing medical assistance. Despite the seriously elevated cancer rates in the Marshall Islands, as of this writing, there is no oncologist in the country. There is no ability to provide chemotherapy or radiation treatment, and perhaps worse of all, there is no ability to undertake a nationwide screening for cancer to catch the illness in its early stages and provide patients with the greatest chance for survival and an improved quality of life.

The problematic consequences of the US effort to address the healthcare needs of a radioactive nation were amplified for us in interviews conducted as follow-up research on the human radiation experimentation program. On September 30, 2004 Holly Barker interviewed a number of Rongelapese who had served as “controls” for the Atomic Energy Commission-funded research conducted by Brookhaven Lab. Their experiences include an array of health issues and because they were “controls” rather than “exposed” responsibility for their long-term health care is problematic. The Department of Energy has provided some medical attention over the years, but in recent years has proposed terminating assistance to this population because control subject health care is not specifically identified in Congressional mandates, and because it will allow the DOE to save some money. One of the resounding themes in these interviews is the frustration expressed by people who served as medical research subjects for so many years, yet, do not have access to their medical records, do not have a full understanding of their health care problems, have immense healthcare problems, and are constantly troubled by the question of what ailments might indeed be a result of their radiogenic exposures. A few excerpts are reprinted here to provide some sense of the complex nature of serving as a control subject, as well as the difficulties in securing adequate healthcare. Note, because

these interviews occurred outside of a formal legal proceeding, to protect peoples privacy we use their initials rather than their full names or human subject numbers.

T.A. was born on Jaluit in 1942 and moved to Rongelap in 1967 with his wife, a Rongelapese. One year later he was enrolled in DOE's program as a control subject. No one asked him permission to participate as a subject in the medical research program, he was simply told that he must participate. He understood it was for comparison purposes. He remembers x-rays, eye exams, unknown injections, and blood samples. *"I was scared. I'm scared of doctors' equipment. I went to see if I had illnesses. I'm concerned about radiation (effects)."* *"I love my wife so I went to Likiep. (I participated in the exams because) I thought I was helping the exposed population."* T.A. had an operation on a stomach tumor at Straub Hospital in Hawaii. T.A. also has thyroid nodules, but hasn't had thyroid surgery. He takes 9 pills of medication everyday. He doesn't know what they are all for. He is worried about where he will get medical help if the U.S. government removes the control population from its current medical program.

J.K. was born in 1934 on Kosrae and lived on Ujae for the Bravo test. He was resettled on Rongelap with the exposed population in 1957. J.K. understood that the program was for comparison purposes. He thought it was a good thing to participate in the program since he was living on Rongelap, an irradiated place and because he was eating the local foods. J.K. remembers that U.S. government doctors gave him a blood transfusion and told him it would make him stronger. He had injections and never knew what they were for. *"I was nervous and thought I wouldn't go (to the exams), but I always went."* J.K. has been on thyroid medication since 2001. He has diabetes and high blood pressure, and eye problems. He has never been to the U.S. to see doctors.

A.J. was born on Rongelap in 1933 and was on Kwajalein during the Bravo test. "The U.S. government told me to be a control. I went back in 1957. I did as I was told. They told me to." A.J. has swollen lumps on many parts of his body, including his breast, neck, arm, and behind his ears. He has had procedures to have them removed four separate times, but not in the U.S. He has breathing problems now. He remembers that the U.S. doctors gave him a blood transfusion. He doesn't know why. He did not get a letter from DOE stating he was part of the acknowledged human radiation experiments. "They've taken samples from me... I didn't want them to enroll me, but they did. I went to Rongelap and I need to know I'm safe."

I.E. was born in 1940 on Rongelap and was on Ebeye during the 1954 Bravo test. The AEC asked for volunteers to compare health to the exposed. *"The people of Rongelap were my relatives. I was sad for them... They had me hold up a number and they took our picture. I had never heard of Project 4.1."* *"I met [Dr. Robert] Conard. He came twice a year. I don't know what they did to us. A Japanese doctor came with him once."* I.E. remembers the blood samples and physical exams. He remembers receiving three kinds of injections, including one that he believes would

help him be immune to illnesses. I.E. assisted the medical survey team. *“They didn’t explain things. They gave me number results that didn’t make any sense.” “They studied me. I might be poisoned but they won’t say. I ate things I shouldn’t have like coconut crab. I lived and ate where there is radiation. If I hadn’t gone back to Rongelap I wouldn’t need this (medical) program.”* I.E.’s older sister, now living in Hawaii, received a letter from the Department of Energy saying she was a human subject in experiments using chromium-51 and tritiated water.

K.A. is from Ujae, she was born in 1943 and moved to Rongelap in 1957. She said U.S. doctors asked who wants to compare blood. *“I was helping them (the exposed). We were sad for them... They[the U.S. government scientists] would give us candy, and fruit, and milk to be in the program. They really wanted us then...”* She remembers that the lobster, pandanus and fish she ate on Rongelap caused swollen bumps in her mouth. She remembers blood samples, stomach exams, and the swollen legs she experienced. She had injections but doesn’t know for what. She says she has heart problems. On two different occasions, the U.S. doctors cut open her side and put tubes in her. No papers were given to her to describe the procedures. She complains of severe body pain, especially in her legs. At times she cannot walk. *“I have pain constantly. I need a doctor.” “My eye tears incessantly... They cut something hard out from under my eye.” “My heart’s getting bigger – I have a bad problem.”* She was told by U.S. government doctors that she had breast cancer, but then she was told she was fine (benign tumors?). *“I want a doctor for my health. Rongelap hurt my body. I still have skin problems from Rongelap. I still have eye problems. My teeth fell out on their own from the poisonous food on Rongelap. My parents died young.”* K.A.’s mother had breast cancer. Her father had swollen legs. Her sister died of bone cancer. All three of these family members were control subjects, too.

What meaningful recourse do these people have, given the immense nature of their problems and complaints? A minimalist approach to health care has been provided through the Compact of Free Association (177 agreement): Some 17,000 people receive healthcare through the 177 Health Care Program established to address the radiogenic health issues of the people of Enewetak, Bikini, Rongelap and Utrik islands. This system is woefully under-funded and lacks comprehensive cancer treatment capability. Many people have filed personal injury claims and with their compensation, moved to Hawaii and the continental United States seeking, among other things, better healthcare. Millions in compensation have been ordered by the NCT for personal injury claims, but many

more people have been found eligible than originally anticipated. Thus, the majority of awards have yet to be paid to victims or their surviving families in full.²¹² And, while a compensatory payment provides assistance at one level or another, in no way does it provide the means to restore overall health.

What is lacking in the Marshall Islands, and sorely needed, is a high-quality medical care program that would address direct *and* indirect health problems caused by U.S. activities during the nuclear test period, and build the capacity of the Marshall Islands to address these needs.²¹³

Seeking meaningful remedy

The Nuclear Claims Tribunal was forced to halt incremental payments for personal injury awards in 2006 due to a lack of funds. As noted above, there have been far more claims for radiogenic illnesses in the Marshall Islands than anyone expected, and the cost to restore the damage created by the nuclear weapons testing program greatly exceeds any initial expectation, especially given the fact that the award fund was established at a time when contaminant levels were still classified and kept secret during negotiations between the United States government and its territorial possession. With the release of previously classified materials, and the scientific research accompanying the development of personal injury, property damage, and hardship claims to the Nuclear Claims Tribunal, a more thorough understanding of physical injury, property damage, and costs to restore has been achieved.

In September 2000, the RMI Government presented the U.S. Congress with a Changed Circumstances Petition requesting that the U.S. Government fund and provide

adequate healthcare for all populations in the RMI whose health was adversely affected by the U.S. nuclear weapons testing program, and fully fund the Nuclear Claims Tribunal so it could make awards for personal injury and private property damage in accordance with its Congressional mandate. The “changed circumstances” refers to any new information not known when the original Compact of Free Association was consummated and signed on June 25, 1983. New information not only includes public awareness that nuclear weapons tests adversely affected the entire nation, but new scientific evidence that low-level exposures to radiation produces significant health risks, and that these risks were not understood when the Compact was originally negotiated.²¹⁴

In 2004, the United States National Cancer Institute (NCI) predicted that more than 500 cancers will ultimately manifest in the population that was living in Marshall Islands in the 1950s as a direct result of the testing program – cancers that would not exist had the U.S. government not used the Marshall Islands to conduct 67 atmospheric weapons tests. More than 200 of those cancers have yet to surface because of the long latency period of certain types of cancer and the aging of the population. And, 297 of the excess cancers estimated by the NCI will occur among people living at atolls other than Rongelap and Utrik in 1954, the only atoll populations eligible to receive U.S. healthcare for radiogenic illnesses.²¹⁵

In July 2005, the National Academy of Sciences released the Biological Effects of Ionizing Radiation (BEIR) VII Report reaffirming the conclusion of the 1990 BEIR V report that every exposure to radiation produces a corresponding increase in cancer risk.²¹⁶ Despite scientific evidence that additional information has come to light, that damages are far greater than originally anticipated, the Changed Circumstances Petition

has not been acted upon in Congress, in large part as a result of the Bush administration's review of the petition, and the contentious finding that the U.S. government has met its' legal obligation to the Marshallese. At Congressional hearings about the petition in July 2005, and again in 2007, the Executive Branch made it clear that it does not find merit in any of the RMI's requests, and Congress still lacks the political will to provide meaningful relief to the Marshallese.

Prior to the Rongelap hearing in 2001, the Tribunal had completed its review and issued property damage claim judgments awarding hundreds of millions to compensate, remediate and restore Bikini and Enewetak. In the years since, the Tribunal issued judgments in the Utrik claim, and accepted other atoll claims.²¹⁷

On April 17, 2007, some sixteen years since the first claims were filed, the Nuclear Claims Tribunal finally issued their decision in the Rongelap case. As laid out in the 34-page judgment: "The Tribunal has determined the amount of compensation due to the Claimants in this case is \$1,031,231,200. This amount includes \$212,000,000 for remediation and restoration of Rongelap and Rongerik Atolls. This award further includes \$784,500,000 for past and future lost property value of Rongelap, Rongerik and Ailinginae Atolls as a result of the Nuclear Testing Program. Finally, it includes \$34,731,200 to the Claimants for consequential damages."

Notably, the "past and future lost property" award reflects "loss of way of life damages" including the loss of the means to live in a healthy fashion on the land: people were on island, but exposed to high levels of radiation. And, the consequential damages award not only includes the resulting pain, suffering and hardships from "loss of a healthy way of life" but also awards personal injury to subjects identified as receiving

chromium-51 injections which were "an additional burden to the already considerable exposure from consuming contaminated foods and living in a radioactive environment."

With regard to the larger involvement of the Rongelap people in four decades of human subject research, the Tribunal found that "the emotional distress resulting from the participation in these studies and the manner in which they were carried out, warrants compensation, and is a component in the consequential damages related to the period of time the people spent on Rongelap from 1957 to 1985."²¹⁸

It was with mixed emotions that we received the news of the final judgment in the Rongelap claim. Historical wrongs have been acknowledged. Yet, the initial trust fund was never adequate to pay personal injury and property damage awards, and an act of U.S. Congress is required before Tribunal judgments can be implemented in full. By 2007, there was less than \$1 million left in the NCT fund. The Rongelap award, the prior awards to Bikini, Enewetak, and Utrik, as well as a huge portion of the personal injury awards, remain unpaid. Pending claims for other atolls can look forward to a similar status. At this writing there is no political will in the United States government to right these wrongs. Whether or not the ordered remedy will ever be achieved remains to be seen.

