

Nuclear contamination of food in the Pacific **Lifting the veil of secrecy**

Fallout from atmospheric testing of nuclear weapons by the United States in the 1950s caused immediate injury and left a legacy of environmental contamination around the Marshall Islands test site. Radioactive contamination of the food chain and resulting health risks to the islands' residents were concealed, writes **DR NANCY POLLOCK**. As the true picture has emerged, recompense of the affected islanders has become paramount.

On 1st March 1954, the US detonated an experimental hydrogen bomb over Bikini Atoll. At 15 megatons, 'Castle Bravo,' was unexpectedly the largest¹ of 67 tests of nuclear and thermonuclear devices conducted at the Bikini and Enewetak atolls in the northern Marshall Islands between 1946 and 1958. This series followed the US detonation of atomic bombs over Hiroshima and Nagasaki in August 1945. The Marshall Islands, under US control as a UN Trust Territory, were used as a testing ground for strategic weapons during the Cold War. Military security effectively imposed a cloud of secrecy over the whole area, including the potential contamination of food sources from radioactive fallout.²

The people of Rongelap atoll in the northern Marshall Islands, about 130 kilometres east of the 'Castle Bravo' blast, were covered in a cloud of powdery ash laden with radioactive by-products carried by the wind. The crew of the Japanese fishing boat 'Lucky Dragon #5,' working off Bikini was also covered in radioactive ash. Both groups suffered extensive burns, hair loss and vomiting. After three days the islanders were removed to the US military base on Kwajalein. The Japanese fishermen headed back to their home port before being treated. They were to suffer extensive health problems lasting to present times. Neither group knew of 'radiation sickness' nor were they told of the connection between the ash and their illnesses.

Their radiation sickness was a direct outcome of

the new nuclear technology. Survivors of the Hiroshima nuclear attack ('hibakusha') had reported a range of symptoms with delayed onset.³ Medical researchers at the US facility established

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Castle Bravo, detonated 1 March 1954 by the US on Bikini Atoll, Marshall Islands, had a yield of 15 megatons, instead of the expected 4 to 6 megatons.

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US navy doctor examines a Rongelap child April 1954, weeks after the huge Castle Bravo blast.
AFP PHOTO

on the hill above Hiroshima while Japan was under US military control examined vital signs of hibakusha and compared them with a group of Japanese from the area outside Hiroshima.⁴ Case records were suppressed and treatment was left to Japanese doctors who were forbidden, on US orders, to reveal any negative effects of the bombing. The possible radioactive contamination of local food supplies was not linked to radiation sickness or seriously considered as a health risk.

Understanding radiation sickness after the Hiroshima explosion was complicated by a lack of prior experience, and a strong desire by US officials to cover-up any negative effects beyond the bomb's explosive force.⁵ US military silence surrounding the Bikini fallout also suppressed, and delayed for 50 years, any understanding of the connection between the serious health problems experienced by Hiroshima survivors, Japanese fishermen on board the Lucky Dragon #5, and the residents of Rongelap atoll. Their initial injuries such as burns and vomiting, and other health effects were considered by US military medical advisors to be short term, and thus expected to disappear once the exposed people were removed from the contaminated surroundings.⁶ US officials initially denied connections between illness and fallout in order to cover-up US responsibilities and later to reduce compensation claims. Links between health problems and ingested contaminated foods emerged many years later.

