

**Invisible Nuclear Catastrophe
Consequences of the U.S. Atomic and Hydrogen Bomb Testings
in the Marshall Islands:
Focusing on the “Overlooked” Ailuk Atoll**

Seiichiro TAKEMINE

Department of Sociology, Meisei University

Affiliated Researcher, Institute for Peace Science, Hiroshima University

Abstract

The United States conducted sixty-seven nuclear tests in total at Bikini and Enewetak Atoll in the Marshall Islands between 1946 and 1958. This article discusses the U.S. nuclear test issues in the Marshall Islands, focusing on the local people who have not been able to apply for the U.S. compensation, especially those on Ailuk Atoll. Until today, little attention has been given to these areas.

Interviews with survivors as well as declassified U.S. documents make it clear that the nuclear tests have been affecting Ailuk people, not only victims of the four atolls: Bikini, Enewetak, Rongelap and Utrik recognized by the U.S. government. It is time for us to pay greater attention to not only the four atolls but also to the other areas to remind ourselves of the real nuclear legacy of the Pacific Islands.

This paper shows how the United States has been underestimating the nuclear test effects on the Marshall Islands. In addition, this article asks not only the United States but also all of us to review the real nature of the nuclear disasters resulting.

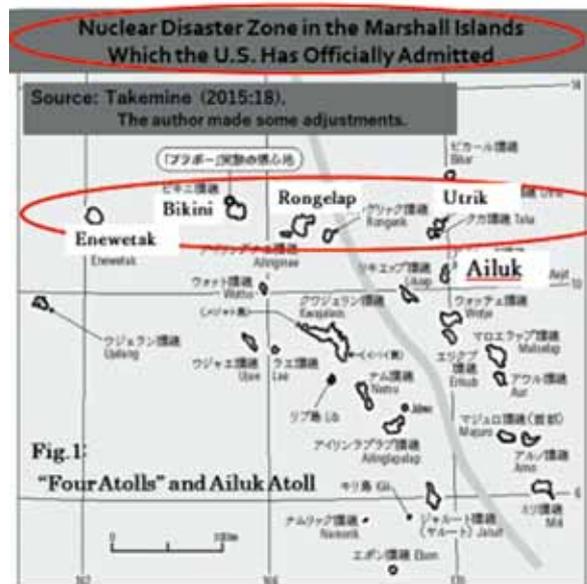
1. Introduction¹

This year, 2018, marks the 60th year since the final nuclear testing that took place in the Marshall Islands, located in the middle western part of the Pacific Ocean. Paying heed to the nuclear devastation since the wartime atomic bombing in Hiroshima and Nagasaki, this article focuses on the Marshall Islands, where the United States conducted sixty-seven tests in total at Bikini and Enewetak Atoll between 1946 and 1958. One of these tests was code named 'Bravo' in Operation Castle and took place on March 1, 1954 on Bikini Atoll in the Marshall Islands. The radioactive ash from the H-bomb explosion fell on the indigenous people as well as Japanese fishermen boats: The Fifth Lucky Dragon (*Daigo-Fukuryu-Maru*), and others².

Bikini Atoll today only reveals beautiful tropical scenery like a 'paradise,' rather than a former nuclear test site. The radioactive fallout however, continues to threaten the basis of daily life in the local communities up to now (Takemine 2015: 65-111). "None of which have faded with time. This is exacerbated by the U.S. not being honest as to the extent of radiation, and the lingering effects the U.S. Nuclear Weapons Testing Program would have on our lives, ocean and

land, and by the U.S. not willing to address the issue of adequate compensation as well as for the radiological clean-up of our islands" (Hine 2017). President of the Republic of the Marshall Islands, Hilda C. Hine remarked in 2017 on Nuclear Victims and Survivors Remembrance Day in Majuro, the capital city of the Marshall Islands.

In this speech, the president also mentioned that "The myth of only four 'exposed' atolls of Bikini, Enewetak, Rongelap and Utrik, has shaped U.S. nuclear policy on the Marshallese people since 1954, which limited medical and scientific follow up, and compensation programs" (Hine 2017).



The United States has officially admitted that nuclear test damage was incurred on four atolls only: Bikini, Enewetak, Rongelap and

¹ This paper is an expanded and revised version of a presentation delivered at Marshall Islands Nuclear Legacy Conference sponsored by Office of the President, Republic of the Marshall Islands on March 1, 2017, Majuro. Part of this work has already been presented in Japanese; Takemine (2015:113-154).

² The victims of Japanese fishermen are not limited to the crews of the Fifth Lucky Dragon. It is estimated that approximately 1,000 fishing boats and ships were exposed to the radiation as a consequence of Operation Castle, a series of nuclear tests including 'Bravo' (Kochi ken bikini suibaku hisai chousadan 2004).

Utirik (Fig.1). Other areas, such as Ailuk Atoll have been excluded from the U.S.

compensation and health care program.

This area has been forgotten not only in the U.S. but also in academia. Fieldwork to study the nuclear aftermath has not been conducted thoroughly in these unacknowledged areas. History of the U.S. Atomic Energy Commission (Hewlett and Anderson 1962; Hewlett and Duncan 1969; Hewlett and Holl 1989) and history of US nuclear testing: *Elements of Controversy* (Hacker 1994) have been published. These history books, however, do not refer at all to areas such as Ailuk Atoll.

Up to now, little attention has been given to these areas. That is why this article discusses the nuclear catastrophe focusing beyond the four atolls: Bikini, Enewetak, Rongelap and Utirik, with special attention to Ailuk Atoll, Marshall Islands.

When the full scale investigation began in 2001, there was no record of who had direct experience with the nuclear test on Ailuk. In order to begin the research, a visit to all houses to look for survivors from the test was needed. As a result of this survey, fifty three survivors were found and a total of forty-six interviews³ conducted.

The argument develops from my field research in 2001, 2004 and 2013, through which I have conducted interviews with the Ailuk survivors and other related persons in

the Marshall Islands. In addition, it analyzes official documents from the U.S. Department of Energy which has jurisdiction over nuclear development. The declassified documents are compared with the testimonies of survivors, which were exhaustively gathered through fieldwork.

Based on these materials, this paper reveals nuclear damage occurred on Ailuk Atoll. This example makes it clear that the U.S. has underestimated its nuclear legacy in the Marshall Islands. Also, this paper inquires where the nuclear disaster area is consequent to the nuclear testing. The key phrase is “invisible nuclear catastrophe.”

2. Testimonies on the Day of ‘Bravo’ Shot

The United States detonated a high yield thermonuclear weapon, code named ‘Bravo’, on a reef off Namu Island in Bikini Atoll at 6:45am on March 1, 1954. Ailuk is located 291 nautical miles (539 km) to the south east of ground zero, with 401 inhabitants on the day of the test (Clarkson and Graves 1954).

It was before sunrise when the bomb exploded. The sky was getting bright. Lajre was still sleeping at his home; but some were starting their morning routines. Joata was washing his face. Daina remembers the day

³ The forty-six interviews are translated to Japanese and stored in Takemine 2005.

“I just woke up and prepare the breakfast. Then I was shaving the copra (dried coconuts meat).” Lilla was collecting fallen leaves of breadfruit with her daughter. Lailmok was climbing and tapping a palm tree for sap called *Jagar*.

Some islanders were fishing. Lene, a then twenty-year-old man, testifies that “I went to lagoon with other three men. Early morning was the best time for fishing.” In the ocean, Mejjon was sailing by in his traditional Marshallese canoe. Some ladies were producing traditional handicrafts made of coconuts and pandanus leaves called *Amimono*. “I was weaving *Jagi* (a traditional mat made of pandanus leaves) at my house,” Rine recalls. On the islands, kids were playing. Then six-year-old girl, Nety was running around on the beach. Rosha was having fun with her friends. Some babies were in their parent’s arms.