Political administrations come and go, but radiogenic contamination and disease present protracted, ulcerating, inter-generational problems. The toxic and radioactive contamination of soil, water, terrestrial and marine biota, and human life that is the legacy of nuclear war games in the Marshall Islands is difficult and expensive to monitor, let alone remediate. The health complications of radiation exposure for individuals and their offspring are similarly expensive to monitor and treat. Nevertheless, it is our

contention that just as the United States government continues to appropriate billions of dollars for the clean-up of the plutonium processing plant in Hanford, Washington, and as it continues to make appropriations to provide full compensation to people living downwind from the Nevada Test Site, so too must it honor commitments to the inhabitants of the former trust territory that deserve the same level of healthcare and clean-up as U.S. citizens.

While actual payment on the Nuclear Claims Tribunal judgments remains in question and thus the costly work of environmental remediation is in doubt, some of the recommendations for remedy outlined in *The Rongelap Report* – ideas that originated from within the Marshallese community -- have spurred action in the Marshall Islands, thanks to the many efforts of Rongelap citizens and their government. When we presented *The Rongelap Report* as supporting evidence in the Rongelap property damage claim in 2001, it was a time of intense effort by the Government of the Republic of the Marshall Islands to urge the Government of the United States to take greater responsibility for the damages and injuries linked to the testing program that the U.S. still needs to address. It was also a time of purposeful effort by the people of Rongelap to define themselves not as “victims,” who are typically portrayed as incapacitated, passive and unable to take control of their situation, but as survivors who experienced extreme hardship yet are able to take the active steps necessary to reclaim their futures. In the years since, collaborative research projects have been initiated by the Rongelap local government with professors and students at the University of Hawai’i producing culturally-appropriate designs and structures that have since been built on Rongelap island. A market analysis was conducted, and the local government purchase a boat, built

tourism structures on Rongelap island and has launched an ecotourism venture.²¹⁹ Plans were announced and a fund raising effort is underway to build a Rongelap Peace Museum.²²⁰ The Rongelap local government hired a team of independent lawyers, health physicists, other scientists, and community planners to review data produced by the United States government about the future habitability of Rongelap, and to review data by the local government's own researchers.²²¹

Both United States scientists and Rongelap consultants believe that the island of Rongelap could be habitable year-round in the future if remediation of the soil continues. They also agree that other islands in Rongelap Atoll, especially the northern islands will remain dangerously contaminated for many years to come (in some cases, 25, 000 years). Thus, the question of whether the people of Rongelap will actually be able to return and live in a sustainable fashion on one relatively "safe" island within a still intensely contaminated atoll has yet to be resolved.²²² Will people survive and thrive when the exploitation of critical resources is largely limited to the main island of Rongelap? What measures can be taken to insure that the people, as they grow and eat local food and live in their environment, are not at risk from hazardous levels of radiation? If the resettlement costs more than initially planned, who will be accountable? Will the Rongelapese feel comfortable about moving back to their home islands a third time, given their experiences of returning in the past with false assurances that all was well? And, what of the generations to come? Will the younger generation, who were born and raised in the more developed islands of the southern atolls have an interest in returning to simpler life on an outer island? Do they have an affinity to a place where they were not

born and raised? Will they view Rongelap as a place to live, realize their dreams, and raise future generations?

These difficult and complex questions can only be addressed when the community has full access to scientific information, has the means and ability to fully participate in developing and choosing remedial strategies and resettlement plans, and because of their increased knowledge and ability to participate, can feel confident that their decisions rest upon transparent and verifiable science. Fortunately, the efforts taken by community leaders to implement recommendations in the Rongelap Report, to conduct their own independent reviews, and to thoroughly and regularly communicate their progress in the scientific assessment and resettlement planning process have greatly empowered the people of Rongelap. The struggle continues, but the people of Rongelap are well on the road to coming to terms with the realities of life in a radioactive nation.

²⁰⁰ Review of the Rongelap hearing video tapes for October 31, 2001: In arguments to the Tribunal, Public Advocate Bill Graham, lead Counsel for the Rongelap claim, noted that many of the witnesses were elderly women whose experiences were very humiliating and painful, and the public discussion of these experiences -- in front of family members and a broader public-- broke numerous taboos. Counsel asked the Tribunal to recognize the cultural linguistic necessity of an anthropologist posing questions in ways that minimize cultural sensitivities, respects taboos, and elicits testimony. He argued that a female anthropologist, with a pre-existing relationship and rapport with the informants, was necessary to present questions in an appropriate respectful manner that allowed the Marshallese witness the cultural space to respond. Counsel noted that ethnographic interviews represent the primary means by which anthropological knowledge is generated, that the posing of neutral and culturally respectful questions to elicit information represented a key element of our data gathering process, and that this approach in the proceedings was a cultural and linguistic necessity. And, counsel cited the Zuni Land Claims case as a relevant example where anthropologists deposed native experts, and this testimony played a central role in judicial proceedings. The post-hearing brief cites U.S. federal rules for evidence, State of California rules for questioning expert witnesses, case study precedents involving land claims cases *Zuni Indian Tribe V. United States*, United States Claims Court Docket Nos. 327-81L (Ct. Cl., 1981) and 224-84L (Ct. Cl., 1984) and Docket 161-79L (Ct. Cl. 1987), the Canadian Supreme Court Ruling on *Delgamuukw V. Province of British Columbia*; and Australian court evidentiary procedures in cases involving native title, the role of anthropologists in these proceedings, and the standing of native elders as of cultural experts. See, Claimants Brief in Support of their use of an anthropologist to question witnesses, filed with the Clerk of the Tribunal, RMI Nuclear Claims Tribunal, February 12, 2002.

²⁰¹ Helena Alik testimony, as recorded on November 1, 2007 videotape of the Nuclear Claims Tribunal hearing on the Rongelap claim.

²⁰² As many as seventy-nine Marshallese subjects received Cr-51 and/or tritium as part of non-treatment related research activities between 1961 and 1966, and between five and twenty-five subjects may have received Cr-51 during the 1959 medical survey. Several of these studies also involve Caucasian Americans

who were living in the Marshall Islands. See the Department of Energy Report to the ACHRE: Human Radiation Experiments Associated with the U.S. Department of Energy and Its Predecessors for human radiation experiment BNL-36 “Total-Body Water and Hematologic Studies in the Pacific Islanders Using Chromium-51 and Tritium.” Electronic document accessed May 10, 2007

http://www.hss.energy.gov/healthsafety/ohre/roadmap/experiments/0491docb.html#0491_Brookhaven.

And, Letter to W. Siri, Subject: Sending you the 1.0 ml volumetric pipette which we used at Kwajalein. From Leo M. Meyer. April 9, 1965. Electronic document accessed April 11, 2007

http://worf.oh.doe.gov/data/ihp2/2522_.pdf; “Medical Survey of Rongelap People Eight Years After Exposure to Fallout” Robert A Conard, M.D., Leo M. Meyer, M.D., Wataru W. Sutow, M.D., William C. Moloney, M.D., Austin Lowrey, Col (MC) USA, A. Hicking, Practitioner, and Ezra Riklon, Practitioner. January 1963, Brookhaven National Laboratory, Upton, New York.

http://worf.oh.doe.gov/data/ihp1a/2682_.pdf; “Medical Survey of the People of Rongelap and Utirik Islands Eleven and Twelve Years After Exposure to Fallout Radiation (March 1965 and March 1966)” Eleven-Year Survey. Robert A Conard, M.D., Leo M. Meyer, M.D., Wataru W. Sutow, M.D., James S. Robertson, M.D., Ph.D., Joseph E. Rall, M.D., Ph.D., John E. Jesseph, M.D., Arobati Hicking, Practitioner, Isaac Lanwi, Practitioner, Ernest A. Gusmano, Ph.D., and Maynard Eicher. Twelve-Year Survey. Robert A Conard, M.D., Jacob Robbins, M.D., Joseph Deisher, M.D. and Arobati Hicking, Practitioner. Brookhaven National Laboratory, Upton, New York.

http://worf.oh.doe.gov/data/ihp1a/2683_.pdf.

²⁰³ Medical Survey of the People of Rongelap and Utirik Islands Thirteen, Fourteen, and Fifteen Years After Exposure to Fallout Radiation (March 1967, March 1968, and March 1969), Robert Conard, M.D., et al. Brookhaven National Laboratory. On October 31, 2001, the names of those in the Rongelap community who died from the 1968 “influenza” epidemic were read into the Nuclear Claims Tribunal record by Councilwoman Rokko Laninbelik. They were Martha Laudam, Tokjeta Riklon, and Rocky Job Jilej.

²⁰⁴ This revelation that the Marshall Islands population experienced ill-effects from biological weapons tests off their shores prompted formal bilateral requests from the RMI to the United States for a full and complete disclosure of all biological and chemical weapons tests conducted in Marshallese waters. For a news report on this issue, see, “Marshall Islands: Marshalls chemical, biological tests revealed” by Gif Johnson Pacific Magazine, *Marianas Variety/PINA Nius Online*, 11 June 2002. Veterans Administration lobbying and Congressional hearings prompted additional disclosures on Project Shad events and possible health effects on American soldiers participating in these tests, and a health care program for veterans of Project Shad was established by a 2003 act of US Congress. A National Academy of Science study was funded to examine the long-term health effects of Project Shad exposure, their May 2007 report “Long-Term Health Effects of Participation in Project SHAD” found “no clear evidence that specific long-term health effects are associated with participation in Project SHAD” Electronic document <http://www.iom.edu/?id=4909> accessed February 10, 2008. Immediate effects from acute exposure, as suggested by the deaths of an older woman and a young Rongelap boy, were not explored. The Marshall Islands has yet to receive a formal response to their 2002 request.

²⁰⁵ The emphasis on study, rather than treatment is reflected in “Study of Response of Human Beings Accidentally Exposed to Significant Fallout Radiation” by EP Cronkite et al, October 1954; and, the plan for follow-up research articulated in the letter from EP Cronkite, Naval Medical Research Institute to John Bugher, Atomic Energy Commission, 3 June 1954 “Follow-up Studies in Conjunction with Project 4.1.” The October 1954 report notes that in isolated cases antibiotics were given to abate high fevers associated with an epidemic of respiratory illness, but were generally withheld out of concern that use would reduce efficacy if needed in the long run. For patients who developed severe burns, treatment was typically limited to topical application of calamine lotion with one percent phenol, or in a few cases, pontocaine ointment, and other salves to soften skin. No reference can be found in to the use of pain relievers.

The issue of research versus treatment became a major source of conflict between Marshallese subjects and United States scientists over the four-decade life of the biomedical survey program. A 1961 exchange of memos, for example, between the Public Health Officer and the High Commissioner of the Pacific Trust Territory regarding communications between Dr. Robert Conard (director of the AEC-funded medical survey conducted by Brookhaven lab) and the High Commissioner and the desire to create a long term agreement for continued research access to the exposed population (including the ability collect samples of fetus specimens), offers the clear sense that the medical survey program operated for explicit

purpose of gathering biological samples that allow the objective study of radiation effects and, not in anyway, for the medical treatment of the exposed Marshallese. See, Office Memorandum, United States Government, letter of May 25, 1961 from Dr. Robert Conard to Dr. H.E. MacDonald; and, Office Memorandum, United States Government May 29, 1961 memo from Dr. H. E. MacDonald to the High Commissioner (subject: Attached correspondence from Dr. Conard) where MacDonald writes “All we ask is that they (AEC) tell us specifically what they want and how they want it furnished to the. We will perform that service and they can do the research they desire in the laboratory.”

