



INITIAL SCOPING MEETING RECOMMENDED READINGS

Please review the materials below prior to our meeting. Our Marshallese point of contact at the RMI NNC kindly shared some of these documents for our gathering, **so we ask that you do not further distribute these documents outside the meeting.** If you would like to cite or use them for reasons beyond the scope of our gathering, please request approval from the RMI NNC members who will be joining us during the meeting.

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QUESTIONS OR CONCERNS

Please contact Lovely Umayam (lovely@bombshelltoe.com) and Lilly Adams (lilly.ucs@gmail.com); we are open to your feedback to make this meeting a success.



U.S. DEPARTMENT OF
ENERGY

Report on the Status of the Runit Dome in the Marshall Islands

Report to Congress
June 2020

United States Department of Energy
Washington, DC 20585

Message from the Secretary

The Department of Energy (DOE) is committed to fulfilling the United States' commitments to the health and safety of the people of the Marshall Islands from the effects of the nuclear weapons testing conducted in the past.

This is the DOE Report to Congress regarding the status of the Runit Dome in the Marshall Islands, as outlined in Section 364 of Public Law 116-92, *National Defense Authorization Act for Fiscal Year 2020*.

Pursuant to statutory requirements, this report is being provided to the following members of Congress:

- **The Honorable James Inhofe**
Chairman, Senate Committee on Armed Services
- **The Honorable Jack Reed**
Ranking Member, Senate Committee on Armed Services
- **The Honorable Deb Fischer**
Chairman, Subcommittee on Strategic Forces
Senate Committee on Armed Services
- **The Honorable Martin Heinrich**
Ranking Member, Subcommittee on Strategic Forces
Senate Committee on Armed Services
- **The Honorable Adam Smith**
Chairman, House Committee on Armed Services
- **The Honorable William "Mac" Thornberry**
Ranking Member, House Committee on Armed Services
- **The Honorable Jim Cooper**
Chairman, Subcommittee on Strategic Forces
House Committee on Armed Services
- **The Honorable Michael Turner**
Ranking Member, Subcommittee on Strategic Forces
House Committee on Armed Services

If you have any questions or need additional information, please contact me or Mr. Shawn Affolter, Deputy Assistant Secretary for Senate Affairs, or Mr. Christopher Morris, Deputy Assistant Secretary for House Affairs, Office of Congressional and Intergovernmental Affairs, at (202) 586-5450.

Sincerely,

A handwritten signature in black ink, appearing to read "Dan Brouillette". The signature is fluid and cursive, with the first name "Dan" being particularly prominent.

Dan Brouillette

Executive Summary

This is the United States (U.S.) Department of Energy (Department or DOE) Report to Congress regarding the status of the Runit Dome (also known as the Cactus Crater containment structure) in the Marshall Islands. The report includes a brief background regarding the Runit Dome and addresses the Matters for Inclusion outlined in Section 364 of Public Law 116-92, *National Defense Authorization Act for Fiscal Year 2020*.

The Runit Dome is a containment structure on Runit Island, located on Enewetak Atoll. Enewetak Atoll is a former U.S. atmospheric nuclear weapons test site located in the Republic of the Marshall Islands, approximately 2,300 miles west of Hawaii in the northwest Pacific Ocean. In 1947, prior to the start of nuclear weapons testing on Enewetak, the approximately 150 residents of Enewetak Atoll were relocated to Ujelang Atoll, approximately 155 miles southwest of Enewetak. The people of Enewetak returned to their ancestral homeland in 1980 following an extensive cleanup and rehabilitation program; however, Runit Island has remained uninhabited. The containment structure, built in the late 1970s, contains over 100,000 cubic yards of radioactively contaminated soil and debris that were encapsulated in concrete (waste pile) inside an unlined nuclear test crater, the Cactus Crater, on the north end of Runit Island. The waste pile was subsequently covered over by a non-load bearing, exterior concrete cap to help protect it from natural erosion. The site has remained a concern to the people of Enewetak and their leadership.