It was a typical morning on Ailuk. The local people never knew that the United States would conduct a nuclear test on the Marshall Islands. Their peaceful morning was permanently changed by the H-bomb test ‘Bravo.’

Suddenly, “sky on western side of the island began turning red and yellow, looking like a fire. The red and yellow colors reflected in the lagoon,” Koju remembers that day.

“The red flash lights up the sky on north and western side. The color of the sea also turned to red. Then, I saw the cloud made its way up into the sky,” Mejjon points at the sky. Joata shares his surprise: “A bucket of water that I was using for washing my face was shaking. Why is the water red and yellow? I didn’t know what was happening at the moment. The ground was also shaking.”

“I heard the big sound. It had never heard before,” Cement, who was standing on the beach, explains. Then thirteen-year-old boy, Tempo was fishing at the moment. He remembers that “‘Boom’ I heard the big explosion in the lagoon. It was not only one time. Every few minutes I heard the sound and it continued around three to four more times.”

“The trees were shaking. It was like typhoon,” Lilla reports. Everything was shaking on the islands. By the blast and air pressure, “Glass windows of a church was blown off,” Lene points out the church.

Ailuk people were frightened. “Jesus Show Me the Way” riding on the Marshallese canoe, Tempo and other three men started singing gospel song asking “the help to God.” Rine rushed out from her house to look for her husband, she went searching for him. Then nine-year-old girl, Ertine says with a shy smile “my friends and I hid in my room and covered with cloth.” Stella tells that her parents instructed the kids to hide in a well.

She adds that “In Japanese times, my parents had an experience to run to the well during World War II.”

“What is going on?” the Atoll was in turmoil. Nobody knew what it was. Endy observes that “the war started again? I thought that the war was already ended, but.” Only ten years had passed since the end of the Pacific War in the islands, so some people were reminded of that time by the big sound.

From the flash over the sky, Jato recalled “at first, I thought that it was a beautiful rainbow. But soon, I realized it was not.” Some even foreboding “the end of the world finally came.” Christianity had already been widespread in Ailuk. The people believed the famous quote from the Bible, “the bright light coming from the east is seen even in the west; so will be the coming of the Son of man,” which is a signal of the termination of the world.

A few days later, almost all the survivors mention that “big American ships came to the islands.” Biem explains, describing the size of the ship with his hands, that “I had never seen such a large ship. The ship had big guns. I was very scared.” Kodama saw with her eyes the “big ship” approaching to Ailuk; she was so frightened that she hid under a tree. The large ship convinced people that another “war started again.” And people were getting more and more terrified.

From this “big ship,” Americans landed on Ailuk. After that, Temple observed

“Americans started to distribute candies, chocolates, and chewing gum to kids.” Candies kept kids engaged and excited. On the other hands, most adults were gathering around a church and watching a conversation between magistrate Typhoon and an American officer. The translator was Lan Lakapun who is from Jalut Atoll, Marshall Islands.

Neiwin remembers that “the American officer told that ‘Ailuk is contaminated.’” In addition, Jato notes that “the American told us we came here to evacuate people.” However, “the magistrate responded, ‘The islands are not destroyed. There is no problem,’” Pero adds. One survivor, Daina, explains that “he did not want us to leave the island.” No one would object to the avoidance of evacuation plans. “I felt good when I heard the news. I did not want to leave Ailuk,” Neiwin stating her feeling at that time.

The United State did not secure a place for evacuation, and thus the locals continued to stay on the island. Yet evacuations took place in nearby Rongelap and Utrik atolls.

Even though the Ailuk people were not evacuated, some local people testify that “Americans warned our representative not to use rainwater.” Rilong adds that “My father was magistrate and he told my family to ‘throw away the water from the catchment and do not use it.’”

3. The US Official Recorded Fallout on Ailuk, but...

How did the United States officially recognize the radiation exposure to the Ailuk people after the 'Bravo' shot? The U.S. Joint Tasks Force Seven mobilized the army, navy and air force, Atomic Energy Committee, and scientists to conduct the nuclear test. On the following day of the test, The Joint Task Force sent a research group from the U.S. military base in Kwajalein Atoll, Marshall Islands by aircraft, named *ABLE*, in order to monitor the radiation (Clarkson and Graves 1954).

Based on the survey, Joint Task Force Seven grasped the fact that 'Bravo' radioactive fallout fell not only on Bikini, Rongelap and Utrik but also on Ailuk Atoll. Richard A. House, a chief officer for radiation monitoring recorded fallout on Ailuk in the report titled "Discussion of Off-Site Fallout" (House 1954a). In this document, the chief officer indicated the interesting points as described below:

"the only other populated atolls which received fallout of any consequence at all was Ailuk. ABLE Pattern indicated 95 mr per hour at 1845 hrs, 2 March. Based upon the best estimate of fallout time it was calculated that a dose to infinite time would reach approximately 20 roentgens" (House 1954a).

That is to say, U.S. Joint Task Force Seven found Ailuk Atoll also "received fallout of some consequence" in the days following the nuclear test. It calculated a dose "reaching approximately 20 roentgens", meaning 200 millisievert. This radioactivity level extends as high as 10 times of a standard which the Japanese government obliged evacuation people regarding to the contaminated area around Fukushima (Imanaka 2014).

There is no doubt that the Ailuk people were exposed to radiation from the nuclear test 'Bravo.' However, keep in mind that the "20 roentgens" represents only external exposure. It must be considered that the local people received internal exposure as well, which is difficult to express numerically.

When did the radiation fallout reach to Ailuk? Joint Task Force Seven Headquarters recorded a Memorandum for record subjected "BRAVO Shot, Operation CASTLE" on 12 April, 1954 (Clarkson and Graves 1954). This record consists of a remarkable appendix titled "tabulation of time of arrival date" which shows radiation fallout arrival times in each area of the Marshall Islands including Ailuk Atoll. According to the list, fallout reached Ailuk 27.1 hours after the detonation. Namely, Ailuk people were exposed to radioactive fallout before 10:00am on the next day after the Bravo shot.

The U.S. official documentation states that "Ailuk people were exposed to fallout of

some consequence.” However, on the other hand, the survivors I have interviewed do not tell much about the ‘powder’ which exposed Rongelap people and The Lucky Dragon crews make reference.

I asked the survivors directly, whether they had seen the powder. Some people answer, “Yes, I saw the powder.” Kanji explains in detail “we found the powder on the leaf of coconuts in the western part in Ailuk (main island of Ailuk Atoll). The color was yellow.” Rosha replies “powder? I saw it on the ground. The powder looked either orange or yellow color.” On the other hand, not all survivors witnessed the powder. Some of them do not remember the ‘powder.’ Lene answers “No, I did not see anything like a powder.” Cement replies “I didn’t see the powder, but I heard the story.”

Did the powder really fall on Ailuk Atoll? On Rongelap Atoll, the powder fell on the ground like snow and piled up all over the islands (Congress of Micronesia 1973: 81-82). Meanwhile, on Ailuk, it seems that the radioactive debris mainly became a mist that fell to the ground. That was similar to neighbor islands, Utrik Atoll⁴ where the United States admitted the effect of nuclear tests. Also, it is expected that a few parts of Ailuk Atoll were slightly covered with the powder.

⁴ After the ‘Bravo’ shot, in Utrik Atoll, the radioactive debris became a mist and fell to the ground (Maeda 1978: 58-59).

Radioactive debris actually reached Ailuk. However, for survivors, it is quite difficult to recognize the fallout because the local people cannot sense the radiation and had no idea how to detect fallout in their surroundings.

