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NUCLEAR WASTE
THE
PACIFIC
PROVING
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REPOSITORY DOE-FORRESTAL

COLLECTION MARKEY FILES

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FOLDER 2.8 MARSHALL ISLANDS
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A succession of nuclear tests at Eniwetok and Bikini atolls from 1946 to 1958 changed the Northern Marshall islands and their people in ways that are now only dimly understood. As an example of environmental, social and economic impact, there has been no precedent.

Because of their remoteness, the atolls became the proving ground for man's most advanced technology. In the process, the islands and their people were forcibly pulled from isolation and subjected to stresses the rest of the world has yet to experience, but may still have to endure.

If there were a Book of Records for misfortune, the Northern Marshalls could claim these divisions:

I First atoll (Bikini) to have an atomic bomb exploded beneath the waters of its lagoon. That shot, "Baker" in 1946, sucked ten million gallons of seawater up to a height of more than a mile, and left a legacy of half a million tons of radioactive mud in the lagoon.

I First atoll (Eniwetok) to have a hydrogen device, the "Mike" shot in November of 1952, remove one of its islands, leaving a one-mile hole in the reef and a blanket of radioactivity on islands nearby.

I First atoll (Eniwetok) to be subjected to a full-scale radiation cleanup by a battalion of Army engineers. Whether the troops will win that battle remains to be seen.

I First group of people (those of Rongelap, Ailinginae, Rongerik and Utirik) ever exposed to acute radiation from fallout, an aftermath of the "Bravo" shot at Bikini in March of 1954. That hydrogen bomb test, the biggest blast yet attempted, sent millions of tons of Bikini reef five miles in the air within one minute, into what the Atomic Energy Commission said was an unexpected shift of winds in the upper atmosphere.

A gritty, radioactive cloud drifted eastward and exposed 240 Marshallese, 28 American servicemen and 23 Japanese fishermen to various levels of contamination. The "Bravo" shot fallout was the worst accident that occurred during the test period.

"Romeo" was the United States' second H-bomb. Detonated on Bikini atoll on March 26, 1954, "Romeo" followed in the wake of worldwide criticism aimed at U.S. nuclear testing in the Pacific. Critics pointed out that even after the tragedy of the March 1, 1954 H-bomb (in which Marshallese islanders and Japanese fishermen were exposed to radioactive fallout) no warning was issued prior to this second testing. (Defense Nuclear Agency photo.)



One of Eniwetok's newest residents adjusts to life on Japtan, one of the atoll's "safe" islands.

It took the military two to three days to evacuate the populations of the exposed islands, during which time the radioactivity fell at Rongelap like snow and the exposure was compounded as island residents, not aware of the problem, ate and drank contaminated food and water. The people from Ailinginae and Rongelap (80 and 100 miles east of Bikini) quickly developed skin burns, gastrointestinal problems, hair loss and blood complications. The people from Utirik (280 miles east of Bikini), who described the fallout there as "mist-like," showed no outward sign of radiation injury.

The residents from the atolls were treated at Kwajalein. The AEC allowed those from Utirik to return three months later but the residents of Ailinginae and Rongelap could not return for three years.

Although the people of the downwind atolls were known to have absorbed large amounts of radioactive iodine, absorbed and stored by the thyroid gland, they showed no recognizable signs of thyroid damage and the medical experts concluded there was little chance of further health problems. This assumption was later proved wrong.

For nine years, a medical team from the Brookhaven National Laboratory, which was chosen by the AEC to monitor the health of the exposed people and to treat radiation-related illness, gave assurances there was nothing to worry about. (See page 21)

In 1963, a 12-year-old girl at Rongelap was found to have a nodule of the thyroid gland, an ominous development. Since then, the incidence of thyroid nodules and cancer of the thyroid, first at Rongelap and later at Utirik, has escalated relentlessly. There have also been fatal cases of stomach cancer and leukemia that are believed to be radiation-related.

One thyroid malignancy on Utirik involved the young son of an exposed person. This raises the possibility of either second-generation health effects from genetic damage or exposure from radiation now on the atoll affecting the next generation. Neither possibility was taken into account by the medical program of the AEC or its successor, the Energy Research and Development Administration (ERDA).