²⁰⁶ On three separate instances during this hearing, the testimony of Marshallese witnesses left many in the room, the judges included, in tears.

²⁰⁷ In defense of the claim, on November 2, 2001, Dr. Nancy J. Pollock presented a methodology for quantifying appropriate compensatory damages based on her analysis of Marshallese diet and suggestions for a three-tiered approach to assuming levels of exposure, thus consequential pain and suffering. Her testimony accepted the major framing of the chain of events and consequential damages outlined in our expert witness report, and included several supportive references to our report and the case presented by the Public Advocate. She later published an elaborated version of her expert witness report as “Reconstructing Diets for Compensation for Nuclear Testing in Rongelap, M.I.” in *Researching Food Habits: Methods and Problems* edited by Helen MacBeth and Jeremy MacClancy (Berghahn Books) 2004:169-180.

²⁰⁸ See, Lieutenant Colonel R.A House, undated, "Discussion of Off-Site Fallout," in *Operation Castle, Radiological Safety, Final Report,* vol. 1, spring 1954. The ACHRE remarked on this 1954 report, noting that “Based on the initial reading of 20 roentgens, the U.S. task force should have evacuated the people of Ailuk. But according to Colonel House, ‘the effort required to move the 400 inhabitants,’ when weighed against potential health risks to the people of Ailuk, seemed too great, so ‘it was decided not to evacuate the atoll.’” *Final Report of the Advisory Committee on Human Radiation Experimentation, Chapter 12: The Marshallese* (U.S. Government Printing Office, Washington DC) 1995. Electronic document http://www.hss.energy.gov/healthsafety/ohre/roadmap/achre/chap12_3.html accessed February 5, 2008.

²⁰⁹ The Republic of the Marshall Islands Changed Circumstances Petition to Congress, “Regarding Changed Circumstances Arising from U.S. Nuclear Testing in the Marshall Islands” September 11, 2000, Electronic document <http://www.bikiniatoll.com/petition.html> accessed February 11, 2008; Revised Petition, June 19, 2003, Electronic document <http://www.yokwe.net/modules.php> accessed February 8, 2008. The RMI’s Petition to U.S. Congress, based on new information, changed international and U.S. safety and measurement standards, and awards of the NCT, requests funding to enable the NCT to make full payments of all claims and to provide funding for the medical infrastructure and services needed by populations affected by the U.S. nuclear weapons testing program. The United States Bush Administration response to the Changed Circumstances Petition was released November 2004. See 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, electronic document posted on <http://www.yokwe.net/modules.php>, accessed February 8, 2008. A subsequent Bush Administration response was delivered to U.S. Congress on March 14, 2005. See CRS Report for Congress, Republic of the Marshall Islands Changed Circumstances Petition to Congress, March 14, 2005, Thomas Lum, Kenneth Thomas, C. Stephen Redhead, David Beardon, Mark Holt, and Salvatore Lazzori, electronic document <http://www.bikiniatoll.com/CRSreportCCP.pdf>, accessed February 8, 2008. For a detailed perspective on contamination, exposure, and remaining risk as an argument against the Marshall Islands petition, see the testimony of Steven Simon to the United States Senate Committee on Energy and Natural Resources, July 19, 2005. For perspectives and data in support of the petition, see the testimony of Nuclear Claims Tribunal Judge James Plasman to the United States Senate Committee on Energy and Natural Resources, July 19, 2005. Electronic document http://bulk_resource.org/gpo.gov/hearings/109s/24536.pdf accessed February 10, 2008.

²¹⁰ See the Energy Employees Occupational Illness Compensation Program Act (EEOICPA). In guidance for implementing this act, the Department of Labor, Division of Energy Employees notes, that if the injured worker was involved in Department of Energy work in the Marshall Islands, a hold shall be placed on the processing of compensation claims, especially for claims involving non-U.S. citizens, including Marshallese workers. See <http://www.dol.gov/esa/regs/compliance/owcp/eoicp/PolicyandProcedures/finalbulletinshtml/bulletin02-30marshalisland-updated.htm> electronic document accessed February 11, 2008. In 2007 a bill was

introduced in Congress to address this omission of coverage, as of this writing the bill still remains in committee. See S1756 Republic of the Marshall Islands Supplemental Nuclear Compensation Act of 2007, electronic document <http://www.govtrack.us/congress/bill.xpd?bill=s110-1756>, accessed February 11, 2008. For a more detailed discussion of the efforts to secure from the United States Government a comprehensive resolution to nuclear legacy issues in the Marshall Islands, see “From Analysis to Action – Efforts to Address the Nuclear Legacy in the Marshall Islands” by Holly M. Barker in *Half-lives and Half-truths: Confronting the Radioactive Legacies of the Cold War*, edited by Barbara Rose Johnston (SAR Press, Santa Fe, NM) 2007:213-247).

²¹¹ Program providers, as well as recipients are frustrated by the severe limitations imposed by harsh and inappropriate eligibility language. For description of the medical program flaws, inadequacies and needs, see the critical comments and proactive suggestions offered by Neal Palafox in his statement to U.S. Congress. Statement of Neal A. Palafox, MD MPH, Professor and Chair, Department of Family Medicine and Community Health, John A. Burns School of Medicine, University of Hawaii to the Senate Energy and Natural Resources Committee, July 19, 2005.

<http://www.yokwe.net/modules.php?op=modload&name=News&file=article&sid=1139> Electronic document accessed February 10, 2008.

²¹² The 177 health care program includes people from Bikini, Enewetak, Rongelap and Utrik deemed by the U.S. to be exposed, thousands of other four atoll residents whose coverage was deemed eligible by the four atoll local governments in the first 15 years of the 177 Agreement program, as well as other people who received a NCT personal injury award. The Nuclear Claims Tribunal personal injury program currently recognizes some 36 cancers and radiogenic health conditions. By December 2006, more than 7000 claims had been filed, and some 2000 Marshallese had been deemed eligible for personal injury awards, many received awards for multiple ailments. Most awards (1186) were for thyroid cancers and disease, pulmonary and lung cancer (235), cancers of the blood, bone marrow and lymph nodes (143), breast cancer (111), and cancers of the ovary (61). As of this writing, no personal injury claim has been paid in full. The last annual pro-rata payments, made in October 2005, brought the cumulative payout for those whose awards issued prior to October 1996 to 91%. Awards issued after that date have received varying levels of payment ranging from 5% to 84%. Source: Barbara Rose Johnston review of Nuclear Claims Tribunal award records, and personal communication from NCT Public Advocate Bill Graham, February 12, 2007.

²¹³ See, *op cit*, note 11. Palafox argues that it is the responsibility of the United States to provide the U.S. standard of care in the RMI for cancer patients because the US nuclear weapons testing program caused the excess cancers.

²¹⁴ *Op cit*, note 9.

²¹⁵ National Cancer Institute (2004) Estimation of the Baseline Number of Cancers among Marshallese and the Number of Cancers Attributable to Exposure to Fallout from nuclear Weapons Testing Conducted in the Marshall Islands. Prepared for the Senate Subcommittee on Energy and Natural Resources, Washington DC: Division of Cancer Epidemiology and Genetics, National Institutes of Health.

²¹⁶ See, BEIR VII: Health Risks from Exposures to Low Levels of Ionizing Radiation. National Academy of Sciences (National Academy Press, Washington DC) 2005.

²¹⁷ Full text of the decisions for the Bikini, Enewetak, Utrik and Rongelap Awards, as well as detail on the personal injury award program can be found on the RMI Nuclear Claims Tribunal site.

<http://www.nuclearclaimstribunal.com/award.htm>, accessed February 11, 2008.

²¹⁸ Full text of the Nuclear Claims Tribunal judgment in the Rongelap claim can be found on the NCT website http://www.nuclearclaimstribunal.com/rongelapfin.htm#_ftn76, accessed February 11, 2008.

²¹⁹ See for example the summary of projects and status of the resettlement program published on the Rongelap Local Government webpage, <http://www.visitrongelap.com>, accessed February 11, 2008. The media center includes links to newspaper and magazine articles on the status of restoring the Rongelap economy, environment, and way of life.

²²⁰ A plan has been completed to build a museum on Major that would showcase the experience of Rongelap, and other radiation-affected communities. Funds are being solicited from other nations and the international community via a website. As of this writing, the plan is still in the proposal stage.

²²¹ For a summary of work conducted by Bernd Franke and the Institute for Energy and Environmental Research, see IEER’s website publications list at <http://www.ieer.org/pubs/index.html>, and the article “Rongelap’s Dream Becomes a Reality” by Christian Liedtke, *Marshall Islands Journal*, Friday March 31, 2006. http://www.visitrongelap.com/MediaCenter/Press_Releases/pdf/2006_mar_resettlement.pdf

electronic document accessed February 11, 2008.

²²² In addition to Rongelap local government website reporting, the status of Rongelap remediation and resettlement efforts are reported on the Department of Energy's Marshall Islands Dose Assessment and Radioecology Program website. See <https://eed.llnl.gov/mi/rongelap.php>, accessed February 11, 2008.

SUPPORTING DOCUMENTS

To further illustrate points made and conclusions reached in our expert witness report, the following documents were submitted to the RMI Nuclear Claims Tribunal as an attachment to the report, as exhibits during the NCY hearing, and in support of post-hearing briefs. Web citations are given where documents are now publicly accessible. Those documents that are not easily accessed are reprinted here.