Awareness of the long-term effects on human bodies of exposure to radiation was not widely known by US officials until near the end of the nuclear testing programme in the northern Pacific in 1958. Reports by US Atomic Energy Commission (AEC) researchers contracted between 1946 and 1961 to monitor radiation levels in marine and terrestrial life in the northern central Pacific were not collated, nor linked to human exposure to radiation. None of the findings explicitly acknowledged human exposure through the food chain.⁷

However Neal Hines, radiobiologist who reviewed the effects of nuclear testing in the region between 1946 and 1961, did warn in July 1956 that 'Rongelap's radioactivity still was at levels at which permanent residence would have been of doubtful wisdom.'⁸ Yet AEC and military officials prepared Rongelap for (the

first) repatriation, carried out in June 1957. Research continued, including annual medical monitoring by the Brookhaven National Laboratory (BNL). Brookhaven's medical surveys on Rongelap followed a similar format to that established outside Hiroshima, comparing those exposed to fallout on Rongelap on 1 March 1954 with other unexposed Rongelap people who were returned to their home atoll in 1957. The medical team used 'a whole-body gamma scintillation spectrometer to measure gamma ray activity from any internally deposited fission products and neutron-induced activities' in 227 Rongelap people.⁹ BNL medical teams visited Rongelap annually for the next 30 years and reported after each visit that the Rongelap people were 'healthy'.¹⁰ Radioactive toxicity of the plant foods which the Rongelap people had been ingesting daily was apparently not considered connected to the whole body gamma scintillation or urinalysis results, or signs of radiation sickness. They found no differences between exposed and unexposed populations, suggesting that all residents were exposed to a common, environmental source of toxic radioactive substances.

But Rongelap people experienced increasing health problems, such as nodules on the thyroid, and stillbirths. By 1972 when Rongelap mayor John Anjain's son died of leukemia in a Bethesda, Maryland hospital, the community expressed their dissatisfaction at the visits that gave them no information about their health, despite increased suffering. They denied the

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Brookhaven team access to their island. As their sicknesses continued unabated, they decided to remove themselves to another atoll in 1985, with the help of the Greenpeace ship, 'Rainbow Warrior,' to draw attention to their plight. Rongelap Senator Jetan Anjain related their concerns in a letter to the US Committee on Interior and Insular Affairs in 1989:

The Rongelap people today live in exile at Mejato, Kwajalein atoll... We evacuated Rongelap atoll in 1985 because we believed it to be contaminated and unsafe. The Department of Energy doctors repeatedly told us we were fine, but one-by-one over the years, more than 20 members of the Rongelap community were transported to Cleveland, Ohio for thyroid operations. We feared for the children. The Rongelap people wish to return home. However, we will only return home if Rongelap Atoll is determined to be safe. ... Rongelap respectfully asks for humanitarian assistance. ... Radiation invaded our lives 35 years ago. It continues to impose its cruelty upon the Rongelap people.¹¹

From 1957 through to 1985 Rongelap people had unknowingly been daily consuming local foods contaminated by radioactive fallout from the 'Castle Bravo' test. Breadfruit and coconuts, and perhaps the fish, were all contaminated by radioactive substances taken up through the soil and environment. Cesium-137 accounted for more than 90% of the estimated dose, while Strontium-90, Iodine-131 and small amounts of Plutonium-239 and Plutonium-240 contributed minor amounts to both background and ingested radiation.¹² These elements need to be reduced if not eliminated before Rongelap's people can safely return to their atoll.

Cesium-137 is widely recognised as the most harmful radioisotope in nuclear fallout with a half-life of 33 years.¹³ It is readily absorbed by plants and animals and takes several months to clear the body once consumption of contaminated material ceases.¹⁴ Strontium-90 with a half life of 50 years is deposited in bone marrow, the most radio-sensitive body tissue; it can cause bone cancer and leukemia and has been associated with stunted growth in children. Iodine-131 has a half-life of only 8 days but is an especially significant toxic substance from nuclear fall-out because it is selectively deposited in the thyroid gland. Children are particularly vulnerable. Some Marshallese children received doses that led them to develop thyroid abnormalities within 10 years of exposure, including hypothyroidism and malignancies.¹⁵ Nodules on the thyroid gland have been the most widely occurring 'radiation sickness' for Rongelap people.