The official count at Utirik this year was 11 cases of thyroid tumors, three of them malignant. There were 30 cases of thyroid tumors on Rongelap, three of them also malignant. The numbers are constantly changing and don't make sense.

"Perhaps you can tell us if there is some explanation for the same number of malignant thyroid cases in Rongelap and Utirik, who received very different levels of radiation," the chiefs and people of Utirik asked ERDA in a letter last year.

But the medical experts are unable to explain the thyroid nodule and malignancy rate. "It turns out we were wrong, but we did it in all sincerity," said Dr. Robert A. Conard, head of the Brookhaven medical program in the Marshalls for 23 years.

Faith in the power of technology has been deeply shaken. "The people ask if this thyroid problem has suddenly occurred, is it not possible that the experts have been wrong for so many years and that more problems will occur in the future?" Dr. Konrad P. Kotrady, a former ERDA doctor in the Marshalls, wrote in a recent criticism of the medical program.

This uncertainty has stirred fear. Women on the atolls are reported to be reluctant to nurse their young. "It has been an amazing psychological trauma to these people," said Glenn Alcalay, who lived on Utirik as a Peace Corps volunteer the past year.

Thyroid patients have been flown to Hawaii and the mainland U.S. for sur-



Army Captain Charles Day, a Defense Nuclear Agency radiation specialist, measures radioactivity at Cactus Crater on Runit Island in Enewetak atoll. In 1958, "Cactus," an 18-kiloton nuclear device containing plutonium was exploded by its triggering mechanism but failed to chain react. The malfunctioning explosion scattered radioactive plutonium 237 over the entire island, creating 79,000 cubic yards of contaminated soil. As

part of Enewetak's \$20 million cleanup program, the contaminated soil will be mixed with cement and pumped into Cactus Crater. An 18-inch thick concrete cap will then be constructed over the crater and the area will be fenced off. Runit has been placed "off limits" for 24,000 years, the half-life of plutonium.

gery and there has been little dispute about the excellent quality of the treatment there. But the medical program has also been an exercise in culture clash and the quarterly medical team visits to the atolls are a constant reminder that all is not well.

Fear of radioactivity and uncertainty over future health problems exist at Bikini and Enewetak as well. Resettlement of those atolls has gone on for several years, but haltingly and with great, perhaps insurmountable, difficulty.

ERDA officials have pledged their willingness to make the atolls safe for resettlement, no matter how long it takes. "We made a mess there and we ought to stay and clean it up," said Joe Dent, an assistant director for health protection for ERDA, in a recent interview.

Roger Ray, assistant manager for environmental safety with ERDA, estimates that language barriers and cultural differences alone guarantee that complete resettlement may take many years. "We're making some progress, but it will take a generation before we are understood," he said.

Restoration of the Marshall Islands

to their pre-atomic condition is conceded by U.S. officials to be impossible. The goal is to allow the people to live on their ancestral lands safely and without fear of unknown or nonexistent radiation hazards.

The first full-scale steps were taken this year with the start of a \$32 million cleanup and resettlement program at Enewetak and a \$2.6 million appropriation by Congress for an aerial radiological survey of the atolls in the Northern Marshalls, starting this fall.

But the intense — and widely publicized — cleanup program and the un-

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answered medical and scientific questions have opened the plight of the atolls to worldwide scrutiny. And it seems that the more the scientists look at resettlement of the atolls, the more problems they find.

As these concerns filter back through various channels to the people of the atolls, their councils and the political

leadership in Majuro, the technical information creates further doubts and erodes the element of trust between the people and the U.S. government.

The pattern was set in 1946 when Bikini was selected as the first atomic bomb test site and the U.S. Navy, which then had jurisdiction over the atoll, told the people they had a week to pack. An agreement had been reached with Juda, the iroiji (island chief), and confirmed by the Bikini council that the atoll would be used for weapons testing.