1. Establishing a program of ecological studies documenting the movement of radiation through the atoll ecosystem in the Marshall Islands. Noting the presence of “radioactive trace substances in relatively large amounts”. Letter from James Forrestal to Gordon Sproul, June 2, 1947. Two pages. DOE Marshall Islands Historical Documents website, electronic document accessed February 14, 2008. http://worf.eh.doe.gov/data/ihp1c/8665_.PDF
2. Memorandum for the Secretary of Defense to the Secretary of the Army, Secretary of the Navy, Secretary of the Air Force, from C.E. Wilson. 26 February 1953. Subject: Use of Human Volunteers in Experimental Research. Department of Defense, Report on Search for Human Radiation Experiment Records 1944 - 1994 Volume I. See electronic document pages 20-25. Electronic document accessed February 14, 2008. <http://www.defenselink.mil/pubs/dodhre/Narratv.pdf>
3. Joint Task Force Seven. Memorandum for the record. Subject: Bravo Shot, OPERATION CASTLE. 12 April 1954. Thirty-eight pages. See, especially, Command Briefing, 0000, 1 March 1954, Submitted by R.A. House on 5 March 1954. DOE Marshall Islands Historical Documents website, electronic document accessed February 14, 2008. http://worf.eh.doe.gov/data/ihp1c/0804_a.pdf
4. 10 April 1954 memo to Commander, Joint Task Force Seven, Subject: Medical Conference at Kwajalein. Page 2 states "In view of the fact that this group received a dose of radiation which was marginal from a standpoint of severe morbidity, justification cannot be made for exposure to significant additional radiation. Therefore, based on the concept that the recovery period should correspond in time to the permissible dose for accumulation, it is recommended that these patients not be exposed to radiation except for essential diagnostic or therapeutic radiation for a period of eight years." This memo is signed by Clinton S. Maupin, Colonel (MC) USA, Staff Surgeon. DOE Marshall Islands Historical Documents website, electronic document accessed February 14, 2008 http://worf.eh.doe.gov/data/ihp1a/3259_.pdf
5. United States Atomic Energy Commission, Division of Biology and Medicine "Conference on Long Term Surveys and Studies of Marshall Islands" July 12 – 13, 1954. Transcripts include detailed plans to conduct additional research on the movement of radioisotopes through the food chain and the Rongelap people, assuming a return to a contaminated setting. DOE Marshall Islands Historical Documents website, electronic document accessed February 14, 2008. http://worf.eh.doe.gov/data/ihp1c/0246_a.pdf. The EDTA experiment is also discussed as an interesting, though ineffective experience, in the US

- Atomic Energy Commission, Division of Biology and Medicine Conference on Longer Term Surveys and Studies of the Marshall Islands (July 12-13, 1954), pg. 54-55. DOE Marshall Islands Historical Documents website, electronic document accessed February 14, 2008. http://worf.eh.doe.gov/data/ihp1c/0246_a.pdf.
6. "Report to the Scientific Director. Project 4.1 – Addendum Report. Nature and Extent of Internal Radioactive Contamination of Human Beings, Plants, and Animals Exposed to Fallout" by S.H. Cohn, R. W. Rinehart, J.K. Gong, J. S. Robertson, W. L. Milne, W. H. Chapman, and V. P. Bond. Report includes description of an EDTA (ethylene diamine tetra-acetic acid) experiment involving seven Rongelap people between the ages of 19 and 60. DOE Marshall Islands Historical Documents website, electronic document accessed February 14, 2008. <http://worf.eh.doe.gov/data/ihp1d/6205e.pdf>.
 7. Radiobiological Resurvey of Rongelap and Ailinginae Atolls Marshall Islands October-November 1955, University of Washington Laboratory of Radiation Biology, Seattle, Washington, December 30, 1955. DOE Marshall Islands Historical Documents website, electronic document accessed February 14, 2008. http://worf.eh.doe.gov/data/ihp1c/0696_a.pdf
 8. Minutes. 58th Meeting of A.E.C. Advisory Committee on Biology and Medicine. Brookhaven National Laboratory. November 16 and 17, 1956. Sixteen pages. Establishing a policy of no re-evacuation: page 9 and 10. Two pages. DOE Marshall Islands Historical Documents website, electronic document accessed February 14, 2008. http://worf.eh.doe.gov/data/ihp1d/1751_f.pdf
 9. Establishing a policy of no re-evacuation. November 19, 1956 letter to Lewis Strauss, Chairman of the U.S. Atomic Energy Commission reporting ACBM resolution unanimously approved by committee members. Two pages. Document originally accessed from the HREX site. *Reprinted here.*
 10. June 13, 1957 Memorandum from Gordon M. Dunning to C.L. Dunham. SUBJECT: Resurvey of Rongelap Atoll. Complaint over resettlement without a complete survey of the Atoll "especially the foodstuffs." One page. Document originally accessed from the HREX site. *Reprinted here.*
 11. February 13, 1958, Memorandum, to Dr. A. H. Seymour from Gordon M. Dunning. Subject: Operational Responsibilities. Two pages. DOE Marshall Islands Historical Documents website, electronic document accessed February 14, 2008. <http://worf.eh.doe.gov/data/ihp1d/400209e.pdf>
 12. March 1957 Medical Survey of Rongelap and Utrik People Three Years After Exposure to Radioactive Fallout, Robert A. Conard, M.D. et al, Brookhaven National Laboratory, Upton, N.Y., June 1958. DOE Marshall Islands Historical Documents website, electronic document accessed February 14, 2008. http://worf.eh.doe.gov/data/ihp1a/1024_.pdf
 13. Letter of June 5, 1958 Letter from Robert A. Conard to Charles L. Dunham. Complaints of too many exams and no treatment. Problems with ban on consuming crabs. Three pages. DOE Marshall Islands Historical Documents website, electronic document accessed February 14, 2008. <http://worf.eh.doe.gov/data/ihp1d/400212e.pdf>

14. January 16, 1959 letter from Robert Conard to Charles Dunham requesting change in the policy forbidding studies radioisotope involving the Rongelap population. Description of three specific radioisotope studies. Two pages. And, January 27, 1959 letter from Charles Dunham to Robert Conard suggesting “no necessary relation between thyroid uptake and high protein bound iodine” and no need to “inconvenience” the people. Approving the plans for Cr-51 studies. Suggesting radioisotope studies are limited to adults. One page. See also, handwritten note from Robert Conard to Dr. Neil Borss dated February (2?), 1955 suggesting only the experiment described in item 2 (involving the administration of Cr-51 to 10 “non-exposed” Marshallese) was actually conducted. DOE Marshall Islands Historical Documents website, electronic document accessed February 14, 2008. DOE Marshall Islands Historical Documents website, electronic document accessed February 14, 2008. http://worf.eh.doe.gov/data/ihp1b/7783_.pdf Note, Conard’s 1995 recollection does not reflect data contained in his medical survey reports and related communications which indicate that Cr-51 was given to a much larger pool of subjects, as well as tritiated water (tritium), and that iodine-uptake studies were conducted with the administration I-131, I-128 and I-129.
15. “An Outline of Some of the Highlights of the Medical Survey of the Marshallese Carried out in February – March 1959, 5 Years After Fallout” by Robert A. Conard. Response to Rongelap community complaints of food poisoning and other health problems from radiation. Trip report references to miscarriages and stillbirths in the Rongelap people. Five pages. DOE Marshall Islands Historical Documents website, electronic document accessed February 14, 2008. http://worf.eh.doe.gov/data/ihp1a/2698_.pdf
16. Medical Survey of Rongelap People, March 1958, Four Years After Exposure to Fallout, Robert A. Conard, M.D. et al, Brookhaven National Laboratory, Associated Universities, Inc., Upton, N.Y., May 1959. DOE Marshall Islands Historical Documents website, electronic document accessed February 14, 2008. http://worf.eh.doe.gov/data/ihp1b/3543_.pdf
17. Response to Rongelap community complaints of food poisoning and other health problems from radiation. April 17, 1961 letter from Robert Conard to Courts Oulahan, AEC Deputy General Counsel. Two pages. DOE Marshall Islands Historical Documents website, electronic document accessed February 14, 2008. http://worf.eh.doe.gov/data/ihp1b/3813_.pdf
18. May 2, 1961 letter from C.L. Dunham to James T. Ramey reporting “low body burdens of Sr-90, Cs-137 and Zn-65, all of which we believe to originate from the contamination in their current food supplies; the Zn-65 is believed to come from the seafood caught locally.” One page. And, Summary report of 1959 and 1960 Medical Survey. Robert. A. Conard. Three pages. DOE website, Marshall Islands Chronology (1944-1990) – Endnotes. DOE Marshall Islands Historical Documents website, electronic document accessed February 14, 2008. http://worf.eh.doe.gov/data/ihp1a/3285_.pdf
19. “Medical Survey of Rongelap People Eight Years After Exposure to Fallout” Robert A Conard, M.D., Leo M. Meyer, M.D., Wataru W. Sutow, M.D., William C. Moloney, M.D., Austin Lowrey, Col (MC) USA, A. Hicking,

- Practitioner, and Ezra Riklon, Practitioner. January 1963, Brookhaven National Laboratory, Upton, New York. This survey includes findings from the administration of Cr-51 to 13 Marshallese subjects and 10 “caucasian” subjects in 1961 and 1962. http://worf.eh.doe.gov/data/ihp1a/2682_.pdf
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21. Letter to W. Siri, Subject: Sending you the 1.0 ml volumetric pipette which we used at Kwajalein. From Leo M. Meyer. April 9, 1965. Data from analysis of samples collected from Rongelap subjects in radioisotope studies reporting findings for six Marshallese subjects who received Cr-51 and tritiated water. http://worf.eh.doe.gov/data/ihp2/2522_.pdf
22. Medical Survey of the People of Rongelap and Utirik Islands Eleven and Twelve Years After Exposure to Fallout Radiation (March 1965 and March 1966)” Eleven-Year Survey. Robert A Conard, M.D., Leo M. Meyer, M.D., Wataru W. Sutow, M.D., James S. Robertson, M.D., Ph.D., Joseph E. Rall, M.D., Ph.D., John E. Jesseph, M.D., Arobati Hicking, Practitioner, Isaac Lanwi,, Practitioner, Ernest A. Gusmano, Ph.D., and Maynard Eicher. Twelve-Year Survey. Robert A Conard, M.D., Jacob Robbins, M.D., Joseph Deisher, M.D. and Arobati Hicking, Practitioner. Brookhaven National Laboratory, Upton, New York. Notes: “Previous studies (1961, 1962) with Cr51-labeled erythrocytes on Marshallese subjects living in their native environment have shown reduced red cell mass and/or total blood volume with total body weight used as a base line. During the 1963 survey, similar studies were performed on 21 Marshall Islanders, but these data were related to total body water as determined by tritiated water. The present study was undertaken during the surveys in 1965 and 1966. A total of 19 Caucasian Americans (3 females and 16 males) living in the Marshall Islands for periods of 3 months to 9 years were examined by the same techniques. The results of these studies on each individual are presented in Appendix 15, along with data on the 21 Marshallese in whom these studies were carried out in 1963.” DOE Marshall Islands Historical Documents website, electronic document accessed February 14, 2008. http://worf.eh.doe.gov/data/ihp1a/2683_.pdf

23. April 29, 1966 letter from Hermann Lisco to George Darling reporting with findings on chromosome abnormality studies using samples collected by R. A. Conard in 1964. Document accessed from the ACHRE Human radiation experimentation online archive. *Reprinted here*. Note, findings reported in Lisco, Hermann and Conard, Robert A. Chromosome studies on Marshall Islanders exposed to fallout radiation. 1967. *Science* 157; pp. 445-447, 1967.
24. Protocol for the 1974 Medical Survey in the Marshall Islands. Robert A. Conard. Example of human subject exams, procedures, and sampling undertaken to support a wide range of scientific research including Thyroid Reserve Study and Dietary Iodine and Iodine Excretion Levels studies. Nine pages. DOE Marshall Islands Historical Documents website, electronic document accessed February 14, 2008.
http://worf.eh.doe.gov/data/ihp1c/0764_a.pdf
25. May 8, 1974 letter from Robert Conard to Dr. James L. Liverman reporting outcome of the 1974 research and summary of Rongelap village meeting with continued “misunderstandings.” DOE Marshall Islands Historical Documents website, electronic document accessed February 14, 2008.
http://worf.eh.doe.gov/data/ihp2/2829_.pdf
26. Memo from Tommy F. McGraw (DOE) to Edward J. Vallario (EH-132) re: Department of Energy (DOE) Involvement in the Evacuation of Rongelap Atoll. Memo illustrates that some U.S. scientists acknowledged the need for the Rongelap community to move in 1985, and acknowledged that continued occupation did indeed pose significant health risks. See also the 11 attachments that accompany this memo. DOE Marshall Islands Historical Documents website, electronic document accessed February 14, 2008.
<http://worf.eh.doe.gov/data/ihp1d/400171e.pdf>
27. Cr-51 and tritiated water radioisotope studies. Disclosure letter from the U.S. Department of Energy. Letter to Mayor James Matayoshi, April 29, 1999. Two pages. *Reprinted here*.