The overall conclusions of this report are:

- The Runit Dome is not in any immediate danger of collapse or failure, and the exterior concrete covering the containment structure is still serving its intended purpose, effectively reducing the wind and water erosion of the waste pile below.
- The main risk posed by the dome will be derived from the flow of contaminated groundwater from beneath the containment structure into the local marine environment. To date, there are no data to suggest that the dome, or more specifically, the radioactive material encapsulated within the containment structure, is currently having a measurable adverse effect on the surrounding environment, or is expected to have any adverse effect on the environment in 5, 10, or 20 years. However, DOE is in the process of establishing a groundwater radiochemical analysis program that is designed to provide scientifically substantiated data that can be used to determine what, if any, effects the dome contents are having, or will have, on the surrounding environment now and in the future.
- Individual radiological protection monitoring data collected from the Department's Marshall Islands Program indicate that radiation dose rates to individuals on Enewetak from internal exposure to fallout radionuclides are well below international standards for radiological protection of the public; i.e., 100 millirem (mrem) per year. There is no

evidence to suggest that the containment structure represents a significant source of radiation exposure relative to other sources of residual radioactive fallout contamination on the atoll.

- The most notable and immediate impact of rising sea levels on the Cactus Crater containment structure is that associated with the physical effects of storm surge and wave-driven flooding. DOE's proposed groundwater radiochemical analysis program is designed to provide some understanding of possible effects of forcing events, such as storm surge, on changes in groundwater quality. It is anticipated that any measured or modeled effects of storm events may help provide a better understanding of the long-term consequences of sea level rise on the mass-transport of dome-derived radionuclides into the environment.
- The Department is in continual communication with the Government and people of the Marshall Islands regarding activities associated with the Runit Dome, as detailed further in this report.

DOE remains committed to fulfilling the United States' commitments regarding the health and safety of the people of the Marshall Islands from the effects of past nuclear weapons testing. This report contains assessments and summaries of environmental and health-related data collected by DOE and its predecessor organizations. Additional detail may be found in the published documents listed in the References and Suggested Reading section of this report, which are available upon request from the Department through the Office of Environment, Health, Safety and Security.



STATUS OF THE RUNIT DOME IN THE MARSHALL ISLANDS

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I. Legislative Language

Section 364 of Public Law 116-92, *National Defense Authorization Act for Fiscal Year 2020* states:

SEC. 364. REPORT ON RUNIT DOME.

(a) REPORT REQUIRED. — Not later than 180 days after the date of the enactment of this Act, the Secretary of Energy shall submit to the Committees on Armed Services of the Senate and House of Representatives a report on the status of the Runit Dome in the Marshall Islands.

(b) MATTERS FOR INCLUSION. — The report required by subsection (a) shall include each of the following:

- (1) A detailed plan to repair the dome to ensure that it does not have any harmful effects to the local population, environment, or wildlife, including the projected costs of implementing such plan.
- (2) The effects on the environment that the dome has currently and is projected to have in 5 years, 10 years, and 20 years.
- (3) An assessment of the current condition of the outer constructs of the dome.
- (4) An assessment of the current and long-term safety to local humans posed by the site.
- (5) An assessment of how rising sea levels might affect the dome.
- (6) A summary of interactions between the Government of the United States and the Government of the Marshall Islands about the dome.

(c) FORM OF REPORT. — The report required by subsection (a) shall be submitted in unclassified form and made publicly available.

II. Introduction

This is the United States (U.S.) Department of Energy (Department or DOE) Report to Congress regarding the status of the Runit Dome (also known as the Cactus Crater containment structure) in the Marshall Islands. The report includes a brief background regarding the location, origin, and construction of the Runit Dome, and addresses the Matters for Inclusion outlined in Section 364 of Public Law (P.L.) 116-92, *National Defense Authorization Act for Fiscal Year 2020*.