As Kanji testified, some adults warned kids not to get close to the mysterious powder. On the other hand, “the powder was colorful. I thought it is good to put the color for my handicraft making,” Rise tells. The powder was radioactive fallout, but it looked “beautiful” in her eyes. Ailuk people were exposed to fallout without noticing the radioactivity.

4. Cancelled Evacuation Plan for Ailuk People

As noted above, the local people testify that “the U.S. big ship came to Ailuk.” Is this “big ship” identified in the U.S. official documentation? The U.S. Joint Task Force Seven kept records about the “big ship” stopping at Ailuk after the ‘Bravo’ shot. This is the memorandum in Joint Task Force Seven Headquarters from Major R. D. Crea to Commander, Joint Task Force Seven, subjected “Report on Soil and Water

Sampling Mission” on 8 March, 1954 (Crea 1954).

Based upon this document, it is clear that what the local people described as a “big ship” is the U.S. destroyer ship named “*Renshaw*”. This memorandum also identifies the name of the translator “Lan Lakapun.” The name also fits in with the testimonies.

According to the official record, the details of the “big ship” are as follows (Crea 1954): The U.S. Joint Task Force Seven assigned a special research group on the USS Renshaw (DOE499) from Kwajalein to Likiep Atoll, Jemo Island, Ailuk Atoll and Mejit Island. The U.S. ship reached to Ailuk at approximately 1600M, on March 6, 1954, five days after the Bravo shot. The landing party moved ashore by whaleboat and obtained water and soil samples. Readings with the MX showed approximately 3 mr/hr (off the 2 mr scale). An An/PDR-27E showed a high reading of 7 mr/hr, however, on a different scale a reading of 12 or 15 mr/hr was obtained. The MX-5 reading is probably closest to accurate. No significant variation was detected on bare feet or clothing of individuals. Samples and readings were taken at approximately 1700, March 6, 1954.

The above documentation confirms that a U.S. ship came to Ailuk. Meanwhile, there is currently no record of what the U.S. representative told to the magistrate. However, there is a remarkable note on a U.S.

government document about the evacuation on Ailuk, to which the local people testified, as mentioned before.

The title is “Radsafe Narrative Sequence of Events” written by Richard A. House, chief officer of radiation monitoring (House 1954b). This note is attached to a memorandum of Joint Task Force Seven’s Headquarter office on 12 April, 1954, written by Alvin C. Graves, Scientific Director and P.W. Clarkson, Major General, U.S. Army Commander.

In this documentation, Richard A. House mention that “With the decision to evacuate Utirik made [...], the status of Ailuk was put up for consideration. This atoll has a population of 401” (House 1954b). The record shows that the United States planned to evacuate the Ailuk people after the nuclear test. However, they did not take any action to evacuate after all. It was quite different from the neighboring Rongelap and Utrik people.

Why were the Ailuk people left on the contaminated island? The U.S. chief officer of radiation monitoring explains “The infinity dose was determined at less than 20 r., i.e., less than the minimum standard used by the task force for its sampling aircraft crews” (House 1954b). He also stated in another document that “Balancing the effort required to move the 400 inhabitants against the fact that such a dose would not be a medical

problem it was decided not to evacuate the atoll” (House 1954a).

About the decision, Dr. Tetsuji Imanaka, Kyoto University, Japan major in atomic physics concerned about the late radiation effects that appear many years after irradiation in Ailuk. The independence scientist pointed out “This standard 20 roentgen was set to avoid acute radiation syndromes that appear only after receiving a large amount of radiation. [...] (However,) From the current standard to protect long-term effects of radiation, that the Ailuk people had to evacuate as soon as possible after the contamination was found by the Bravo test” (Imanaka 2014).

For the reason why evacuations were not carried out, the islanders whispered that “401 persons on Ailuk has the large population compared to 157 persons on Utrik.” A wife of then magistrate Neiwn testifies that: “American asked about a population of Ailuk to my husband and he answered. Then, by two-way radio American told commander ‘the population is 401’. After a while, the commander said ‘the population is too big. Do not bring them.’” The population who were evacuated after the ‘Bravo’ test was 82 on Rongelap and 154 on Utrik meanwhile the inhabitation on Ailuk was 401⁵.

⁵ About the population at the time of the ‘Bravo’ shot in 1954, see Craves and Clarkson 1954.

The Government of Republic of the Marshall Islands points out an integral dose to the Ailuk people comparing with the Utrik people who were evacuated in a petition to the Congress of the United States. “it is most reasonable to conclude that the airborne activity levels in the cloud passing over Ailuk were similar if not identical to that of Utrik. Moreover, because the people of Ailuk were not evacuated, the duration of exposure was, therefore, longer (essentially to “infinity”) and would have resulted in individual doses well in excess of doses received by individuals on Utrik” (RMI 2000: Appendix I-2).

5. People Observed the “Abnormal Circumstances”

More than six decades have passed since the nuclear test ‘Bravo’. In Ailuk, Marshallese canoes and free and easy living surrounded by beautiful emerald lagoons. The landscape of the atoll looks far removed from the effects of the nuclear test. However, the nuclear catastrophe has been gradually recognized through survivor’s testimony.

Almost all survivors think that Ailuk was affected by “the bomb” based on their experiences. “The bomb changed our islands and destroyed our life,” Telio contemplates

the nuclear issues. Lene also feels that “The bomb destroyed everything. No good.”

Why have the Ailuk people realized that they suffer from the nuclear test, even though, the catastrophe was unseen at the time of the testing? “We saw strange animals and plants,” “we had not seen this before” most survivors explain. People started to notice something unusual happening on this atoll.

A main source of their diet, arrowroot, was significantly decreased. This made local people think about the effect of the test. “It used to be that there is a plenty of arrowroots everywhere in our islands. After the Bomb, it almost disappeared” Kaju says. Cement remembers “When I came back to Ailuk in 1964, arrowroots was decreasing. People were wondering where were the arrowroots.” Today, it is not easy to find arrowroots.

Another important plant, the “palm tree is also affected by the bomb” the survivors also tell, because they saw something unusual in this tree. Normally, a palm tree grows one straight branch. However, “we started to see the palm tree that it spreads by two branches,” Neti testifies. Tempo remembers “I also saw the trees that it spread by three branches. In around 1959, I found the strange tree in remote island, Ailuk. When I open coconuts, surprisingly, there was no meat and juice.”

Besides the arrowroot and palm tree, Ailuk people also mentioned the abnormal

conditions of other local foods such as breadfruits and Pandanus boninensis.

Not only the plants but also “animals were by the nuclear test.” Trsusila says “I saw the abnormal pig.” “We saw a pig that having both male and female reproductive organs,” Kaju said surprised. Stela also mentions “I saw a dog with three legs, a pig with only one ball, and a chicken with one wing.” Telio believes that “our livestock such as chicken and pig are also poisoned. I am sure that the bomb created these animals, I can’t think about any other reasons.”

Some women also speak about the miscarriage and stillbirth rates on this islands. Daina tells her experience: “I delivered the first baby in 1955, but the baby looked like in human condition. My second baby had physical handicap, one of his leg was short. Now he lives in Jalut Atoll, Marshall Islands, he cannot walk smoothly.” A fetus and a mother are connected by the mother’s umbilical cord which delivers nutrition and oxygen from the mother. However, Stella remembers that “a baby on this island was born without an umbilical cord and a head of the baby is directly connected to placenta. The other abnormal baby was born like the turtle eggs.”