GLOSSARY

177 Agreement: The section of the Compact of Free Association detailing U.S. responsibility for the damages and injuries resulting from the U.S. nuclear weapons testing program in the Marshall Islands.

Advisory Committee on Biology and Medicine (ACBM): The Atomic Energy Commission's committee that researched the impacts of radiation on human beings and the environment.

Advisory Committee on Human Radiation Experiments (ACHRE): A White House committee, established by Executive Order under President Bill Clinton, to investigate the extent that U.S. Government researchers used human beings in radiation experiments.

Ak: A frigate bird.

Alaps: Managers of an *iroij's* land who ensure that the land is used productively. The *alaps* protect the interests of the *iroij* and ensure that the workers have rights to cultivate and live from the land.

Alpha radiation: Created when two protons and two neutrons are emitted from the nucleus of an atom. Alpha particles have the same nucleus as the helium atom but lack the two electrons that make helium stable. Alpha particles travel at speeds up to ten thousand miles per second. Because they are so large in "subatomic" terms, alpha particles have been likened to large-caliber bullets. They tend to collide with molecules in the air and are easily slowed down. A thin sheet of paper or two inches of air can usually stop an alpha particle. When alpha-emitting elements are inhaled or ingested into the body, the high-energy particles they emit can rip into the cells of sensitive internal soft tissues, creating serious damage. Alpha particles are emitted by a wide array of heavy elements, including plutonium, a by-product of nuclear fission; and radon, which seeps into the environment from the uranium-mining and -milling process; and radon gas, whose decay or "daughter" elements are carried into the atmosphere from uranium-mining wastes. See also *Ionizing radiation*.

Americium-241: Produced when plutonium atoms absorb neutrons in nuclear reactors and in nuclear weapons detonations. It has a half-life of 432.7 years. All isotopes of americium are radioactive. As it decays, it releases alpha and gamma radiation and changes into Neptunium-237, which is also radioactive. The americium-241 decay chain ends with Bismuth-209, a stable (non-radioactive) element. People may be directly exposed to gamma radiation from Americium-241 by walking on contaminated land. They may also be exposed to both alpha and gamma radiation by breathing in Am-241 contaminated dust, or drinking contaminated water. People who live or work near a contaminated site, such as a former weapons testing or production facility, may ingest Americium-241 with food and water, or may inhale it as part of resuspended dust. In the human body, Americium-241 tends to concentrate in the bone, liver, and muscle. When inhaled, some Am-241 remains in the lungs, depending upon the particle size and the

chemical form of the americium compound. The chemical forms that dissolve easily may pass into the bloodstream from the lungs. The chemical forms that dissolve less easily tend to remain in the lungs, or are coughed up through the lung's natural defense system, and swallowed. From the stomach, swallowed americium may dissolve and pass into the bloodstream. Undissolved material passes from the body through the feces. Americium-241 can stay in the body for decades, exposing the surrounding tissues to radiation to both alpha and gamma radiation, and increasing the risk of developing cancer. It also poses a cancer risk to all organs of the body from direct external exposure to its gamma radiation.

Arrowroot (*Maranta arundinacea*): A starchy staple of the Marshallese diet that is easy to preserve and digest.

Atomic bomb: An explosive device in which a large amount of energy is released through the nuclear fission of uranium or plutonium. The first atomic bomb test, known as the Trinity Shot, took place in the desert north of Alamogordo, New Mexico, on July 16, 1945. Several weeks later, an atomic bomb was used for the first time as an instrument of war, detonating over the Japanese cities of Hiroshima (August 6) and Nagasaki (August 9). The next detonation occurred in the Marshall Islands during the 1946 Operation Crossroads where atmospheric (Able Test) and sub-surface (Baker Test) tests deployed Nagasaki-type bombs.

Atomic Bomb Casualty Commission (ABCC): The Commission established by President Harry Truman in 1946 to study the effects of radiation on human beings and the environment after the bombing of Hiroshima and Nagasaki.

Atomic Energy Commission (AEC): The predecessor to the U.S. Department of Energy established by the U.S. Congress in 1946. The AEC became the Department of Energy in 1974.

Atolls: A series of coral islands with a lagoon in the middle.

Background Radiation: Ionizing radiation from natural and man-made sources including cosmic radiation, radiation emitted by naturally occurring radionuclides in air, water, soil and rock, and radiation emitted by natural radionuclides deposited in tissues of organs; and man-made sources such as nuclear weapons fallout, nuclear power operations and accidents, and exposures to diagnostic x-rays and consumer products. Exposures to natural background radiation vary depending on the geographic area, diet and other factors such as the composition of materials used in the construction of homes.

Becquerel (Bq): The International System (SI) unit for activity of radioactive material. One Bq of radioactive material is that amount of material in which one atom is transformed or undergoes one disintegration every second. Whole body counting and plutonium bioassay measurements are usually reported in activity units of kBq (kiloBecquerel) ($1000 \times 1 \text{ Bq}$) and μBq (microBecquerel) ($1 \times 10^{-6} \times 1 \text{ Bq}$), respectively. See also *Units of radioactivity*.

Beta radiation: Composed of streams of electrons that often travel at close to the speed of light. In some cases beta particles are emitted from a nucleus when a neutron breaks down into a proton and electron. The proton stays in the atom's core while the electron shoots out. Because they move faster than alpha particles, and weigh much less, beta particles are far more penetrating than alpha particles. Sheets of metal and heavy clothing are required to stop them. Beta emissions to the skin can lead to skin cancer. Like elements that emit alpha particles, beta-emitters can be very dangerous when inhaled or ingested into the body. Beta radiation can be emitted from many substances released by nuclear bombs and power plants, including Strontium-90 and tritium. See also *Ionizing radiation*.

Bioaccumulation: The increase in concentration of a substance in an organism over time.

Biodistribution: The pattern and process of a chemical substance's distribution through the body.

Biopsy: The removal and/or examination of tissues, cells, or fluids from a living body for the purposes of diagnosis or experimental tests.

Body burden: The amount of a radioactive material present in a body over a long time period. It is calculated by considering the amount of material initially present and the reduction in that amount due to elimination and radioactive decay. It is commonly used in reference to radionuclides having a long biological half-life. A body burden that subjects the body's most sensitive organs to the highest dose of a particular radionuclide that regulators allow is known as a maximum permissible body burden (MPBB).

Bone marrow: The soft tissue contained within the internal cavities of the bones. Bone marrow is a site of blood cell formation, especially in young animals and humans.

Bone marrow infusion: The injection of bone marrow (an essential tissue producing red and white blood cells and platelets) into the body, used primarily to replace bone marrow destroyed by disease or in the course of radiation and other therapies for certain types of cancer.

Brookhaven National Laboratory (BNL): The U.S. weapons laboratory in Brookhaven, New York contracted by the U.S. Government to conduct medical and scientific research on the consequences of radiation exposure in the Marshall Islands. Brookhaven played a key role in establishing and maintaining Project 4.1.

Bwebwenato: Storytelling, talking together.

Bwuj: Literally meaning "land," but used to refer to lineage (because land is the basis of lineage in the Marshall Islands).

Calibration: The process of adjusting or determining the response or reading of an instrument to a standard.

Cancer: A general term for more than 100 diseases that have uncontrolled, abnormal growth of cells that can invade and destroy healthy tissues.

Carcinogen: A material that can initiate or promote the development of cancer. Well-known carcinogens include saccharine, nitrosamines found in cured meat, certain pesticides, and ionizing radiation.

Cesium-137: Nonradioactive cesium occurs naturally in various minerals. Radioactive Cesium-137 is produced when uranium and plutonium absorb neutrons and undergo fission. Cesium-137 has a half-life of 30 years. It decays by emission of a beta particle and gamma rays to Barium-137m, a short-lived decay product, which in turn decays to a non-radioactive form of barium. Because of the chemical nature of cesium, it moves easily through the environment and bioaccumulates in plants and animals. People may ingest Cesium-137 with food and water, or may inhale it as dust. If Cesium-137 enters the body, it is distributed fairly uniformly throughout the body's soft tissues, resulting in exposure of those tissues. Slightly higher concentrations of the metal are found in muscle, while slightly lower concentrations are found in bone and fat. Compared to some other radionuclides, Cesium-137 remains in the body for a relatively short time. It is eliminated through the urine. Exposure to Cesium-137 may also be external (that is, exposure to its gamma radiation from outside the body). Like all radionuclides, exposure to radiation from Cesium-137 results in increased risk of cancer. If exposures are very high, serious burns, and even death, can result. The magnitude of the health risk depends on exposure conditions. These include such factors as strength of the source, length of exposure, distance from the source, and whether there was shielding between a person and the source (such as metal plating).

Chromium-51 (Cr51): an ion of the element chromium, which is used as a radioactive tracer because it binds to red blood cells. It is a gamma-emmitter with a 27.7 day half-life. By measuring the amount of radioactivity produced by Cr51, red blood cell mass and survival can be measured. Exposure can occur via ingestion, inhalation, and skin absorption and once absorbed tends to concentrate in the liver, bones, large intestines and kidneys.

Chromosome: Each chromosome is composed of deoxyribonucleic acid (DNA) and specialized protein molecules, which convey genetic information. They are located in the nucleus of both plant and animal cells. In humans there are 46 chromosomes.

Chromosome aberration: Any deviation from the normal number or morphology of chromosomes.

Changed Circumstances: A provision of the Compact of Free Association allowing the RMI Government to petition the U.S. Congress for additional assistance resulting from

damages and injuries from the testing program not known or understood during bilateral negotiations of the Compact.

Chelating therapy: One of the human radiation experiments in the Marshall Islands confirmed by ACHRE. The therapy binds chelating agents (such as EDTA) to heavy metals to assist with the removal of these metals from the body.

Ciguatera: Fish poisoning created when reef fish eat smaller fish and bioaccumulate the neurotoxins produced by the consumption of toxic algae.

Coconut crab: *Birgus latro* is the largest terrestrial arthropod in the world. It is a hermit crab and is known for its ability to crack coconuts with its strong pincers in order to eat the contents. The coconut crab bioaccumulates radiation, and is a favorite food of the Marshallese.

Compact of Free Association: United States Public Law 99-239 (amended in 2003 under U.S. Public Law 180-188) defines the terms of the bilateral relationship between the United States and the RMI. The Compact provides economic assistance to the RMI in exchange for critical U.S. defense rights. For example, the U.S. retains the right to deny third country military vessels into the Marshall Islands, and Marshallese men and women serve in every branch of the U.S. armed forces.

Congress of Micronesia: Established in 1966 by President Johnson to help citizens of the Trust Territory of the Pacific Islands achieve greater self-determination. The Congress paved the way for the termination of trusteeship twenty years later.

Copra: Dried coconut meat, and the most important cash-generating commodity for Marshallese living on rural islands. Making copra is labor intensive and requires locating and opening coconuts by hand, removing and drying the meat, and bagging it for sale to the middlemen who arrive in boats to bring copra to the capital.