"We thought that after the testing,

if the land was still there we could come back," said Jamore Aitap, who was 38 years old when he left Bikini. "They didn't really say how they were going to do the testing or that the atoll was going to be uninhabitable," he said recently at Majuro through an interpreter. "We thought we would be back in a year, possibly two." That was over 30 years ago.

The Bikini council picked Rongerik, about 100 miles to the east, to settle on. A village was built there by Seabees and the people, then almost 170 in number, were taken there by Navy LST on March 6 and 7, 1946. The people took with them personal possessions, pandanus thatch panels and outrigger canoes.

Word was sent out through official government channels that the people of Bikini had gotten a good deal. "The natives are delighted and enthusiastic about the atomic bomb, which has already brought them prosperity and a new promising future," said a Navy press release.

An Associated Press story said "Rongerik is much more beautiful and is a richer island than Bikini. Rongerik is about three times larger than Bikini and roughly triangular. Coconuts here are three or four times as large as those on Bikini and food is plentiful."

But the Bikini council knew differently. While their atoll had 26 islands and 2.32 square miles of land, Rongerik had ten islands with 0.17 square miles of land. It was also believed to be influenced by an evil spirit and the fish in the lagoon were consistently toxic.

"Relocation was accomplished swiftly and with little planning," anthropologist Robert Kiste wrote in his book on the Bikini people. "As soon as the people began to subsist on local foods, it became apparent that Rongerik's resources had been greatly overestimated, and were, in fact, inadequate."

Two months after they arrived, the Bikini people made their first request to return home. In June of 1947, a Navy board of investigation found the people were in serious straits and recommended they be moved.

By now, it was becoming clear to scientists studying Bikini atoll that, more than a year after the two initial tests, no one could take the responsibility for certifying the atoll as safe for human habitation.

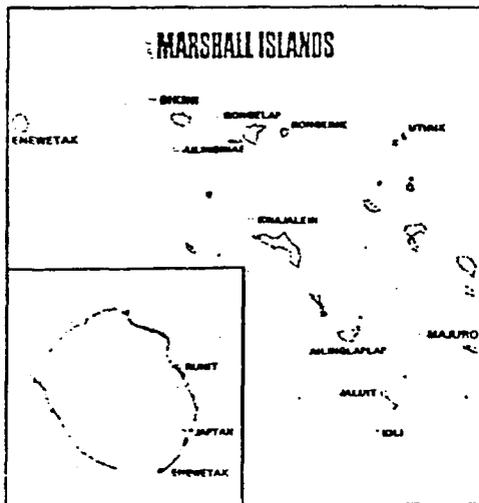
Neal Hines, in his book "Proving Ground," recounts how scientists returned to the atoll in 1947 and found the lagoon waters, once clear, had become almost opaque. Hines said the Radiobiology Group found "very widespread distribution of radioactive substances in the organisms in and about Bikini Lagoon. In fact, some activity was found in organisms taken from every part of the Bikini area that was sampled . . ."

Official statements continued, however, to be optimistic. "One year later the scientists and military personnel now engaged in an intensive six week survey of Bikini atoll can find few visible effects of

that blast," the Navy said, referring to Bikini atoll as "the same placid palm ringed lagoon on which King Judah and his subjects sailed in outrigger canoes."

Too much had been invested

In March of 1948, the people of Bikini were moved to Kwajalein and the following fall to Kili, an island which had headquartered a copra plantation during the German period in the Marshalls. Kili had rich soil but a number of serious



The Marshalls, 29 coral atolls and five islands scattered over 357,000 square miles of ocean, served as the U.S. Pacific Proving Ground until the late 1950's.

drawbacks, not the least being it was an island, not an atoll, and with a land mass one sixth that of Bikini atoll.

It had no sheltered fishing area or protected anchorage and was virtually inaccessible during the heavy seas of the winter months. Generations of skills useful for lagoon life were worthless on this island. Efforts at development at Kili were set back by typhoons, food became scarce and pressures grew to return to Bikini.

AEC that Bikini would be needed for the bigger tests. Too much had been invested in the assembly facility at Parry Island on Enewetak to risk its destruction.