“One of my son had a birth defect. He had a twin brother, but soon after one was stopped breathing”, “Maybe, it effects of the bomb,” Lain says. In 2001, the remaining son became

16 years old, but he stays in his bed all the time except when he needs to eat. “Church people visit him to pray about four times a year,” Lain explains. “I have never taken him to a hospital in Majuro (capital city). It might be good idea to see a doctor in Hawaii, but can the doctor cure his conditions?” Lain wonders. Lain is the only health aid in Ailuk (At the time of 2001), but he cannot provide anything for his son.

“After the bomb, many sicknesses appeared in Ailuk,” describes Nerai. An old man, Ritok describes “people got new diseases.” What are these “many sicknesses” and “new diseases” that they talk about?

Most of the people mention thyroid abnormalities which is common among the local people. Cement says that “I am the first patient of thyroid problem in Ailuk.” He tells in detail: “in 1979, when I got a sick and went to the doctor in Majuro (capital city), I was diagnosed with thyroid tumor. After that I was sent to a US Army hospital in Hawaii, Tripler Army Medical Center Hospital and received an operation. I was in the hospital for four months. The doctor asked me ‘did you have an experience of the Bravo test?’ I received the scanning and X-ray examination, but nobody told me about the result.”

Thyroid abnormalities occur also among the residents who were born after the ‘Bravo’ shot in 1954. Japanese doctors, Tetsuya Takahashi, Keisei Fujimori and others

conducted the thyroid survey in the Marshall Islands including Ailuk. The report summarizes as follows: “7172 Marshallese were examined, 4762 of whom were alive at the time of the A-bomb testing in the Marshall Islands.”; “The frequency of benign thyroid nodules and of thyroid cancer in the general population throughout the Marshall Islands appears to be high.”; “continuation of thyroid cancer surveillance, examinations of Marshallese who are not yet participants, and medical treatment, as necessary and where possible” (Takahashi et al. 2001: XV, XVI). Jepe, who was born in 1956, two years after the test, tells that “the Japanese doctor found my thyroid problem. I’m scared now.”

Many Ailuk people realize that the nuclear test causes the cancer on the island. Rine says “I lost my husband in 1972 and one of my daughter in 1988. Both of them had a cancer.” Ready speaks out that “Ailuk has problems of thyroid and cancer. Ailuk needs a medical doctor.” Cancer was not a common illness before the nuclear test, such a word doesn’t exist in their local language. To become cancer, however, is not unusual anymore on this island.

People had several symptoms but they don’t know a specific name for their illness. During this interview, some people showed their lump and asked “why this happen?” Koju explains that “I have a bowl size lump.

It was getting big. Sometimes, I feel pain.” Endy says that “after the bomb, I developed a lump. It was cut off in 1997.” The residents firmly believe that the nuclear test also caused the lumps. And not a small number of people believe that the nuclear test brought diabetes and high blood pressures to this island, because “these sicknesses were not here before the test,” Nimits comments.

As described above, Ailuk people started to see several strange things in their everyday life after the test. This is when they started to realize the effects of the nuclear test on Ailuk.

It was not just a bomb. “The bomb has plenty of ‘poison,’” Endy describes the radiation with the word ‘poison.’ A word for ‘radiation’ doesn’t exist in the Marshallese language. In their local language, the word for poison is ‘*kadek*.’ However, when the local people talk about the nuclear testing, they do not use the word ‘*kadek*,’ and borrow the English word ‘poison’. The meaning of ‘*kadek*’ expresses only a condition of mind and body such as fish poisoning and alcoholic intoxication. After the nuclear testing they realized a new threat. Their original word ‘*kadek*’ was insufficient in describing the serious effects on human bodies and environments. Eventually the word ‘poison’ became synonymous with this new threat, radiation.

Mejjon expresses his concern that from the local food, “I ate ‘poison’ all the time on this island.” When first exposed to the nuclear test, “we didn’t know nothing about the ‘poison.’ American did not explain about the ‘poison’. But we know now that the ‘poison’ was spread out in our islands,” Biem notes. Ailuk people see their invisible fallout damages based on their experience with the word ‘poison.’

However, ‘these abnormal circumstances’ which the local people testify to have not been properly recorded. They did not have the tools to record their circumstances at the time. The U.S. officials neglected to monitor what had been happening on Ailuk after the test. In addition, the suffering of the people has been ignored by researchers and journalists. ‘These abnormal circumstances’ remain only in their memory.

6. Unrealized Health Care and Monitoring Program

As they started to identify the invisible radiation, the Ailuk people grew aware their rights had increased for demanding compensation from the United State. Jato asks that “America should compensate us.” Trsusila requests to return their land to the original state by saying “please remove the ‘poison.’ we need the help from America.”

Nerai stresses his desire, “Give us our health back, our life and our island like we had before. I truly love Ailuk.”

Some people wish every person could come to Ailuk to see their situation. Lilla wants “America to come to our islands and think about us.” Mata demands that “the bomb destroyed many things. Please come to Ailuk and listen about our story.” Biem hopes that “America should send us a doctor and pay the compensation to help our health.”

However, that doesn't mean Ailuk people are always criticizing the United States directly. They tend to understate their feelings, but their incisive comments sometimes appear in their testimony. Ema asks a simple question “why did America tested the bomb on our islands? America has ‘big islands’ (territory) and but why did they come to our ‘small islands?’” Tane points out that “America treated us like pig. They did not think Marshallese are human-being, so they didn't care about us.”

As noted above, Ailuk people started to raise awareness that we should receive compensation from the United State. However, it had been rare for them to raise the radiation issues to the outside by 2004. At the same time, outsiders do make an effort to hear the voices of survivors but they had not given much consideration to Ailuk.

Since the middle of the 1990s, 40 years after the ‘Bravo’ test, fallout on Ailuk is finally

recognized by the local newspaper and the Marshall Islands government. In February 1995, Then Ambassador to the United States, Wilfred I. Kendall testified at the Advisory Committee on Human Radiation Experiments under the U.S. Clinton Administration as following: “Ailuk, Likiep and populations from every atoll in the country are experiencing radiation-linked illnesses as a result of the weapons testing program. (However,) The United States Government has always led us to believe that only four atolls were exposed to radioactive fall-out” (Kendall 1995).

Following the statement, “Amb. Kendall to U.S.: The forgotten atolls need help” the only newspaper of the Marshall Islands, *Marshall Islands Journal* reported on the front page on February 24, 1995. After that the newspaper covers the follow-up “What about Ailuk?” on September 29, 2000 and “AILUK SAFE?” on the front page on April 13, 2001.

In September 2000, the Republic of the Marshall Islands government submitted to the United States Congress a Petition to push forward a formal request for additional compensation for personal injuries, property damages and medical care programs (RMI 2000).

The Petition is based upon the provision ‘changed circumstances’ pursuant to Article IX of the nuclear claims settlement agreement under the section 177 Agreement of the

Compact of Free Association enacted in 1986⁶. In the article IX, “changed circumstance” provides possible additional compensation to the Marshall Islands, if loss or damages to persons or property arose or were discovered that could not reasonably have been identified as of the effective date of the agreement, and if such injuries rendered the provisions of the Compact “manifestly inadequate.”

The petition argues that “new and additional” information since the enactment of the Compact; such as a wider extent of radioactive fallout than previously known and disclosed scientific or historical findings, which constituted “changed circumstances” (RMI 2000). Then the president of the Marshall Islands, Kessai H. Note asserted that “What might have been acknowledged by the Government of the United States in 1983 as ‘damages resulting from the Nuclear Testing program’ is only a small portion of what such injuries and damages are now known to be” (RMI 2000:6). The former president of the Marshall Islands also pointed out that “the terms of Section 177 represent a political determined settlement rather than either a good faith assessment of personal injury or property claims” (RMI 2000:2).