C-ration : Combat Food Ration – packaged meals used by the United States armed forces.

Curie (Ci): One curie is the quantity of a radioactive material that will have 37 billion disintegrations per second. (1 Ci = 37 billion Bq). See *Units of radioactivity*.

Customary laws: Traditional practices that reflect the priorities of a culture, such as land distribution practices in the RMI. In the Marshall Islands customary law is codified in the national constitution.

Danger Area: The area in the RMI determined to be in danger of high radiation exposure during test events. During the Bravo event on March 1, 1954, the U.S. Government excluded the inhabited atolls of Rongelap and Ailinginae from the Danger Area at the last minute despite wind patterns blowing from the test site to those atolls.

Defense Nuclear Agency (DNA): A United States agency that was established to support nuclear activities during the Cold War. The DNA, which no longer exists, constructed a nuclear waste storage facility on Runit Island, Enewetak Atoll. No U.S. agency currently has responsibility for monitoring that facility.

Department of Energy (DOE): The successor to the AEC. The agency has responsibility for contracting medical and environmental programs in the RMI that address those damages and injuries resulting from the testing program that the U.S. Government currently accepts responsibility for.

Deterministic effect: Radiation or other agents can create a deterministic effect, or increased severity. Kidney damage is one example of a deterministic effect.

Diagnostic procedure: A method used to identify a disease in a living person.

Dose: In radiology, a measure of energy absorbed in the body from ionizing radiation, measured in the form of rads. See *Rad*.

Dose equivalent: A dose equivalent is the absorbed radiation dose adjusted to consider the biological harmfulness of different kinds of radiation; it is measured in sieverts (Sv).

Dose rate: Dose rate is the ionizing radiation dose delivered per unit of time.

Dose reconstruction: The process of using information about an individual's past exposures to ionizing radiation as well as general knowledge about the behavior of radioactive materials in the human body and in the environment to estimate the dose of radiation that someone has received.

Dosimeter: An instrument that measures the dose of ionizing radiation. A biological dosimeter is a biological or biochemical indicator of the effects of exposure, such as a change in blood chemistry or in blood count. A highly accurate biological dosimeter has yet to be found.

Drekeinin: A mallet made from clam shells used to bang dried pandanus as a way to soften the long leaves and make them suitable to weave into sleeping mats. The mallets are passed from generation to generation matrilineally.

EDTA (ethylenediaminetetraacetate): See “chelating therapy.”

Emok: Giant clamshell used for water storage.

Endocrine glands: The endocrine glands manufacture one or more hormones and secrete them directly into the bloodstream. Endocrine glands include the pituitary, thyroid, parathyroid, adrenal, ovary, testis, placenta and part of the pancreas.

Exclusive Economic Zone (EEZ): A Law of the Sea term denoting the marine area where a state possesses rights to explore and cultivate marine resources.

“Exposed” (versus “non-exposed”): Section 177 of the Compact of Free Association defines “exposed” people as the people present on Rongelap, Ailinginae and Utrik atolls on March 1, 1954. The “exposed” population is legally eligible to participate in U.S. healthcare provided by DOE. The term is controversial because it ignores the evidence suggesting that the entire nation was exposed to harmful levels of radioactive fallout.

Fallout: Radioactive debris that falls to earth after a nuclear explosion.

Film badges: Badges developed by the U.S. armed forces to record individual levels of radiation exposure. Badges were not used regularly by U.S. military personnel in the Marshall Islands, and often did not accurately record acute exposure levels. Many U.S. servicemen suffered severe health consequences from their radiation exposure in the RMI. No film badges were ever distributed to Marshallese citizens.

Fish poisoning: *See ciguatera*.

Fission: The division of an atomic nucleus into parts of comparable mass. Generally speaking, fission may occur only in heavier nuclei, such as isotopes of uranium and plutonium. Atomic bombs derive energy from the fission of uranium or plutonium.

Fission product: An atom or nucleus that results from the fission of a larger nucleus.

Fusion: The combining of two light atomic nuclei to form a single heavier nucleus, releasing energy. Hydrogen bombs derive a large portion of their energy from the fusion of hydrogen isotopes.

Gamma radiation: A form of electromagnetic or wave energy similar in some respects to x-rays, radio waves, and light. Like x-rays, gamma radiation is highly energetic and can penetrate matter much more easily than alpha or beta particles. Gamma rays are usually emitted from the nucleus when it undergoes transformations. An inch of lead or iron, eight inches of heavy concrete, or three feet of sod may be required to stop most of the gamma rays from an intense source. *See also Ionizing radiation*.

Gene: The functional unit of heredity which occupies a specific place on a chromosome.

Genetic effects: Changes in a person's germ cells (sperm or ova) that are transmissible to future generations. Such changes result from mutations in genes within the germ cells.

Gray (Gy): Measures a quantity called the absorbed dose. This refers to the amount of energy actually absorbed in any given material. (1 Gy = 100 rads). *See Units of radioactivity*.

Half-life: The average time required for one-half of the amount of radioactivity of a radionuclide to undergo radioactive decay. For material with a half-life of one week, half of the original amount of activity will remain after one week; half of that (one-quarter of the original amount) will remain after two weeks and so on.

Health physics: A branch of physics specializing in accurate measurement of agents, such as ionizing radiation, which effect human health.

Hematocrit: The percentage of the volume of a blood sample occupied by cells, as determined by a centrifuge or device which separates the cells and other particulate elements of the blood from the plasma. The remaining fraction of the blood sample is called plasmocrit (blood plasma volume).

Hemoglobin: An iron-containing respiratory pigment contained within red blood cells; it gives the cells their red color. Hemoglobin, which has the unique property of combining reversibly with oxygen, picks up oxygen in the lungs and transports it to the rest of the body.

Hormone: A substance produced in one part of the body; it passes into the bloodstream and is carried to other distant organs or tissues where it acts to modify their structure or function.

Hydatidiform mole: A rare mass or growth that forms inside the uterus at the beginning of a pregnancy. A hydatidiform mole results from over-production of the tissue that is supposed to develop into the placenta. The placenta normally feeds a fetus during pregnancy. In this condition, the tissues develop into an abnormal growth, called a mass. Often, there is no fetus at all. In 10-15% of cases, hydatidiform moles may develop into invasive moles. These moles may grow so far into the uterine wall and cause bleeding or other complications. In a few cases, a hydatidiform mole may develop into a choriocarcinoma, a fast-growing, spreading form of cancer. A hydatiform mole is referred to as a “grape” pregnancy by the Marshallese.

Hydrogen bomb: An explosive weapon, also known as a thermonuclear bomb, that uses nuclear fusion to release energy stored in the nuclei of hydrogen isotopes. The high temperatures essential to fusion are attained by detonating an atomic bomb placed at the H-bomb's structural center. The United States tested its largest hydrogen bomb (Bravo Test) in 1954 at the Pacific Test Site.

Immune system: The immune system provides the body with a defense against infection, afforded by the presence of circulating antibodies and white blood cells. Antibodies are manufactured specifically to deal with the antigens associated with different diseases. As they are encountered, while white blood cells attack and destroy foreign particles in the blood and tissues, including antigen-antibody complexes. Exposure to ionizing radiation adversely affects the immune system.

Influenza virus: An acute infectious respiratory disease, in which the inhaled virus attacks the respiratory epithelial cells of susceptible persons and produces an inflammation of the mucous membrane. Influenza virus is of the genus *Orthomyxoviridae*, which comprises the influenza viruses types A and B. Each type of virus has a stable nucleoprotein group antigen common to all strains of the type, but distinct from that of the other type; each also has a mosaic of surface antigens (hemagglutinin and neuraminidase) which characterize the strains. Strain notations indicate (1) type, (2) geographic origin, (3) year of isolation and (4) in the case of type A strains, the characterizing subtypes of hemagglutinin and neuraminidase antigens (e.g., A/HongKong/1/68 (H3N2)).

Internal emitter: A radioisotope incorporated into a tissue in the body that decays in place and continuously exposes that tissue to ionizing radiation.

Iodine isotopes: Iodine is a nonmetallic, purplish-black crystalline solid. It has the unusual property of 'sublimation,' which means that it can go directly from a solid to a gas, without first becoming liquid. Iodine reacts easily with other chemicals, and isotopes of iodine are found as compounds rather than as a pure elemental nuclide. Radioactive iodines are produced by the fission of uranium atoms during operation of nuclear reactors and by plutonium (or uranium) in the detonation of nuclear weapons. They have the same physical properties as stable iodine, easily bonding with chemical compounds, and they emit beta particles as they decay. Iodine-129 has a half-life of 15.7 million years; iodine-131 has a half-life of about 8 days. Because of its short half-life and useful beta emission, iodine-131 is used extensively in nuclear medicine. Its tendency to collect in the thyroid gland makes iodine especially useful for diagnosing and treating thyroid problems. Iodine-123 is widely used in medical imaging, and I-124 is useful in immunotherapy. Iodine's chemical properties make it easy to attach to molecules for imaging studies. It is useful in tracking the metabolism of drugs or compounds, or for viewing structural defects in various organs, such as the heart. A less common isotope, iodine-125, is sometimes used to treat cancerous tissue. Iodine-129 has little practical use, but may be used to check some radioactivity counters in diagnostic testing laboratories.

Iodine-129 and iodine-131 are gaseous fission products that form within reactor fuel rods as they fission, and in the detonation of nuclear weapons. Radioactive iodine can disperse rapidly in air and water, under the right conditions. However, it combines easily with organic materials in soil. This is known as 'organic fixation' and slows iodine's movement in the environment. Some soil minerals also attach to, or adsorb, iodine, which also slows its movement. The long half-life of iodine-129, 15.7 million years, means that it remains in the environment. However, iodine-131's short half-life of 8 days means that it will decay away completely in the environment in a matter of months. Both decay with the emission of a beta particle, accompanied by weak gamma radiation. Radioactive iodine can be inhaled as a gas or ingested in food or water. It dissolves in water so it moves easily from the atmosphere into humans and other living organisms. For example, I-129 and I-131 can settle on grass where cows can eat it and pass it to humans through their milk. It may settle on leafy vegetables and be ingested by humans. Iodine isotopes also concentrate in marine and freshwater fish, which people may then eat. Also, doctors may give thyroid patients radioactive iodine, usually iodine-

¹³¹I, to treat or help diagnose certain thyroid problems. The tendency of iodine to collect in the thyroid makes it very useful for highlighting parts of its structure in diagnostic images. When I-129 or I-131 is ingested, some of it concentrates in the thyroid gland. The rest passes from the body in urine. Airborne I-129 and I-131 can be inhaled. In the lung, radioactive iodine is absorbed, passes into the blood stream, and collects in the thyroid. Any remaining iodine passes from the body with urine. In the body, iodine has a biological half-life of about 100 days for the body as a whole. It has different biological half-lives for various organs: thyroid - 100 days, bone - 14 days, and kidney, spleen, and reproductive organs - 7 days. Long-term (chronic) exposure to radioactive iodine can cause nodules, or cancer of the thyroid. However, once thyroid cancer occurs, treatment with high doses of I-131 may be used to treat it. Lower doses of I-131 may be used to treat overactive thyroids by reducing activity of the thyroid gland and lowering hormone production in the gland. The thyroid cannot tell the difference between radioactive and non-radioactive iodine. It will take up radioactive iodine in whatever proportion it is available in the environment. If large amounts of radioactive iodine are released during a nuclear event, large doses of stable iodine may be distributed by government agencies to keep peoples' thyroid glands from absorbing too much radioactive iodine: Raising the concentration of stable iodine in the blood increases the likelihood that the thyroid will absorb it instead of radioactive iodine. Large doses of stable iodine can be a health hazard and should not be taken except in an emergency. However, iodized table salt is an important means of acquiring essential non-radioactive iodine to maintain health.