The Runit Dome is a containment structure on Runit Island, located on Enewetak Atoll. Enewetak Atoll is a former U.S. atmospheric nuclear weapons test site located in the Republic of the Marshall Islands (RMI), approximately 2,300 miles west of Hawaii in the northwest Pacific Ocean (see Appendix). In 1947, prior to the start of nuclear weapons testing on Enewetak, the

approximately 150 residents of Enewetak Atoll were relocated to Ujelang Atoll, approximately 155 miles southwest of Enewetak. The people of Enewetak returned to their ancestral homeland in 1980, following an extensive cleanup and rehabilitation program. However, the Defense Nuclear Agency, DOE, Department of the Interior, and the people of Enewetak determined that Runit Island should remain indefinitely quarantined due to the possibility of subsurface levels of plutonium, and in 1980, high-chief (Iroij) Johannes Peter announced that Runit Island was henceforth “off-limits” (DNA, 1981). Runit Island has remained uninhabited to the present day.

The Runit Dome is approximately 114 meters (374 feet) in diameter, has an apex of 7.4 meters (24.3 feet), and contains over 100,000 cubic yards of radiologically contaminated soil and debris that were collected and encapsulated in concrete (waste pile) inside an unlined nuclear test crater, the Cactus Crater, on the north end of Runit Island.

Between 1946 and 1958, the U.S. conducted 67 atmospheric nuclear weapons tests in the Marshall Islands, 43 of which were conducted at Enewetak Atoll. Radioactive fallout from these tests resulted in environmental contamination. Key fallout radionuclides remaining in the environment include the fission products cesium-137 (^{137}Cs) and strontium-90 (^{90}Sr), as well as alpha-emitting plutonium (Pu) isotopes (e.g., ^{239}Pu , ^{240}Pu), and americium-241 (^{241}Am). Of these radionuclides, ^{137}Cs is the largest contributor to radiation doses. ^{137}Cs , with a physical half-life of 30 years, emits gamma radiation that poses a hazard through external exposure or when inhaled or ingested. Indeed, ^{137}Cs in the soil is the largest contributor to external radiation dose in the Marshall Islands, and consumption of ^{137}Cs contained in locally grown foods is the largest contributor to the internal dose. The isotopes ^{239}Pu , with a half-life of 24,000 years, and ^{240}Pu , with a half-life of 6,560 years, emit alpha particles that pose a hazard when inhaled or ingested. The main pathway for exposure to Pu in the northern Marshall Islands is the inhalation of contaminated dust particles that are suspended into the air during operations that disrupt contaminated soil. Also, radioactive debris deposited in lagoon sediments formed a reservoir and potential long-term source for remobilization and transfer of Pu through the marine food chain. However, the individual radiological protection monitoring data collected from the Department’s Marshall Islands Program, as discussed in Section III of this report, indicate that radiation dose rates on Enewetak from internal exposure to fallout radionuclides are well below international standards for radiological protection of the public; i.e., 100 millirem (mrem) per year.

In the mid to late 1970s, the U.S. conducted cleanup operations at the Enewetak Atoll by stripping off successive layers of contaminated soil to reduce the level of Pu in surface soils. The waste soil and other radiologically contaminated debris were mixed with cement grout, placed inside the crater formed from the Cactus nuclear weapons test, and covered with a circular, dome-shaped concrete cap to help protect the waste pile below from natural erosion (DNA, 1981). The sum of transuranic (TRU) elements, e.g., Pu isotopes and ^{241}Am , of contaminated soil placed inside the crater was estimated to be approximately 545 giga Becquerel [GBq] (DNA, 1981), or about 0.8 percent of the total TRU inventory found in

Enewetak lagoon sediment (Noshkin et al., 1980). Construction of the containment structure was completed in 1979.

The Runit Dome consists of three design elements (Hamilton, 2013, see Appendix):

- A keywall, consisting of 99 concrete sections, 0.62 meters (24.4 inches) thick, resting on bedrock, designed to prevent scouring and undercutting of the containment structure ;
- A waste pile, consisting of radiologically contaminated soil mixed with concrete and other encapsulation agents, and other contaminated debris, structural steel, and concrete; and
- A cap, composed of 357 trapezoidal-shaped concrete panels, 0.45 meters (17.7 inches) thick, designed to protect the encapsulated material from erosion.

The site has remained a concern to the people of Enewetak and their leadership. After the construction of the Runit Dome, the United States was required to monitor the containment structure under the United Nations' Trusteeship of the Marshall Islands. Visual surveys were conducted in June and December 1982, June 1983, and January 1984.