As part of the agenda, the Government of the Marshall Islands brought to the table the nuclear issues in Ailuk to the United States in

the petition. It requests, “there is critical need to include Ailuk under the health care program [...]. Under the Agreement, these programs are currently restricted to persons of Bikini, Enewetak, Rongelap, and Utrik” (RMI 2000: Attachment II-5).

In 2002, the Congress of the United States transmitted the request of the Republic of the Marshall Islands to the U.S. President for evaluation by the appropriate agencies. Then, in November 2004, the Bush Administration released “Report Evaluating the Request of the Government of the Republic of the Marshall Islands Presented to the Congress of the United States of America” (U.S. Department of State 2004).

The Bush Administration set out a position that the Congress of the United States should reject any consideration of additional funding beyond the \$150 million fund provided as part of a ‘full and final’ settlement agreed to in the section 177 Agreement of the Compact of Free Association. Marshall Islands pointed out that fallout exposure spread to a far wider area of the Marshall Islands than the northerly atolls in the petition. However, the U.S. report asserts: “the weight of expert scientific evidence indicates that the present impact of radioactive fallout on the Marshall Islands

⁶ Regarding to the full text of the section 177 Agreement of the Compact of Free Association, See;

Marshall Islands. Committee on Political Education 1983: 145-165.

is limited to the more northerly atolls and islands” (U.S. Department of State 2004).

However, the Bush Administration did not conduct any field investigation. The report also had some inconsistencies with official documentations they themselves had written.

For instance, an official document shows that U.S. officials considered responding to the fallout problem on Ailuk which the Bush administration denied. The document title is “Increased DOE responsibilities in the Marshall Islands” (Wachholz 1980)⁷. Who wrote this paper? Marshallese. No, a US official in the Department of Energy made this report.

According to the document (Wachholz 1980), the U.S. Department of Energy examined the following health care program:

1. Provide general medical care to the people of Rongelap, Utrik, Bikini, and Enewetak in addition to examination and treatment, if necessary, for radiation related diseases.
2. Include atolls in addition to those identified above (e.g. Likiep, Wotje, Ailuk, Mejit). It says that “The inclusion of island, and a medical survey of additional people was estimated the people of at approximately \$750,000 for every 200 persons added to the program (e.g., Enewetak-\$1.7M; Likiep-\$2.3M; Wotje-\$1.3M; Ailuk-\$1.6M; Mejit-\$1,3M)”. In

brief, for Ailuk people, the Department of Energy planned to introduce a medical follow up program from 1983.

In addition, regarding the environmental monitoring, the U.S. official notes that “radiological surveys, research programs and dose assessments need to be continued indefinitely at Bikini and Enewetak, and expanded” (Wachholz 1980). Then, the Department of Energy planned to start the environmental monitoring program on Ailuk from 1985.

This document date is on Jan 22, 1980, when Marshall Islands negotiated Compact of Free Association with the United State about compensation for the nuclear tests. Its author, Bruce W. Wachholz, at the Office of Environment, Department of Energy was one of the negotiators on behalf of the United States.

In Section 177 of Compact of Free Association undersigned in 1982 and ratified in 1986, “The Government of the United States accepts responsibility for compensation owing to citizens of the Marshall Islands [...] for loss or damage to property and person of the citizens of the Marshall Islands [...] resulting from the nuclear testing program.”

⁷ Another official internal documents which Bruce W. Wachhloz; Department of Energy sent to M. J. Cifrino; Department of Defense on Oct 17, 1979 is also important (Wachholz 1978). In the

documentation, Bruce W. Wachhloz estimated cost about the medical care program to Likiep; 600 persons \$2.3M, Wotje; 340 persons \$1.3M, Ailuk; 430 persons \$1.6M, Mejit; 350 persons \$1.3M.

The United States recognized responsibility, but only for four atolls; Bikini, Enewetak, Rongelap and Utrik; and set the provision on “full settlement of all claims” with providing the sum of \$150 million in the agreement of section 177 of the Compact of Free Association⁸.

It drew a boundary, removing Ailuk. Ailuk atoll was separated from neighboring Utrik atoll and excluded from the U.S. compensation. The Department of Energy’s plan which provides health care and conducting environmental monitoring for people in Ailuk vanished in smoke.

7. Should Transfer Nuclear Disaster Fallout Map

In the negotiation for compensation, on behalf of the Marshall Islands, Carles T. Domnick stressed that “the people of all other atolls of the Marshall Islands are entitled to the medical care provided for in the statute. We find no statutory basis for discriminating between people of these

atolls”; “we insist that all other Marshallese from ‘exposed’ atolls must be accorded that same consideration” (Domnick 1980).

On the other hand, during this negotiation, the representative of the United States repeatedly said that nuclear-affected areas were only the “four” atolls. However, a negotiator on behalf of the Marshall Islands, Tony DeBrum feels the frustration that “The choice to sign the 177 agreement was based on faulty, sometimes outright duplicitous information”(DeBrum 2017).

A U.S. official documentation titled “Atolls Upon Which Significant Nuclear Fallout Could Have Occurred From The Pacific Proving Grounds During Atmospheric Testing” suggests that the nuclear fallout was extending to Ailuk and other areas beside the four atolls (“Atolls Upon Which Significant Nuclear Fallout ...” 1973). The documentation date is June 22, 1973 which was before the negotiation of the compensation. It is not clear who wrote the documentation, but the U.S. Department of Energy owns this document.

⁸ See the full text of the section 177 Agreement of the Compact of Free Association (Marshall Islands. Committee on Political Education 1983: 145-165).

TABLE 1. POSSIBLE SIGNIFICANT NUCLEAR FALLOUT FROM PACIFIC PROVING GROUNDS, SUSPECTED ATOLLS

EVENT	ATOLL	BLACK = POSITIVE	RED = POSSIBLE
SANDSTONE ZEBRA 5/48	ENIWETOK, BIKINI, AILINGINAE, RONGELAP, RONGERIK, TAKA, BIKAR, UTIRIK		
GREENHOUSE DOG 4/51	ENIWETOK, UJELANG		
GREENHOUSE GEORGE 6/51	ENIWETOK, BIKINI, AILINGINAE, RONGELAP, RONGERIK		
IVY KING 11/52	ENIWETOK, UJELANG, *		
CASTLE BRAVO 2/54	BIKINI, AILINGINAE, RONGELAP, RONGERIK, TAKA, BIKAR, AILUK , LIKIEP, JEMO, UTIRIK, WOTHO, KWAJALEIN, WOTJE		
CASTLE UNION 4/54	BIKINI, AILINGINAE, RONGELAP, RONGERIK, TAKA, BIKAR, TAONGI, UTIRIK		
CASTLE YANKEE 6/54	BIKINI, AILINGINAE, RONGELAP, RONGERIK, BIKAR, TAONGI		
REDWING ZUNI 5/56	BIKINI, AILINGINAE, RONGELAP, RONGERIK		
REDWING IACROSS 5/56	ENIWETOK, BIKINI, AILINGINAE, RONGELAP, RONGERIK, BIKAR, TAONGI		
HARDTACK MAGNOLIA 5/58	ENIWETOK, UJELANG, *		
HARDTACK MAPLE 6/58	BIKINI, AILINGINAE, RONGELAP, RONGERIK, WOTHO, UJAE, LAE, KWAJALEIN		

* This hodograph indicated that the fallout pattern could have extended southwest as far as Ponape and other nearby atolls.

The author made some adjustments

In the documentation, Table 1 shows suspected atolls of possible significant nuclear fallout for some nuclear testing in the Marshall Islands ("Atolls Upon Which Significant Nuclear Fallout ..." 1973). In this table, if we look at "CASTLE BRAVO" which means the 'Bravo' test in operation castle, 1954, as many as 13 atolls lists as suspected atolls of possible significant nuclear fallout. In short, this table suggests that the fallout disaster areas are not only the four atolls where the United States accepts the responsibility resulting from the nuclear tests, but also Ailuk and the wider areas.