Ionization: The process by which a neutral atom or molecule loses or gains electrons, thereby acquiring a net electrical charge. When charged, it is known as an ion.

Ionizing radiation: Any of the various forms of radiant energy that causes ionization when it interacts with matter. The most common types are alpha radiation, made up of helium nuclei; beta radiation, made up of electrons; and gamma and x radiation, consisting of high-energy particles of light (photons).

Iroij: Chiefs who customarily assume ownership of the land on behalf of their generation. *Iroij* are responsible for ensuring the well-being of all his people who live and work on his land. *Alaps* manage the land on behalf of the *iroij*.

Iroij Rilik: God of Fish.

Iron: Iron-55 (Fe-55) has a 2.68 year half-life. Iron-59 (Fe-59) has a 44.5 day half-life. Exposure can occur via ingestion, inhalation, puncture, wound and skin absorption and once absorbed tends to concentrate in the spleen and blood.

Irradiation: Exposure to radiation of any kind, especially ionizing radiation.

Isotope: A species of nucleus with a fixed number of protons and neutrons. The term isotope is usually used to distinguish nuclear species of the same chemical element (i.e., those having the same number of protons, but different numbers of neutrons), such as

Iodine-127 and Iodine-131. Atoms with the same number of protons but different numbers of neutrons are called isotopes of that element. Different isotopes are identified by appending the total number of nucleons (the total number of proton plus neutrons in the nucleus of an atom) to the name of the element, e.g., Cesium-137. Isotopes are usually written in an abbreviated form using the chemical symbol of the element. Two examples include Cs-137 for Cesium-137 and Pu-239 for Plutonium-239.

Janwin: Preserved breadfruit that allowed Marshallese to have a more diverse diet during the off-seasons of major types of breadfruit.

Jebro: God of Breadfruit.

Jekaka: Dried pandanus. Suitable for grating, and easy to store.

Jibun: Miscarriage.

Joint Task Force 7 (JTF-7): The U.S. Department of Navy team responsible for carrying out the testing of the atomic and thermonuclear devices in the Marshall Islands.

Jolet: A social group determined by its collective inheritance of common land.

Jujukop: Barracuda fish.

Kajor: Synonym for *ri-jerbal*, literally meaning strength. Refers to the workers who cultivate the land and keep it productive for the *iroij*.

Kalo: *Brown booby bird*.

Kano: Fern.

Kear: A tern (bird).

Kejinbwij: The collecting and distribution of foods by an *iroij*.

Kemem: A family and community birthday celebration for a one-year old.

Kinbit: Rules and regulations for collecting food, such as the coconut crab.

Kitde land: Land that an *iroij* or *alap* gives to his wife. The land passes down through the family of the wife upon her death.

K-rations: Three Combat Food Rations bundled into a single package; designed to sustain a U.S. Army soldier for one day during World War II.

Kwajalein Atoll: The world's largest atoll; home to the U.S. Army's Ronald Reagan Ballistic Missile Defense Test Site on Kwajalein Island as well as a portion of the Rongelap community residing on Mejjatto Island.

Latency period: The time between when an exposure to radiation occurs and when its effects are detectable as an injury or illness.

Lagoon: In the RMI, the lagoon is the enclosed water in the center of a circular string of small coral islands. The water is calmer and shallower than the ocean. In the rural areas, most homes are built on the lagoon side of the islands.

Lamoren: Lineage land extending back for generations. The term denotes a sense of eternal heritage and the essence of what it means to be Marshallese.

Laroiij: Female *iroij*, or chief.

Lawi Jemo: Kanal tree God.

Leukemia: Any group of malignant diseases in which the bone marrow and other blood forming organs produce increased numbers of leukocytes (white blood cells).

Lineage: See *bwij*.

Lojepjep: Grouper fish.

L.S.T.: Landing Ship, Tank. Ships that could be beached for the easy unloading of cargo and crew. The L.S.T.s helped with the relocation of populations in the Marshall Islands either as precautionary measures in advance of weapons tests, or following the exposure of populations to radiation from weapon events.

Majuro: The name of the RMI's capital, Majuro Island, as well as the atoll, Majuro Atoll, where the island is located.

Metabolism: The manner in which a substance is acted upon (taken up, converted to other substances, and excreted) by various organs of the body.

Millirem: One thousandth of a rem. See *Units of radiation*.

Millisievert: A standard international unit for measuring dose to humans; 1 millisievert equals 100 millirems. See Units of radiation.

Mo: A Marshallese word meaning forbidden.

Mon-tutu: Shower house.

Morjinkot land: Land, such as Rongerik Atoll, given to a warrior by an *iroij* for heroics in battle.

Mweo: A type of long line fishing.

Mwilmwil: Mackerel.

National Radiation Commission (NRC): *The U.S. National Radiation Commission has responsibility for exploring civilian applications of radioactive materials in ways that do not compromise the well-being of people or the environment.*

Natural background radiation: Ionizing radiation that occurs naturally. Its principle sources are cosmic rays from outer space, radionuclides in the human body, and radon gas (a decay product of natural uranium in the earth's crust).

National Cancer Institute (NCI): The component of the U.S. National Institute of Health (NIH) tasked with reducing the burden of cancer through research and training.

Nitijela: The Marshallese parliament.

Ni: A young, drinking coconut.

Nuclear Claims Tribunal (NCT): *The judiciary forum established by the 177 Agreement of the Compact of Free Association to consider personal injury and property damage claims resulting from the U.S. nuclear weapons testing program in the Marshall Islands. The Tribunal was meant to serve as a alternative to the U.S. courts.*

Ok: Net for fishing.

Operation Castle: A series of six high yield tests conducted by JTF-7 on Bikini Atoll in 1954, including the infamous Bravo event on March 1, 1954.

Pandanus tectorius: A wide-branched tree that grows up to heights of about 8 m (25 ft). One of a few edible species in the Marshall Islands, pandanus is a very important plant that has been cultivated for thousands of years. It is used for food, medicine, and fiber for mats, hats, baskets, thatch for traditional houses, and in the past, canoe sails were plaited from the leaves.

Pejwak: Brown noddy bird (*Anous stolidus*).

Permissible dose: In the judgment of a regulatory or advisory body, such as the National Committee on Radiation Protection, the amount of radiation that may be received by an individual within a specified period.

PHRI: The Pacific Health Research Institute in Hawaii was the first non-U.S. Government healthcare delivery group to assume responsibility for the DOE medical

program after Brookhaven National Laboratory. The human research aspect of the medical program terminated when PHRI assumed responsibility for the care of the “exposed” Marshallese.

Plutonium: Created from uranium in nuclear reactors and used in nuclear weapons. When Uranium-238 absorbs a neutron, it becomes Uranium-239 before decaying to Plutonium-239. Various isotopes of uranium and different combinations of neutron absorptions and radioactive decay create at least 15 types of plutonium isotopes, all of which are radioactive. The most common ones are Pu-238, Pu-239, and Pu-240. Pu-238 has a half-life of 87.7 years. As plutonium decays, it releases radiation and forms other radioactive isotopes. For example, Pu-238 emits an alpha particle and becomes uranium-234; Pu-239 emits an alpha particle and becomes uranium-235. This process happens slowly since the half-lives of plutonium isotopes tend to be relatively long: Plutonium-239 has a half-life of 24,100, and Pu-240 has a half-life 6,560 years. Plutonium-239 is used to make nuclear weapons. The plutonium in the bomb undergoes fission in an arrangement that assures enormous energy generation and destructive potential. Plutonium was dispersed world wide from atmospheric testing of nuclear weapons conducted during the 1950s and ‘60s. The fallout from these tests left very low concentrations of plutonium in soils around the world and high concentrations at nuclear weapons production and testing facilities. People may inhale plutonium as a contaminant in dust. It can also be ingested with food or water. The stomach does not absorb plutonium very well, and most plutonium swallowed with food or water passes from the body through the feces. Plutonium is most readily absorbed through mucus membranes. When inhaled, plutonium can remain in the lungs depending upon its particle size and how well the particular chemical form dissolves. The chemical forms that dissolve less easily may lodge in the lungs or move out with phlegm, and either be swallowed or spit out. But, the lungs may absorb chemical forms that dissolve more easily and pass them into the bloodstream. Once in the bloodstream, plutonium moves throughout the body and into the bones, liver, or other body organs. Plutonium that reaches body organs generally stays in the body for decades and continues to expose the surrounding tissue to radiation. External exposure to plutonium poses very little health risk, since plutonium isotopes emit alpha radiation, and almost no beta or gamma radiation. In contrast, internal exposure to plutonium is an extremely serious health hazard. It generally stays in the body for decades, exposing organs and tissues to radiation, and increasing the risk of cancer. In addition to its’ radioactive nature, plutonium is also a toxic metal, and may cause damage to the kidneys.

Plankton: Any drifting organism that inhabits the water column of oceans, seas, and bodies of fresh water.

Principal investigator: The scientist or scholar with primary responsibility for the design and conduct of a research project.

Project 4.1: A top secret medical research program to study the effects of radiation exposure on human beings exposed to radiation from the Bravo event on March 1, 1954.

Project SHAD: From 1963 through the early 1970's, the U.S. Department of Defense (DOD) conducted tests to determine the effectiveness of shipboard detection and protective measures against both chemical and biological warfare agents, and less toxic simulants for these agents. The tests were conducted under the broad heading of Shipboard Hazard and Defense (SHAD), which was part of a larger activity DOD called Project 112 that also included similar land-based tests.

Protocol: The formal design or plan of an experiment or research activity; specifically, the plan submitted to an institutional review board for review and to a government agency for research support. Protocols include a description of the research design or methodology to be employed, the eligibility requirements for prospective subjects and controls, the treatment regimen(s), and the methods of analysis to be performed on the collected data.

Psychosocial stigmatization: The individual and community-wide experience with, and feelings of, alienation, social unacceptability, shame, or disgrace.

Rad: Short for "radiation absorbed dose." A measurement of the amount of radiation absorbed by tissues; it is the amount of radiation that will deposit 1/100 joule per kilogram. (100 rads = 1 Gy). See *Units of radiation*.

Radiation: The emission of waves transmitting energy through space or a material medium, such as water. Light, radio waves, and x-rays are all forms of radiation. When a radioactive particle or ray strikes a cell, one of at least four things can happen: it may pass through the cell without doing any damage; it may damage the cell, but in a way that the cell can recover and repair itself before it divides; it may kill the cell; or, it may damage the cell in such a way that the damage is repeated when the cell divides.

Radiation Dose (or mrem): A generic term to describe the amount of radiation a person receives. Dose is measured in units of thousands of a roentgen equivalent man (rem) (called the millirem). The conventional unit used by federal and state agencies in the United States is the millirem (mrem). Dose is a general term used to assist in the management of exposure to radiation. The common international scientific (SI) unit for dose is the millisievert (mSv). One mSv is the same as 100 mrem.