In 1986, Congress passed P.L. 99–239, *Compact of Free Association Act of 1985*, which, among other things, required the U.S. and the Government of the Marshall Islands to enter a separate agreement that would come into effect simultaneously with the Compact. In that agreement, among other things, the U.S. agreed to provide dosimetry and bioassay services and related assistance to the people of the Marshall Islands, and the Government of the Marshall Islands assumed responsibility for, and control of, the utilization of areas in the Marshall Islands affected by the nuclear testing program, thereby ending the U.S. role and responsibility for the Runit Dome.

In 2012, Congress passed P.L. 112-149, *Insular Areas Act of 2011*, which amended the *Compact of Free Association Amendments Act of 2003* by assigning Cactus Crater containment monitoring and reporting requirements to the Secretary of Energy (Secretary). Effective January 1, 2012, the Secretary was required to “periodically (but not less frequently than every 4 years) conduct -- (I) a visual study of the concrete exterior of the Cactus Crater containment structure on Runit Island; and (II) a radiochemical analysis of the groundwater surrounding and in the Cactus Crater containment structure on Runit Island.” 48 U.S.C. 1921b(f)(1)(B)(i). The Secretary was also directed to submit to Congress a report describing the results of each visual survey and the radiochemical analysis and “a determination on whether the surveys and analyses indicate any significant change in the health risks to the people of Enewetak from the contaminants within the Cactus Crater containment structure.” 48 U.S.C. 1921b(f)(1)(B)(ii)(II).

DOE completed visual surveys of the concrete exterior of the Cactus Crater containment structure in 2013 (Hamilton 2013) and 2018 (scheduled to be published in calendar year 2020). The results from these surveys are used in addressing some of the Matters for Inclusion in the next section of this report.

The radiochemical analysis of groundwater as stipulated in the *Insular Areas Act of 2011* requires having access to suitable groundwater sampling wells. DOE has developed plans to drill and install a series of groundwater monitoring wells within and surrounding the Runit Dome. This phase of the project is presently on hold in response to international travel restrictions imposed as a result of the Covid-19 pandemic.

III. Runit Dome Status

This section provides responses to each of the Matters for Inclusion outlined in Section 364 of P.L. 116-92, *National Defense Authorization Act for Fiscal Year 2020*. Additional details may be found in the published documents listed in the References and Suggested Reading section of this report, which may be obtained upon request from the Department through the Office of Environment, Health, Safety and Security.

1. Detailed plan to repair the dome to ensure that it does not have any harmful effects to the local population, environment, or wildlife, including the projected costs of implementing such plan.

Based on historical data and results from recent surveys, the exterior concrete covering the Cactus Crater containment structure is still serving its intended purpose, effectively reducing natural erosion of the waste pile below. The dome is not in any immediate danger of collapse or failure.

Visual surveys as recently as 2018 found that although some cracks, chipping, and spalling of the concrete cap were evident, the exterior concrete contained in the cap appears to be providing an effective and erosion resistant seal for the encapsulated radioactive material within the containment structure. The observed cracks and spalls do not form sites for external or internal radiation exposure that impact or endanger human health, the environment, or wildlife. Nonetheless, DOE has performed preventative maintenance on exterior surfaces of the containment structure to aid in determining whether any changes are occurring between visual surveys and to address public perception about possible deterioration of the concrete. Non-destructive and destructive testing of concrete cores collected from the cap show the strength properties of the concrete remain strong (Hamilton 2020b, 2020c).

DOE believes that no further maintenance of the dome is required at this time beyond conducting periodic preventative maintenance of the exterior concrete and eradication of rooting vines infiltrating the voids between concrete cap segments. Results from the groundwater monitoring program will ultimately be used to make an informed decision about management of the site. In the interim, DOE will continue to provide preventative maintenance of the external concrete.

2. Effects on the environment that the dome has currently and is projected to have in 5 years, 10 years, and 20 years.

There are no data to suggest that the dome, or more specifically, the radioactive material encapsulated within the containment structure, is currently having a measurable adverse effect on the surrounding environment or is expected to have any adverse effect on the environment in 5, 10, or 20 years. However, DOE is in the process of establishing a groundwater radiochemical analysis program that is designed to provide scientifically substantiated data that can be used to determine what, if any, effects the dome contents are having, or will have, on the surrounding environment now and in the future.