Food contamination by radioisotopes has been under-recognised as a serious and persistent risk to health from nuclear fallout. For 28 years Rongelap people had to rely on local food sources that they

did not know were contaminated. Their only supplementation came from imported rice sold to them by trade ships on irregular visits. No other population has been exposed to both background and ingested radiation for such a long period of time.

Information released under a US declassification order in the 1990s revealed the degree to which the Marshall Islands people had been experimental subjects on the effects of radioactive substances on human populations. Access to reports for the AEC Radiological Safety Committee on the longer-term effects had been restricted by the US Defence Nuclear Agency. US Department of Defence and AEC archives contain many records that had been suppressed. When the information became available researchers were able to build a picture of the Rongelap people's suffering, told in their own words. That information contributed significantly to the Rongelap claim before the Nuclear Claims Tribunal in 2002.¹⁶

With declassification some information held by investigating medical agencies became available.¹⁷ Lawrence Livermore Laboratory revealed high levels of Cs-137 taken up by breadfruit and coconut crabs and lesser levels in coconuts. Although an important part of the islanders' diet, fish was not tested.¹⁸ In the journal 'Health Physics' 1997, Cronkite et al.¹⁹ gave a retrospective explanation of BNL medical records indicating that short-term effects were expected to be of little consequence; most of the exposed [in 1954] apparently recovered after 6 months.

Longer-term effects had emerged ten or more years after exposure. No differences were found between the exposed and unexposed populations. BNL urinalyses had revealed that Rongelap subjects had accumulated Strontium-90 and Iodine-131 in their systems. But no dietary intake of radioactivity via particular foods was apparently recorded; Cronkite adds that from 1978: 'the [BNL] medical team was no longer responsible for measurements of radioactivity in foodstuffs or body burdens.'²⁰ Neither laboratory gives an explanation for failing to identify or report links between radiation sicknesses and consumption of radioactive contaminated foods.

New information on these oversights gained public attention during the 1990s, leading up to the Nuclear Claims Tribunal hearings, beginning in 2000. The four northern atolls made separate claims for direct effects of nuclear fallout on their islands. Rongelap peoples' claims before the Tribunal²¹ sought restitu-

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tion for damage to their health, as well as damage to their atoll environment.²² Rongelap women asked the Tribunal for compensation for the many stillbirths, deformed fetuses and disturbed reproductive cycles they had suffered, but were initially denied as US officials could find no connection between contaminants and these reproductive disorders, and the women could not produce conclusive evidence. Ingested radioactive substances now linked to the many sicknesses they were suffering formed part of their claim for compensation. They also wanted assurances that their atoll would be cleaned of radiation so their radiation sicknesses would not continue. The Nuclear Claims Tribunal accepted responsibility for a selected list of medical conditions when awarding personal injury claims in 2001. Only some of those claims have been paid out; some claimants have died before receiving their payments. The allocated fund is now exhausted, yet health problems continue to afflict Rongelap people.

Earlier repeated requests by Rongelap leaders to the US government for their atoll to be cleaned of radioactivity had met with delays that led them to remove themselves to a neighbouring atoll in 1985. A U.S. Committee on Radiological Safety in the Marshall Islands, a subgroup of the International Committee on Radiological Protection (ICRP), addressed the topic of 'radiological assessments for the resettlement of Rongelap' based on a 1992 Memorandum Of Understanding with the US. This memorandum stated: 'Resettlement will only occur if no person will receive a calculated annual whole body radiation dose equivalent of more than 100mrem above background.'²³ To achieve this target, any clean-up programme needed data on the contaminants ingested (inhaled and eaten) as well as the levels of background radiation across the atoll. The ICRP Committee recommended replacement of contaminated surface soil with clean crushed coral fill to reduce background radiation and the spreading of large amounts of potassium fertilizer to counter the uptake of Cs-137 by breadfruit and coconut trees.²⁴ The Committee was critical of earlier data on radioactivity in the diet compiled by Brookhaven and Lawrence Livermore Laboratories, but not made available.²⁵ Whatever form of clean-up was to be put in place, the Committee advised that returning Rongelap residents should obtain only 25 percent of their annual food supply from local foods, with the balance to be come from imported foods.