Radiation sickness: Acute physical illness caused by exposure to doses of ionizing radiation large enough to cause toxic reactions. This can include symptoms such as nausea, diarrhea, headache, lethargy, and fever.

Radioactive decay: The process by which the nucleus of a radioactive isotope decomposes and releases radioactivity. For example, Carbon-14 (a radioisotope of carbon) decays by losing a beta particle, thereby becoming Nitrogen-14, which is unstable.

Radioactive iodine: See *iodine isotopes*.

Radioactivity: The decay of unstable nuclei through the emission of ionizing radiation. The resulting nucleus may itself be unstable and undergo radioactive decay. The process stops only when the decay product is stable.

Radiogenic: A term used to identify conditions observed to be caused by exposure to ionizing radiation, such as certain kinds of cancer.

Radioisotope: A radioactive isotope of an element. Radioisotopes are used in medical research as tracers. See also *isotope, nuclide, and radionuclide*.

Radiological weapons: Weapons that use radioactive materials to cause radiation injury.

Radionuclide: A radioactive nuclide. Often used to distinguish radioisotopes of different chemical elements, such as Iodine-131 and Uranium-239. In the human body, radionuclides that are in soluble form and chemically analogous to essential nutrient elements will typically follow pathways in a fashion similar to their nutrient analogues. For example, Sr-89, Sr-90, Ba-140, Ra-226, and Ca-45 behave like calcium and are bone-seeking elements; Cs-137, Rb-86 and K-40 follow the general movement of potassium and will be found throughout the body; I-129 and I-131 behave like stable iodine and accumulate in the thyroid; and tritium resembles hydrogen and, as tritiated water, will be distributed throughout the body. Elements that demonstrate unique behaviour include Ce-144, Ru-106, Zr-95, Kr-85 and Pu-239.

Radiopharmaceuticals: Drugs (compounds or materials) that may be labeled or tagged with a radioisotope. In many cases, these materials function much like materials found in the body and do not produce special pharmacological effects. The principal risk associated with these materials is the consequent exposure of the body or certain tissues to radiation.

Radioresistance: The degree of resistance of organisms or tissues to the harmful effects of ionizing radiation.

Radiosensitivity: The degree of sensitivity of organisms or tissues to the harmful effects of ionizing radiation.

RALGOV: The abbreviation for Rongelap Local Government which serves the interests of Rongelap, Rongerik and Ailinginae atolls.

Ralik: The RMI consists of two north-to-south chains of atolls. *Ralik*, meaning sunset, is the chain to the west.

Ratak: The RMI consists of two north-to-south chains of atolls. *Ratak*, meaning sunrise, is the chain to the east.

Rem: Short for "Roentgen equivalent man." A unit used to derive a quantity called the equivalent dose. This is used because not all radiation has the same effect on living

human tissue, even for the same amount of absorbed dose. (1 rem = .01 Sv = 1000 mrem (Millirem)). See also *Units of radiation*.

Rep: See Units of radiation.

RMI: Republic of the Marshall Islands.

The RMI became an independent nation in 1986 when the Compact of Free Association came into effect and the nation was no longer part of the United Nations Trust Territory of the Pacific Islands (TTPI) administered by the United States.

Ri-jerbal: See “*Kajor*.”

Risk: The probability of harm from the presence of radionuclides or hazardous materials taking into account (1) the probability of occurrences or events that could lead to an exposure, (2) probability that individual or populations would be exposed to radioactive or hazardous materials and the magnitude of such exposures, and (3) the probability that an exposure would produce a response.

Roentgen (R): Measures the ability of photons (gamma rays and x-rays) to make ions in the air (not in tissue or other materials). See also *Units of radiation*.

Roro: A chant used to disseminate information orally, or to document history.

Seamounts: Large submarine volcanic mountains rising at least 1,000 m (3,300 feet) above the surrounding deep-sea floor. Preliminary oceanographic studies have shown that seamounts are biologically rich areas supporting a distinct benthic (bottom dwelling) community of animals, many of which are unique and do not occur elsewhere on earth. In addition to supporting diverse marine life, seamounts attract pelagic species-- schools of large fish (especially tuna) -- that visit to feed and spawn.

Sievert (Sv): Another measurement of equivalent dose in humans. (1 Sv = 100 rem.)

Staphylococcal enterotoxin B (PG): Produced by the bacteria *Staphylococcus aureus*. Used by the United States in biological warfare experiments as an anthrax-simulating agent. Exposure can cause illness if inhaled in low doses. The toxin interacts with the individual's immune system to produce a variety of effects. Symptoms of inhaled SEB appear 3- 12 hours after exposure and can include: sudden onset of a high fever (103-106 degrees F), chills, headache, muscle aches, a dry cough and possibly an inflammation of the lining of the eyelids. There may be difficulty breathing, chest pain and fluid in the lungs, or a fever for 2-5 days. The cough may persist up to four weeks. Exposure will result in 80% incapacitation of 80%. If inhaled, exposure may result in inflammation of the lung, pneumonia, and, in the very young or old, death. If the toxin is swallowed, there may be nausea, vomiting and diarrhea with no symptoms involving the lungs.

Stronium-90: A by-product of the fission of uranium and plutonium in nuclear reactors and in nuclear weapons. As Strontium-90 decays, it releases radiation and forms

yttrium-90 (Y-90), which in turn decays to stable zirconium. The half-life of Sr-90 is 29.1 years, and that of Yttrium-90 is 64 hours. Sr-90 emits moderate energy beta particles, and Y-90 emits very strong (energetic) beta particles. Strontium-90 can form many chemical compounds, including halides, oxides, and sulfides, and moves easily through the environment and into the human food chain. People may also inhale trace amounts of Strontium-90 as a contaminant in dust. But, swallowing Sr-90 with food or water is the primary pathway of intake. Strontium-90 is chemically similar to calcium, and tends to deposit in teeth, bone and blood-forming tissue (bone marrow). Thus, Strontium-90 is referred to as a "bone seeker." Internal exposure to Sr-90 is linked to bone cancer, cancer of the soft tissue near the bone, and leukemia.

Superfund: The name given to the United States environmental program established to address abandoned hazardous waste sites. It is also the name of the fund established by the Comprehensive Environmental Response, Compensation and Liability Act of 1980, as amended (CERCLA statute), which allows the Environmental Protection Agency to clean up hazardous waste sites, to compel responsible parties to perform cleanups, and to fine responsible parties to reimburse the government costs of cleanups.

Taban: Medicinal areas that are off-limits except to *ri-bubu*, or healers.

Taboos: Rules that restrict behavior. Taboos are defined and imposed by internal actors in ways that establish and regulate social, political, and economic relationships. While “taboo” is not a Marshallese word, the term is used by the Marshallese when speaking in English about those “rules that restrict behavior.” In the Marshall Islands rules are known and followed, and there are specific Marshallese terms for specific sets of rules, but adherence to these rules is not enforced by a strict code of sanctions -- as has been described in some other Pacific Island cultures.

TERPACIS: A military term used to denote the Trust Territory of the Pacific Islands.

Teratogenic effects: Non-hereditary effects from some agent that are seen in the offspring of the individual who was exposed to the agent. The agent must be encountered during the gestation period.

Tolerance dose: See *Permissible dose*.

Total-Body Irradiation (TBI): Exposure of the entire body to external radiation.

Tracer: A distinguishable substance, usually radioactive, added to the makeup of a nuclear weapon to develop a distinctive signature that allows tracking of weapons fallout locally, regionally and worldwide. In the Marshall Islands, nuclear weapons fallout contained radioisotopes specific to the make-up and detonation of each bomb, as well as additional radioisotopes of added tracer elements. Reported tracers include sulfur, arsenic, yttrium, rhodium, indium, tantalum, tungsten, gold, thallium, Polonium-210, Thorium-230, Thorium-232, Uranium-233, Uranium-238, Americium-241, and Curium-242.

Tritium: A radioactive isotope of hydrogen. Tritium contains one proton and two neutrons in its nucleus. Because it is chemically identical to the natural hydrogen atoms present in water, tritium can easily be taken into the body by ingestion. It decays by beta emission and has a radioactive half-life of about 12.3 years. As it undergoes radioactive decay, tritium emits a very low energy beta particle and transforms to stable, nonradioactive helium. Tritium occurs naturally in the environment in very low concentrations in the form of *tritiated water*, which easily disburse in the atmosphere, water bodies, soil, and rock. Tritium is also a component in the triggering mechanism in thermonuclear (fusion) weapons. It is used in various self-luminescent devices, such as exit signs in buildings, aircraft dials, gauges, luminous paints, and wristwatches. Tritium primarily enters the body when people swallow tritiated water. People may also inhale tritium as a gas in the air, and absorb it through their skin. Once tritium enters the body, it disperses quickly and is uniformly distributed throughout the body. Tritium is excreted through the urine within a month or so after ingestion. Organically bound tritium (tritium that is incorporated in organic compounds) can remain in the body for a longer period. Since tritium is almost always found as water, it goes directly into soft tissues and organs. It produces a low-level exposure and may result in toxic effects to the kidney. However, as with all ionizing radiation, exposure to tritium increases the risk of developing cancer.

Trust Territory of the Pacific Islands (TTPI): A United Nations trust territory established after World War II and administered by the United States beginning July 18, 1947. The TTPI was a “strategic” trust territory which meant that the U.S. did not have to disclose details about its military operations within the area.

Units of radiation: The basic unit of radiation exposure is the roentgen, named after Wilhelm Roentgen (discoverer of x-rays). It is a measure of ionization in air, technically equal to one ESU (electrostatic unit) per cubic centimeter, due to radiation. A rep (roentgen equivalent physical) is an archaic measure of skin exposure to a dose of beta radiation having an effect equivalent to 1 roentgen of x rays. The basic unit of radiation absorbed by the body is the rad, technically equal to 100 ergs (energy unit) per gram of exposed tissue. One roentgen corresponds to roughly 0.95 rad. The rem (roentgen equivalent in man) is a unit of effective dose, a dose corrected for the varying biological effectiveness of various types of ionizing radiation. The currently accepted unit of radiation is the gray (Gy), the International System unit of absorbed dose, equal to the energy imparted by ionizing radiation to a mass of matter corresponding to one joule per kilogram.

Units of radioactivity: The becquerel (Bq), named after the physicist Henri Becquerel (the discoverer of radioactivity), is a measure of radioactivity equal to one atomic disintegration per second. The curie (Ci), whose name honors the French scientists Marie and Pierre Curie (the discoverers of radium), is a standard based on the radioactivity of 1 gram of radium. It is equal to 3.7×10^{10} becquerels.

Walap: A large, ocean-going outrigger boat. The Marshallese, and particularly the people from Enewetak and Ujelang, were famous in the Pacific region for the construction and use of these vessels.

Weto: A land parcel running the width of an island, including access to the ocean and the lagoon.

X-rays: Invisible, highly penetrating electromagnetic radiation of a much shorter wavelength than visible light, discovered in 1895 by Wilhelm C. Roentgen. Most applications of x-rays are based on their ability to pass through matter. They are dangerous in that they can destroy living tissue, causing severe skin burns on human flesh exposed for too long a time. This property is applied in x-ray therapy to destroy diseased cells. See also *Ionizing radiation*.

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