The key pathway for exposure to radioactive materials contained in the Cactus Crater containment structure is from leakage of contaminated groundwater entering the local marine environment, and the subsequent uptake of dome derived fallout contamination into the marine food chain.

DOE recently re-established two borehole locations, one in an area outside the containment structure and one in the containment structure, drilled by the National Academy of Sciences in 1980. Although water depth sensor data from the boreholes indicate that groundwater level inside the containment structure rises and falls with changes in the ocean tide, limited radiochemical analysis of water samples collected from the boreholes, the nearshore lagoon, and the open ocean indicate that, in general, levels of fallout contamination in the dome groundwater far exceed those observed in open ocean waters from across the Marshall Islands. The same is true in comparing the level of ¹³⁷Cs and iodine-129 (¹²⁹I) contamination in dome groundwater with that observed in Enewetak lagoon waters. This is not true for Pu isotopes. Similar levels of Pu contamination have been observed in the dome groundwater and the lagoon waters. This can be explained by the fact that there is over 100 times more Pu as TRU contamination freely available in the lagoon sediments compared with that stabilized in the containment structure as a concrete-encased, contaminated-soil mixture (67,800 GBq vs. 545 GBq, respectively). Consequently, the main source of Pu in the lagoon water is from slow and continuous dissolution of sedimentary sources of Pu inside the lagoon, not from leakage of radioactive waste from the containment structure.

Isotopic analyses appear to support this view, showing that elevated levels of Pu observed in lagoon waters in the vicinity of Runit Island appear to be derived from the dissolution of sedimentary sources of Pu into solution rather than from the leakage of waste from the containment structure. As a result, any leakage of dome fallout contamination from Cactus Crater into the marine environment is difficult to distinguish from existing levels of contamination in the lagoon. This situation is not likely to change in the foreseeable future as the total amount of TRU waste (including Pu isotopes) encapsulated in Cactus Crater is dwarfed by the TRU inventory available for re-solubilization in local lagoon sediments. Moreover, the annual dissolution rate of sedimentary Pu released into the surrounding water column represents a very small fraction (<< 1 percent) of the remaining sedimentary inventory of Pu in the lagoon. Therefore, this existing source of Pu contamination in the lagoon is likely to

dominate observed distributions of Pu acquired by local marine biota for the foreseeable future.

DOE also recently analyzed banded corals. The skeletal material laid down by banded corals accumulates radionuclides, such as Pu, in proportionate amounts to the concentrations observed in the surrounding water column. Consequently, analysis of aged coral sections can provide an effective retrospective assessment tool to monitor for changes in the level of fallout contamination in the marine environment over the life history of the coral. This methodology is analogous to tracking pollutants in tree rings. Retrospective analysis of Pu in an aged coral core collected in the lagoon off the Cactus Crater containment structure clearly shows that the Pu contamination in local lagoon waters has decreased significantly since the early 1960s (Figure 1). These data provide compelling evidence that contamination in the waste pile within the Runit Dome has had, and continues to have, a negligible impact on the wider marine environment.