Activity moved back to Bikini, but at a scale that dwarfed the earlier tests. "Bravo" was 750 times more powerful than the atomic bombs detonated there eight years before. Meanwhile, the people of Bikini stayed on Kili, a harsh and isolated place.

President Eisenhower announced a moratorium on atmospheric testing in 1958 and the Pacific Proving Ground fell silent. Ten years later, President Johnson announced that, with the exception of several islands, radiation levels on Bikini atoll were low enough to allow safe re-habitation. Sources on Kili at the time said the news was greeted with outright jubilation.

As months went by, the mood turned to deep disillusionment. Several Bikini people went to their home atoll, a widely-publicized event, and brought back a disturbing report to Kili. "There were differences," said Nathan Note, scribe of Bikini. "It was not the original Bikini people have seen, just because of bombs wiping it out."

Kiste, the anthropologist, said the restoration program at Bikini did not receive the full support of the Trust Territory administration. Equipment was frequently out of repair, air service to the atoll was terminated and supplies and wages for workers came through sporadically.

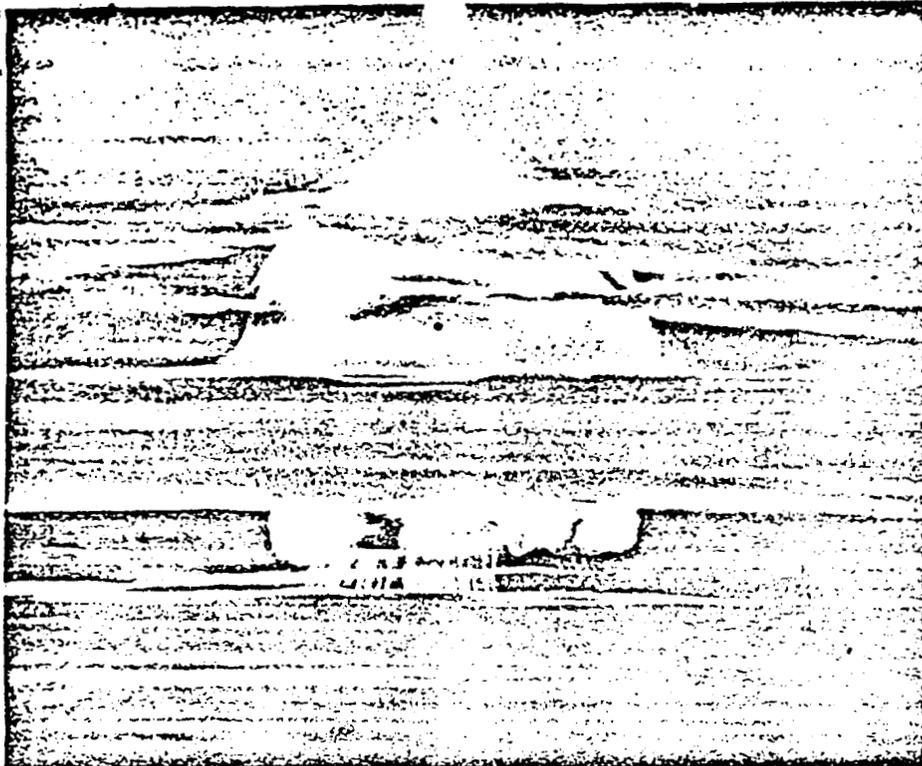
By 1969, the population on Kili was 344 and the Bikini people were spreading out through the Marshalls, to Ebeye near Kwajalein, to Majuro and to other atolls, such as Jaluit, Ailinglaplap and Lae. What had once been a community was being pulled apart.

Whether or not their atoll was a safe place to return to became an increasingly complicated question. According to a suit filed by the Bikini people in federal

AEC officials were concerned over the possibility of radionuclides such as strontium 90, cesium 137 and plutonium 239 and 240 --- all known cancer-causing agents --- getting into the water supply and cultivated food on Bikini. The AEC's cautions, for the most part were ignored.