Out of 67 nuclear tests, the United States claimed only 'Bravo' test led to any significant fallout. Table 1, however, shows the other tests could also potentially cause

radiation exposure to the local people. In addition, the table notes that "the fallout pattern could have extended southwest as far as Ponape and other nearby areas" ("Atolls Upon Which Significant Nuclear Fallout ..." 1973). In brief, the significant fallout has stretched beyond the current national borders to the neighboring countries of the Marshall Islands. It is debatable that this documentation, marked "DRAFT," discusses only the "possibility" of significant fallout. However, if we look at another U.S. official report, it clearly shows the expanding of the nuclear disaster to Ailuk and other areas.

For instance, this report "Radioactive Debris from Operation Castle: Islands of the Mid-Pacific" is written by Alfred J. Breslin and Melvin E. Cassidy of the United States

TABLE 2
CUMULATIVE DOSES BY EVENT AND LOCATION
(Finite Dose to Next Event)-mr

<u>EVENT</u>	<u>BRAVO</u>	<u>ROMEO</u>	<u>KOON</u>	<u>UNION</u>	<u>YANKEE</u>	<u>NECTAR</u>	<u>TOTAL</u>
Days between events	26	11	19	9	9	10	
<u>Aerial Monitoring</u>							
Lae	5.5	12	12	7.5	78	95	125
Ujae	6	32	17	9.5	48	1.4	114
Wotho	250	270	110	55	95	4	784
Ailinginae	60000*	3400	3300	8	600	70	67000
Rongelap	180000*	11000	6000	3400	1700	300	202000
Rongerik	190000*	9000	5000	550	1400	280	206000
Taongi	280	60	9.5	10	10	-	370
Bikar	60000*	3000	1200	650	1700	150	67000
Utirik	22000*	1200	700	100	330	50	24000
Taka	15000*	800	1000	120	380	50	17000
Ailuk	5000	410	110	100	500	20	6140
Jemo	1200	410	130	18	200	20	1978
Likiep	1700	170	80	30	200	16	2196
Nam	1.8	90	100	0	25	0	216
Ailinglapalap	7.2	140	100	8	0	0	255
Namorik	20	160	70	2	0	0	252
Ebon	20	250	50	8	25	0	353
Kili	20	200	70	0	0	1.3	291
Jaluit	20	300	70	8	0	2.6	401
Mili	60	160	200	20	0	1.3	441
Arno	60	200	300	8	25	1.3	594
Majuro	200	200	50	20	0	1.3	471
Aur	40	200	50	8	40	2.6	341
Maldlap	350	120	50	0	25	4.0	549
Erikab	390	200	50	0	0	6.5	647
Wotja	1300	300	200	13	220	10	2543

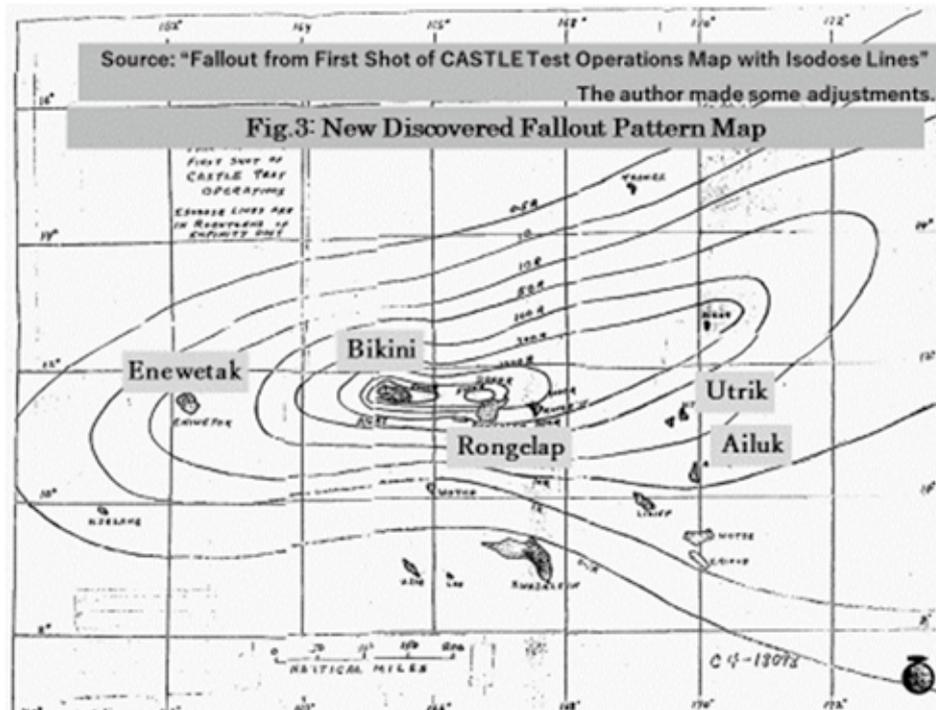
*Based on arrival estimated from Rongerik data.

Atomic Energy Commission, Health and Safety Laboratory (Breslin and Cassidy 1955). Published January 18, 1955, during the time tests were being conducted, this document, however, had been classified while Marshall Islands and the United States negotiated the compensation for nuclear damages. This document was finally declassified in 1994.

One of the highlights of this document is Table 2 "Cumulative Doses by Event and Location" (Breslin and Cassidy 1955: 37). It summarizes dates of the radiological fallout in each atoll in the Marshall Islands, including 'Bravo' shot on March 1, 1954. In

this table, if we look at Ailuk, the cumulative dose is 5000 mr from 'Bravo' test and the total dose of the Castle series is 6140 mr. This diagram also justifies the expanding radioactive fallout to the whole Marshall Islands.

As described earlier, the significant fallout consequence of the testing was never limited within the four atolls: Bikini, Enewetak, Rongelap and Utirik. Until today, however, spreading fallout was explaining by using a cigar-shaped map which omitted to expand fallout to Ailuk and other areas (Fig.2).



explain the nuclear issues in the Marshall Islands. However, there are significant nuclear issues also in Ailuk and other areas that lie outside of this cigar-shaped map. That is to say that this fallout map cannot represent the whole picture of the nuclear catastrophe in the Marshall Islands.

"The U.S. had different maps of nuclear fallout, but conveniently choose to release only this map" (Takahashi 2012:188), A Japanese historian, Dr. Hiroko Takahashi pointed out in her book.

The Marshall Islands government as well as Dr. Takahashi et al. discovered a new fallout map from a declassified U.S. document ("Fallout from First Shot of CASTLE Test Operations Map with Isodose Lines"). This alternative map covers the radiological fallout spread certainly to Ailuk and other wider areas(Fig.3).

Use of the cigar-shaped fallout map (Fig.2) renders the Ailuk nuclear catastrophe 'invisible', further limiting their options. This map, which has been in use for so long should be replaced with this, newly discovered less deceptive one(Fig.3).

At the national ceremony for nuclear victims and Remembrance Day in 2004, not only the designated four atolls people, but also the other people were given an opportunity to deliver a speech. Senator for Ailuk, Maynard Alfred's remarks focused on their islands "in remembrance of the overlooked victims of Bravo Shot" (Alfred 2004). At the beginning, he stated the following: "On this occasion of the 50th anniversary of the Bravo Shot, I wish to dedicate my statement to all nuclear victims, and most especially the victims of the Bravo Shot who have been overlooked, those

whose plight for justice have not been heard” (Alfred 2004).