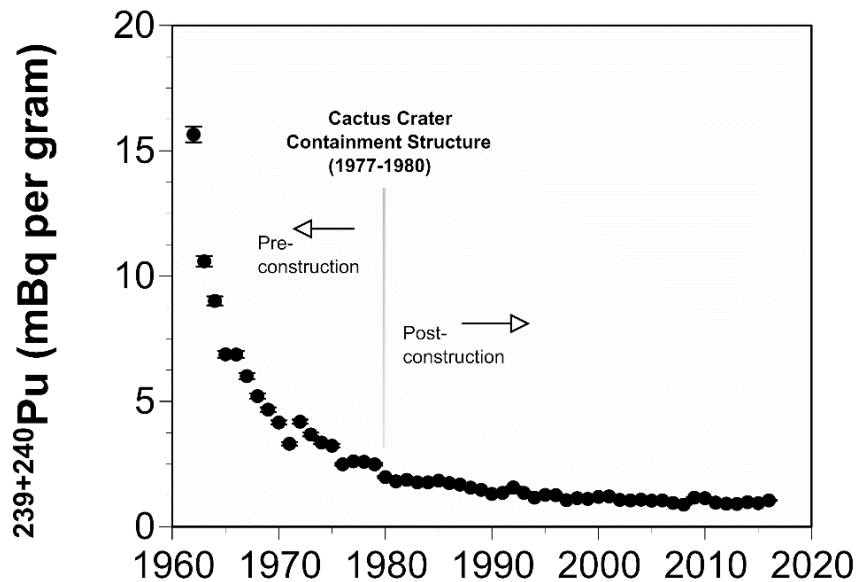


Figure 1. Analysis of Pu in a coral core sample collected in offshore water from the Runit Dome.

DOE is currently in the process of implementing the groundwater radiochemical analysis program as required by the *Insular Areas Act of 2011*. However, this phase of the project is presently on hold due to international travel restrictions. The following information describes the activities to be conducted once access to the atoll is restored.

The initial task under this project is to establish a network of groundwater monitoring boreholes surrounding and in the Cactus Crater containment structure. The flow of contaminated groundwater away from the site boundary into the marine environment will be controlled by the solubilization potential of radionuclides encapsulated in the waste pile and

local groundwater hydrology. In turn, these interactions and the mass-transport of fallout contamination will be influenced by forcing events, such as diurnal tides, storms, and periods of high rainfall. Groundwater monitoring boreholes will be strategically placed along forcing lines predicted by the direction of prevailing winds and the ocean reef break. DOE's plan is to place three well clusters in the containment structure, two well clusters around the containment structure, and one well cluster away from the containment structure as a control (identified in red, green, and grey, respectively, in Figure 2, below). This arrangement will allow for a determination of water table shape, gradient magnitude, and flow direction. Full implementation of a proposed groundwater monitoring program under the *Insular Areas Act of 2011* will enable the dynamics of these processes to be studied in a scientifically credible manner. Results stemming from these studies will then be used to develop a conceptual model of mass-transport of fallout radionuclides into the marine environment under different release scenarios. The goal is to produce a site-specific dose assessment and quantitative risk analysis that describes conditions that may affect the health status of the people of Enewetak now and in the future.

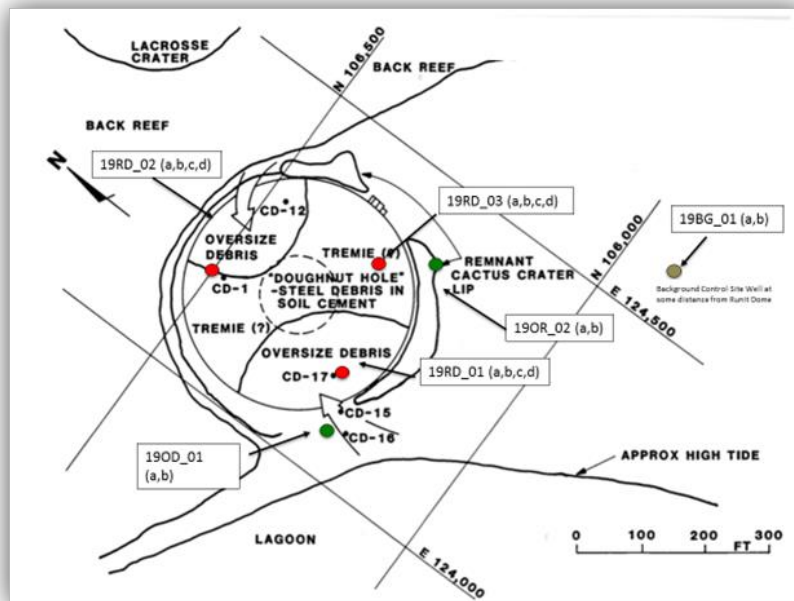


Figure 2. Schematic cross-section showing proposed locations of groundwater monitoring wells surrounding and in the Runit Dome containment structure (schematic modified after Ristvet, 1980).