After the two nuclear shots in 1946, the atoll was used as a minor support area and the action shifted to Enewetak. But the detonation of "Mike" there and the atomization of an entire island by that hydrogen device, made it clear to the

court in Hawaii, a number of recommendations made by the AEC on how the resettlement should be done on Bikini Island, the spot favored by the people to relocate, were not followed by the Department of Interior or the Trust Terri-



This photo of "Mike," code name for America's first hydrogen bomb, was taken at 12,000 feet and 50 miles from Elugelap Island in Enewetak atoll, the site of detonation. "Mike," detonated in 1952, caused the greatest destruction ever from any single explosive device. The island of Elugelap completely disappeared as a result of the explosion. (U.S. Air Force photo)

tory administration.

For example, the AEC recommended that:

- 1 Soil be removed from areas surrounding food plantings and be replaced by soil from less radioactive islands.
- 1 Ground surrounding houses be covered with coral and sand taken from less radioactive areas.
- 1 Material for slabs, walls and porches and cisterns for water come from uncontaminated islands and reefs.

they may not have passed on their concerns as emphatically as they should have.

In any case, the resettlement of Bikini Island proceeded on a piecemeal basis, without additional funding from the U.S. Congress and against the advice of experts. Followup studies by the U.S. government have not been reassuring. Samples of blood and pooled urine from Bikini residents showed they were absorbing radiation, including plutonium, although scientists disagree on whether

"It is clear . . . that residents in houses built within the interior of Bikini Island will receive 30-year external doses exceeding the guide value."

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"People read the first line of the recommendation that said the people could go back," said Tom F. McGraw, a health protection specialist with ERDA. "I don't think there was too much recognition of or understanding of the rest of the advice." Other ERDA officials admit

the amounts found were significant.

A study published earlier this year by the Lawrence Livermore Laboratory under a contract with ERDA found that well water on Bikini Island exceeded federal limits for strontium 90. The Livermore Lab also found that persons living in houses recently built on the island would receive doses of external radiation amounting to about 70% of the federal guidance limit.

"This leaves little margin for additional radiation doses that may be potentially received by intake of radionuclides

The U.S. medical program in the Marshalls, organized to monitor and treat radiation-linked illnesses, has come under recent attack from various groups. Since 1957, a yearly medical surveillance program for the Rongelap people and a tri-yearly medical evaluation of the people of Utirik have been carried out by scientists and physicians of the Brookhaven National Laboratory, under the direction of Robert Conard, M.D. Many feel the medical program, sponsored by ERDA, is woefully inadequate.

One of those who disagrees with the program is Konrad P. Kotrady, M.D., who served as resident physician for Brookhaven's medical program between June 1975 and September 1976. In a report critical of the program, Kotrady wrote: "The philosophy of Dr. Conard and ERDA is that the Brookhaven research program should not be concerned with the general health care needs of the people except to assist local government programs. The general health care needs are said by both parties to be the full responsibility of the Trust Territory and Department of Interior, despite knowledge that neither has a workable plan for delivering health care to any of the outer islands such as Rongelap and Utirik."

In the same report Doctor Kotrady assesses the Trust Territory's health care: "The delivery of health care in the Marshall Islands, particularly that provided to the outer islands, is sporadic at best. Health care is concentrated at Majuro, the District Center, and Ebeye, where a sub hospital is located. Both hospitals are understaffed and suffer from a lack of properly trained personnel, lack of medications and inadequate facilities. The outer islands, such as Rongelap and Utirik, are served by a health aide on each island. He is inadequately trained and lacks proper or sufficient medications. A Trust Territory physician rarely gets to visit the outer islands. Discussions with physicians in Majuro indicated that a physician accompanying a field trip has not occurred in over two years."

Kotrady attacks the Brookhaven program for its self-limiting "research" status. "It is the research profile of the program," continues Kotrady, "that has created other misunderstandings with the people. Several years ago the charge was made by many Marshallese that the people examined in the program were being used as guinea pigs in an experiment on radiation effects. This charge touched off a bitter controversy and vigorous denials on the part of the program directors.