However, on behalf of the United States, Ambassador Greta N. Morris made a speech at the beginning that “I want to express my sincerest appreciation to the people of the Marshall Islands for their contribution to the protection of the Free World during the Cold War era through the nuclear testing program”; “This tremendous contribution is something in which all Marshallese people should take pride” (Morris 2004). The United States replaced nuclear catastrophe with ‘contribution to security’.

In addition, the U.S. ambassador stated that “the United States deeply regrets the hardships the peoples of the four atolls have endured as a result of the testing program, as well as the accidental downwind injuries caused by one test” (Morris 2004). The representative of the U.S. mentioned, as usual, only one test and the four atolls.

8. Conclusion

On Aug, 2013, I visited Ailuk, having not been to the Atolls in the past nine years. Cancer, unknown diseases, stillbirths and so forth, radioactive fallout continues to threaten

the basis of daily life in local communities even up to now.

Just before I revisited Ailuk in 2013, Line who served as Health aid for Ailuk people, passed away from liver cancer at an age of 57. His birth was just five months after the ‘Bravo’ test, namely he was exposed in his mother’s womb on Ailuk.

Menaja, who was born nine months after the ‘Bravo’ shot, says that “I have the thyroid diseases. When Japanese doctors came to Ailuk, they found my problem.” Showing me a medical certificate from the Japanese doctor dated on January 19, 1997, Menaja expresses his concern: “I felt that my thyroid problem is getting worse. But I did not have medicine and I did not know where to go, who to ask. No doctor comes to Ailuk.”

On the other hand, I would state that it was more difficult for me to see the nuclear catastrophe of Ailuk. When I conducted house surveys on the main island of Ailuk in 2001, I found that fifty-three people had experienced the ‘Bravo’ test on Ailuk. However, in 2013, when I counted again, the number reduced to only one-third, or seventeen.

“I am exposed, but Ailuk has been neglected in the past 50 years. The United States, the United States [...] Why do you ignore me?”, publicly decried the forgotten people in Majuro, capital city of the Marshall Islands, on March 1, 2004 or the 50th commemoration day of the ‘Bravo’ nuclear test.

An Ailuk people who participated in the demonstration told that “I was born and grew up in Ailuk eating local food. So I feel that the experience of the nuclear test is stabbing me with a knife.”

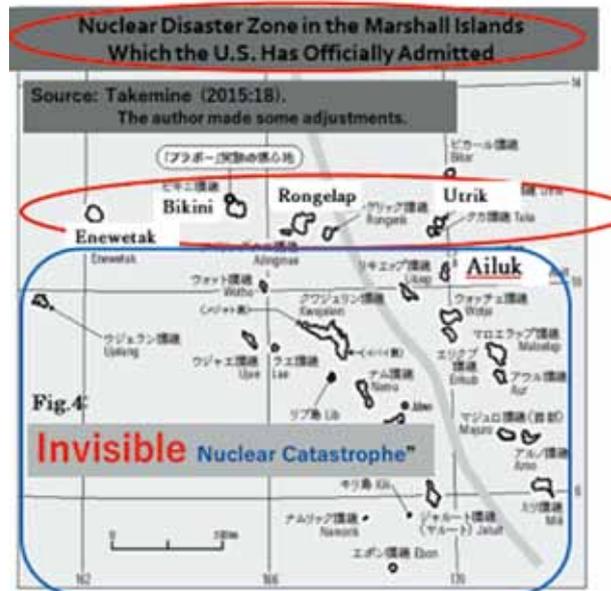
On March 1, 2014, a decade later, Nuclear Victims and Survivors Remembrance Day events took place again in Majuro. However, Ailuk people did not say anything publically. They were silent even on the 60th commemoration day of the ‘Bravo’ nuclear detonation. One of the Ailuk survivors expressed his feeling, “We have talked about our experiences and asked for compensation, but it has not made any difference.”

This article discussed the U.S. nuclear test issues in the Marshall Islands, focusing on the local people who have not been able to apply for the U.S. compensation, especially to Ailuk. Interviews with survivors as well as declassified U.S. documents make it clear that the nuclear tests have been affecting Ailuk people, not only the four atolls recognized by the U.S. government.

The nuclear catastrophe is almost invisible. Radioactivity is an invisible substance, so the nuclear legacy is often neglected and hidden. In an interview with the author in 2014, Tony DeBrum, an eye-witness to the nuclear testing in a “overlooked atoll”, Likiep, next to Ailuk atoll the and former Minister of Foreign Affairs in the Marshall Islands pointed out with nuclear

disasters to “deny, lie and classify. It is nuclear culture. It is repeated in Fukushima”.

Drawing lines among the four atolls and excluding Ailuk is not based on scientific data. These lines of four atolls are created politically. Please keep in mind that the lines of the four atolls; Bikini, Enewetak, Rongelap and Utririk make the nuclear catastrophe invisible(Fig.4).



It is time for us to pay greater attention not only to the four atolls but also to the other areas to remind ourselves of the real nuclear legacy of the Marshall Islands.

The findings should not be understood as an issue on just one isolated island. This paper argues that the United States has been underestimating the nuclear test effects on the Marshall Islands. In addition, this article asks not only the United States but also all of us to review the real nature of the nuclear disasters.

This research could not have been completed without steady efforts of Mr. Tempo Alfred as well as cooperation of a large number of Ailuk people. Tempo welcomed me as a host family in Ailuk. Tempo and I worked together to look for survivors from the test and took interviews from them in Ailuk. A heartbreaking news jumped in me immediately after writing this article. Mr. Tempo Alfred has just passed away on March 2, 2018. You are always in my heart. Tempo, our project is not over. Komoll tata, Rest in peace.

References

1. Testimonies of Ailuk People (only who has cited this paper):

As an expression of my gratitude towards to Ailuk people who told me their experiences, I would like to acknowledge the name here.

Biem: Born in 1924. Interview several times in Jan 2001 and on Jun 13, 2001 in Ailuk. (the deceased)

Cement: Born in 1938. Interview on July 1, 2001 in Ailuk and on July 10, 2001 in Majuro. (the deceased)

Daina: Born in 1936. Interview on Jun 14 in Ailuk. (the deceased)

Endy: Born in 1924. Interview on Jan 31 and Jun 15, 2001 in Ailuk. (the deceased)

Ertine: Born in 1944. Interview on Jun 14, 2001 in Ailuk.

Jato: Born in 1937. Interview on Jun 27, 2001 in Ailuk. (the deceased)

Jepe: Born in 1956. Interview several times in 2001 and 2004 in Ailuk and 2013 in Majuro.

Joata: Born in 1930. Interview in May 2001 in Majuro. (the deceased)

Kanji: Born in 1938. Interview on Jun 23, 2001 in Ailuk.

Kodama: Born in 1942. Interview on Jun 4, 2001 in Ailuk. (the deceased)

Koju: Born in 1932. Interview on Jan 31 and Jun 29, 2001 in Ailuk. (the deceased)

Lailmok: Born in 1935. Interview on Jun 23 in Ailuk. (the deceased)

Lain: Born in 1954. Interview several times in 2001 and 2004 in Ailuk. (the deceased)

Lajre: Born in 1944. Interview on Feb 7 in Ailuk. (the deceased)

Lene: Born in 1933. Interview on Jan 29, May 29 and May 30, 2001 in Ailuk. (the deceased)

Lilla: Born in 1927. Interview on Feb 1, 2001 in Ailuk. (the deceased)

Mata: Born in 1936. Interview on Jan 31 and Jun 15 in Ailuk. (the deceased)

Menaja: Born in 1954. Interview on Aug 13, 2013 in Ailuk.