At the Nuclear Claims hearings in 2002 a range of possible rehabilitation processes was considered, adding to the peoples' continued unease about the uncertainties surrounding how and when the clean-up programme would proceed. Theoretical

physicists and agriculturalists suggested alternatives but needed more data on the contaminants, safety levels, and associated health problems. The Rongelap claim became a bewildering debate between health physicists, agriculturalists, lawyers, and Marshallese representatives, expressed in a technical language of rem and radioisotopes. Humanitarian concerns were obscured.

In 2004, Robert Alvarez strongly criticised the plan for repatriating Rongelap people to their atoll. As Deputy Assistant Secretary for National Security and Environmental Policy, he suggested that the Departments of Energy and Interior had quietly resisted complying with the 1992 Agreement. He stated categorically:

*Until the US government can assure... doses below 100-milirem..., efforts to force the Rongelap people back to their home are unjustified and unfairly place the burden of protection on the Rongelap people.*²⁶

Rongelap people have yet to reoccupy their atoll. The Tribunal's recommendations have yet to be implemented, posing several concerns. Restricting clean-up to the main island because of costs leaves 60 other islets still contaminated; normal usage for supplementary foods and recreation poses many hazards. Also, effects of the recommended heavy doses of potassium on the growth, taste and acceptability of replanted breadfruit and coconuts is unknown. Projected dose rates from radiation that persist in the new environment have been calculated with little understanding of life on a northern atoll.²⁷ New plantings of breadfruit and coconut will take from 6 to 10 years before they produce mature fruits ready for eating, so the returnees will have to live on imported food until then; the recommended 25%/75% split in the annual dietary intake between local and imported foods cannot commence for some years after repatriation. Already there are concerns about high levels of diabetes in the expatriate Rongelap community that are likely to continue if they have to live entirely on an imported diet. Rongelap people are understandably wary of outsiders' plans for life on their island.

The Rongelap community was scheduled, under US order, to return to their own atoll by October 2011. But rehabilitation is not yet completed, so the return date has been postponed to July 2013. Almost 60 years have elapsed since fallout from the US thermonuclear bomb test on Bikini on March 1 1954, so decontamination of radioactive substances is a matter of urgency. How many of the community will return is unknown, but given the high level of distrust of previous considerations of their illnesses and the radioactive environment on their atoll, only a proportion of the community is likely to take up a long awaited opportunity.

We must conclude that ingestion of contaminated local foods and exposure to background radiation has had disturbing, long-lasting medical and social effects on exposed peoples. It has contributed to ill health and dislocation from their islands over a period of more than 50 years. Understanding the Marshallese concerns about effects of radioactive contamination of their food sources and their environment can contribute to considerations worldwide about radioactive pollution from nuclear explosions.

Postscript

A United Nations Human Rights Council Report released its findings on 12 Sept. 2012 on the impact on human rights of the nuclear weapons tests conducted by the USA in the Marshall Islands between 1946 and 1958. It recommends that steps should be taken

to undertake action to protect the right to life, health and environment of all [Marshallese] affected victims and their families.

The Special Rapporteur, Calen Georgescu, recommended that a comprehensive independent radiological survey of the entire (Marshall Islands) territory be undertaken. He also established that the US has an obligation to encourage a final and just resolution for the Marshallese people, including full payment of compensation sums awarded



Rongelap's people cannot safely return to their atoll before the soil has been decontaminated. Lawrence Livermore National Laboratory has a small garden on Rongelap to assess uptake of radionuclides in crops.

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by the Nuclear Claims Tribunal hearings. He stated: 'The continued risks of further such events needs to be addressed urgently in order to replace a legacy of distrust.'²⁸

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