ERDA's Medical Program

Criticized

Yet, even now the people feel an intense awareness of being subjects of a research project rather than willing participants of a general health care program... What seems to be forgotten is the patient's right to decide how, when, where or by whom he/she is treated. It is easy for a research program to neglect such patient's rights and feelings in the interest of the outcome of a program... The people on all the islands feel that the program fails to understand and accept their local traditions and culture. They claim that things are done according to American standards rather than Marshallese. The problem creates only another gap of understanding between the (Brookhaven) doctors and the people."

Last year, a letter signed by Joanej Peter and Aplos Alce, magistrate and iroij of Utirik respectively, criticized ERDA's medical program. The letter asked why ERDA doctors don't examine the children of the exposed Utirik group and why ERDA doctors give different treatment to the people of Utirik than the people of Rongelap. ("They do not give full examinations to the people of Utirik every year as they do in Rongelap. Why not?") The letter raised other questions about the health care and concluded, "As you can see, the people of Utirik are very distressed and angry as a result of the radiation. The people feel that the ERDA program is in need of vast changes."

ERDA's medical program also came under attack recently from the Nagasaki chapter of the Japan Congress Against Atomic and Hydrogen Bombs (Gensuikin). The group noted that, according to AEC treatment cards it had received, 66 Marshallese are suffering from bone marrow ailments "and it is feared that they will contract blood diseases." The report, released by Japanese doctors in Nagasaki, noted the already-reported cases of leukemia and cancer of the generative organs and termed present health care "inadequate."

ERDA officials defend the program and explain it has recently been revised in an effort to better serve the needs of the Utirik people. Dr. Conard has said, "The treatment we have given these people is so far above what is given on the other outer islands of Micronesia, I feel proud of what we have done for them."

Dr. Bill Burr, deputy director of ERDA's Division of Biomedical and Environmental Research is more candid in his appraisal: "Let's face it, the U.S. goofed." — R.K.



via groundwater and various food chains," the study concluded. "It is clear... that residents in houses built within the interior of Bikini Island will receive 30-year external doses exceeding the guide value."

As word of medical and other test results filtered back to Kili in various forms, disillusionment about the resettlement program increased. Bikini people who had returned to their home atoll began to move elsewhere, according to Tomaki Juda, the magistrate.

"There are about 60 people on Bikini now," he said, not counting the Trust Territory workers. "There were about 86 a year or two ago but they have been moving off the island because of the concern."

Residents on Bikini Island were advised to eat surplus government food, canned goods and rice, but, inevitably, some ate fresh pandanus and breadfruit. "I guess the temptation is too great," said Oscar deBrum, Trust Territory administrator for the Marshalls.

Bikini council members said their biggest problem has been the lack of solid information about the resettlement program. But ERDA officials said they need more time to sort the information out and then let the Bikini people decide how they want the resettlement to proceed.

"We can't go and alarm them with sterile recommendations. We want to try to inform them and help them make reasonable choices," said one official. The options being considered involve restricting movement to certain parts of the atolls or setting some foods aside.

While ERDA officials are convinced both Bikini and Enewetak atolls can be safely resettled, given certain limitations, other experts fear the penalty for restricted living on the islands may be too great. "Perhaps most alarming is the grim possibility that Bikinians, like American Indians, may become wards to the extent that livelihood and quality of life will be totally derived from federal government provisions," said Joseph E. Trimble, a scientist with Battelle Human Affairs Research Center at a recent seminar on forced migration.

"Life is starting all over"

The resettlement of the Enewetak people back from Ujelang, 124 miles away, has more going in its favor. The Enewetak people are more cohesive than the people of Bikini. The returning contingent, which numbered 57 in June, stays in radio contact with the 400 or so who remain on Ujelang and both groups are in



This twisted steel bar on Runit Island registers "hot" as the Geiger counter needle jumps into the warning zone. The bar is part of Enewetak's 7,300 cubic yards of cobalt-60 radioactive scrap that is to be buried on Runit. Face masks and rubber boots protect onlookers from contamination.

contact with ERDA and Trust Territory officials. The opportunity for misunderstandings can be held to a minimum.