Mejjon: Born in 1936. Interview on Jan 30, 2001 in Ailuk and Aug, 2013 in Majuro.

Neiwin: Born in 1917. Interview on July 12 and 17, 2001 in Majuro. (the deceased)

Nerai: Born in 1952. Interview on Jun 27, 2001 and Aug 10 and 12, 2013 in Ailuk.

Nety: Born in 1947. Interview on Jun 16, 2001 in Ailuk.

Nimits: Born in 1948. Interview on Jun 28, 2001 in Ailuk.

Pero: Born in 1920. Interview on Jan 30 and Jun 18, 2001 in Ailuk. (the deceased)

Ready: Born in 1948. Interview on Feb 6 and 7, 2001 in Majuro.

Rilong: Born in 1942. Interview on Feb 1 and Jun 28, 2001 in Ailuk. (the deceased)

Rine: Born in 1927. Interview on Feb 9, 2001 and several times in May and Jun, 2001 in Ailuk.

Rise: Born in 1939. Interview on Feb 5 and Jun 28, 2001 in Ailuk. Moved to the U.S.

Rosha: Born in 1944. Interview on Jun 23, 2001 in Ailuk. (the deceased)

Ritok: Born in unknown, probably 1920s to 1930s. Interview on Jan 30 and Jun 5, 2001 in Ailuk.

Stella: Born in 1947. Interview on Jun 6, 2001 in Ailuk. Moved to the U.S.

Tane: Born in 1945. Interview several times in Jun 2001, Ailuk. (the deceased)

Telio: Born in 1941. Interview on Jun 4, 2001 in Ailuk. (the deceased)

Tempo: Born in 1941. Interview on Jun 26, 2001 in Ailuk and many times in 2001, 2004 and 2013 in Ailuk and Majuro. (the deceased)

Trsusila: Born in 1948. Interview on Jun 28, 2001 in Ailuk.

2. Archival Sources:

AEC: The United States Atomic Energy Commission. 1955. "Press Release, Report on The Effects of High-Yield Nuclear Explosions". Feb 15. DOE OpenNet, Accession Number: NV0403293.

"Atolls Upon Which Significant Nuclear Fallout Could Have Occurred from The Pacific Proving Grounds During Atmospheric Testing." 1973 Jun 22. DOE OpenNet, Accession Number: NV0410289.

Breslin, Alfred J. and Melvin E. Cassidy. 1955. "Radioactive Debris from Operation Castle: Islands of the Mid-Pacific." January 18. DOE OpenNet, Accession Number: NV0410411.

Crea, R. D. 1954. "Letter to Commander JTF7, Subject: Report on Soil And Water Sampling Mission." Mar 8. DOE OpenNet, Accession Number: NV0410413.

Domnick, Charles T. 1980. Letter from to Wallace O. Green. August 8 in Wacholz, Bruce W. U.S. Department of Energy Memorandum. Subject: Health Care Program for the Marshall Islands.

- Aug 19. DOE OpenNet, Accession Number: NV0402869.
- “Fallout from First Shot of CASTLE Test Operations Map with Isodose Lines.” DOE OpenNet, Accession Number: NV0410222.
- Graves, A. C. and P. W. Clarkson. 1954. “Memorandum for Record, Subject: Bravo Shot, Operation Castle.” April 12. DOE OpenNet, Accession Number: NV0410202.
- House, Richard A. 1954a. “Discussion of Off-Site Fallout” included “Memorandum for Record, Subject: Bravo Shot, Operation Castle.” April 12. DOE OpenNet, Accession Number: NV0410202.
- _____. 1954b. “Radsafe, Narrative Sequence of Events” included “Memorandum for Record, Subject: Bravo Shot, Operation Castle.” April 12, DOE OpenNet, Accession Number: NV0410202.
- Wachholz, B. W. 1978. Letter to M. J. Cifrino, Subject: Long Range Plans and Costs in Pacific. Oct 17. DOE OpenNet, Accession Number: NV0402854.
- _____. 1980. “Increased DOE responsibilities in the Marshall Islands.” Jan 22, DOE OpenNet, Accession Number: NV0402855.
- 3. Secondary Literature:**
- Alfred, Maynard. 2004. “Statement for Nuclear Victims Remembrance Day: In remembrance of the overlooked victims of Bravo Shot.” March 1, Majuro.
- Congress of Micronesia. 1973. *A report on the people of Rongelap and Utirik relative to medical aspects of the March 1, 1954 incident injury, examination and treatment.* Saipan.
- DeBrum, Tony. 2017. “Keynote address at nuclear legacy conference.” March 1, Majuro.
- Glasstone, Samuel and Phillip J. Dolan. 1977. *The Effects of Nuclear Weapons.* Third Edition. United States Department of Defense and the United States Department of Energy. Washington D.C.
- Hacker, Barton C. 1994. *Elements of Controversy: The Atomic Energy Commission and Radiation Safety in Nuclear Weapons Testing 1947-1974.* University of California Press.
- Hewlett, Richard G. and Oscar E. Anderson. 1962. *The New World, 1939-1946.* Pennsylvania State University Press.
- Hewlett, Richard G. and Francis Duncan. 1969. *Atomic Shield, 1947-1952.* Pennsylvania State University Press.
- Hewlett, Richard G. and Jack M. Holl. 1989. *Atoms for Peace and War, 1953-1961: Eisenhower and the Atomic Energy Commission.* University of California Press.
- Hine, Hilda C. 2017. “63rd Nuclear Victims Remembrance Day Keynote Remarks.” March 1, Majuro.

- Imanaka, Tetsuji. 2014. "Letter to Senator Maynard Alfred." September 22.
- Kendall, Wilfred I. 1995. "Public Comments at Advisory Committee on Human Radiation Experiments Public Meeting." February 15, Washington, D.C.
- Kochi ken bikini suibaku hisai chousadan. 2004. *Mou hitotsu no Bikini Jiken*. Tokyo: Heiwa Bunka. (Japanese)
- Morris, Greta N. 2004. "The 50th Anniversary of the Bravo Test Remarks by U.S. Ambassador Greta N. Morris." March 1, Majuro.
- RMI: Republic of the Marshall Islands. 2000. *Petition: Presented to the Congress of the U.S.A. Regarding Changed Circumstances Arising from U.S. Nuclear Testing in the Marshall Islands*. September 11, Majuro.
- Takahashi, Hiroko. 2012. *Fuuin sareta Hiroshima/Nagasaki*. Tokyo: Gaifusha. (Japanese)
- Takahashi, Tatsuya, Klaus R. Trott, Keisei Fujimori et al. 2001. *Thyroid Disease in the Marshall Islands: Findings from 10 Years of Study*. Sendai: Tohoku University Press.
- Takemine, Seiichiro. 2005. *Marshall Syoto Ailuk Kansyo min no Hibaku Shougen syuu*. Hiroshima: Hiroshima Daigaku Hiroshima Heiwakagaku Konsoshiamu. (Japanese)
- _____. 2015: *Marshall Syoto Owarinaki Kakuhigai wo Ikiru*. Tokyo: Shinsen sha. (Japanese)
- U.S. Department of State. 2004. Report Evaluating the Request of the Government of the Republic of the Marshall Islands Presented to the Congress of the United States of America. November, Washington, DC.
- Maeda, Tetsuo. 1978. *Kakusareta hibaku: Marshall guntoumin no 23 nen*, Tokyo:Gensuikin. (Japanese)
- Marshall Islands. Committee on Political Education. 1983. *Compact of Free Association and Related Agreements between the Republic of the Marshall Islands and the United States of America*, Majuro: Marshall Islands Journal.

*This research was supported by JSPS KAKENHI Grant Numbers JP26760013 and 16H03694.