Enewetak atoll now vibrates to the sound of jet transports, Navy landing craft and heavy construction equipment. Nearly 1,000 civilian and military personnel swarm over the sand and shrubs scavenging and burying hot metal and soil.

But there are resettlement problems at Enewetak as well. They are just not as obvious as those at Bikini. The exact extent of the radiation at Enewetak will not be known until the atoll has been surveyed this fall. At least one large island, Runit, where most of the tests were conducted, may have to be put off limits for 24,000 years, the half-life of plutonium.

Cultivation of food may not be possible on some islands, depending on the outcome of a test garden. Food, water and basic amenities are short on Japtan, the initial "residence island" for the Enewetak people. The resettlement clearly will not be easy. "Life is starting all over," said Chief Johannes Peter, the aging leader of the Enewetak people.

Several Japtan residents said they were not convinced that their part of the atoll was free of contamination. When a tuna caught in the Japtan lagoon this summer turned out to be toxic and gave

half a dozen men a stomach ache, the pain was only half-jokingly blamed on the radioactivity.

Since the contamination of the Northern Marshalls is a problem without precedent, neither are the remedies. Monetary compensation for injury and loss of land may be the most difficult problem of all. Each atoll was affected in its own way by the testing program and it is still difficult to assess the cost.

"At this point, the people of Bikini don't know what they've lost," said

connected with ERDA and a full understanding of how much, if any, of Bikini can be resettled, Allen said.

Congress paid the people of Bikini \$325,000 in 1956 and \$3 million in a trust fund in 1975 to compensate them for hardships. Before the issue is closed, Allen, who left a flourishing insurance law business in Denver to move to the Marshalls, no doubt will seek a larger settlement.

The people of Enewetak may find themselves in the same position. As of

When a tuna caught in the Japtan lagoon this summer turned out to be toxic and gave half a dozen men a stomach ache, the pain was only half-jokingly blamed on radioactivity.

George M. Allen, a Majuro attorney who represents the Bikini council. "They've lost the use of Bikini Atoll for 30 years. They went through very arduous circumstances, from 1946 to 1950, and even now life on Kili is very difficult."

Compensation will have to await the completion of the radiological survey, an analysis of the data by scientists not

now, they seem willing to wait and see what the massive cleanup effort will do to their environment.

The people of Rongelap and Utirik raise the issue of adequate compensation for accidental injury and death caused by the fallout from the "Bravo" blast. So far, the exposed people of Rongelap have received \$10,500 each and the people of

gimpses

Utirik about \$114 each. Congress appears willing to pay \$25,000 as compensation for radiation-related illness and \$100,000 in death benefits.

But the question persists: how much is enough? If Rongelap had been a community near the atomic testing ground in Nevada, some attorneys argue, the settlements would be far higher. Others question whether a big money payment would be meaningful, given the depressed economy of the Marshalls, or even desirable. Some individuals might become wealthy and certain atolls would get a permanent subsidy, but what would this mean to the entire population of the Marshalls? It's possible that everyone might want to move to Bikini.

Another Bikini?

As these questions are thrashed out, the rest of the world starts to watch. The problems in the Northern Marshalls begin to look like a first-class human rights issue. (The Russians appear to be aware of this, but some scientists outside the Communist bloc wonder if the Soviet's nuclear test site in Siberia didn't also involve migrations and contamination.)

The kind of people who have to think about nuclear war or atomic devices getting into the hands of terrorists or unstable Third World nations look to the Northern Marshalls as possibly being a scene from the future. Widespread radioactive contamination and its long-term medical effects could be repeated almost anywhere. 



"Life is starting all over," said Chief Johannes Peter (above), the leader of the Enewetak people. Food, water and basic amenities are short on Japtan, the initial "residence island" for the returning islanders. Yet, residents seem willing to wait and see what the massive clean up effort will do to their environment.

Many of Enewetak's nuclear tests were detonated here at Ground Zero on Runit Island. Today, the desolate crater is filled with crystal-clear Pacific waters. A sign, written in English and Marshallese, forbids entry and warns of radioactive contamination.