3. Assessment of the current condition of the outer constructs of the dome.

As stated in response to Element 1, visual surveys and structural testing of the cap from as recently as 2018 indicate that although some superficial cracks, chipping, and spalling of the concrete are evident, the exterior concrete covering the Cactus Crater containment structure is still serving its intended purpose, effectively reducing the natural erosion of the waste pile

below by wind and water. Any concerns about the imminent failure or collapse of the structure are unfounded.

As with most concrete pads and structures, cracks often appear in aged concrete from long-term drying shrinkage. Similarly, the chipped edges and spalls observed in the concrete cap are likely caused by thermal movement of the slabs due to expansion and contraction. Both destructive and non-destructive testing of the concrete cap was recently conducted to determine the viability of placing a drill rig on the cap. Non-Destructive Testing (NDT) techniques based on Ground Penetrating Radar (GPR) for sub-grade evaluation, Impact Echo (IE) for concrete thickness and condition, and Spectral Analysis of Surface Waves (SASW) for overall concrete condition have been performed (Hamilton 2020c). These data show that the structure is not in any immediate danger of collapse or failure. The concrete cap segments are sitting in intimate contact with the encapsulated waste pile below with very few voided or poorly consolidated areas. In general, analyses of contemporary concrete core samples show that the exterior concrete remains well-cemented, appears to be properly consolidated and cured, and has satisfactory strength and binding properties. Cracks observed along the exterior portion of concrete do not appear to be adversely affecting the strength properties or overall integrity of the concrete. These data, along with compression and load capacity strength testing of the concrete, indicate that the structure can support the weight of a drilling rig and provide added confidence that the drilling and groundwater sampling borehole installation project, as required to comply with the *Insular Areas Act of 2011*, can be conducted in a safe manner.

4. Assessment of the current and long-term safety to local humans posed by the site.

Individual radiological protection monitoring data collected from the Department's Marshall Islands Program indicate that the people on Enewetak are not being exposed to levels of fallout contamination of concern to human health. There is no evidence to suggest that the containment structure represents a significant source of radiation exposure relative to other sources of residual radioactive fallout contamination on the atoll.

Over the past two decades, DOE, together with the Enewetak Ujelang Local Government (EULG), has developed a comprehensive individual radiological protection monitoring program on Enewetak Atoll, based on whole-body counting and Pu urinalysis bioassay. The Enewetak Radiological Laboratory on Enewetak Island is operated and maintained by Marshallese technicians, with scientists from Lawrence Livermore National Laboratory (LLNL) providing oversight, technical support services, and reporting (see https://marshallislands.llnl.gov/dose_report/index.php). ¹³⁷Cs is a major contributor to the manmade dose on Enewetak through consumption of local marine and terrestrial foods. While ingestion of ¹³⁷Cs from consumption of locally grown food tree crops is by far the most dominant exposure pathway, the whole-body counting program is by default also monitoring for potential dietary intakes of ¹³⁷Cs from consumption of fish and other marine foods, including those collected in the vicinity of the Cactus Crater containment structure. Similarly,

DOE has been performing periodic collections of bioassay samples on Enewetak to assess potential exposures of the local population to Pu isotopes in the environment.

The monitoring results indicate that the people of Enewetak are being adequately protected from exposure to internally deposited ^{137}Cs , and that the concentration of Pu observed in Enewetak residents is well within the normal range expected for people exposed to world-wide fallout contamination in the environment. The average annual effective dose from internally deposited ^{137}Cs in the adult male population on Enewetak over the four decades has ranged from <0.01 to about 0.05 millisievert (mSv) (<1 to 5 mrem), trending towards lower doses. The most widely accepted international standard for the protection of the public from radiation exposure is 1 mSv (100 mrem) per year above background. The population average urinary excretion rate of Pu from Enewetak residents is <1 micro Becquerel (μBq) per 24-hour void, compared with a measurement background of $\sim 0.01 \mu\text{Bq}$ observed in compatible sets of field blank samples (<https://marshallislands.llnl.gov/plutonium.php>). In general, the concentration of Pu observed in bioassay samples collected from Enewetak residents is well within the normal daily range of around 2-4 μBq expected for people exposed to worldwide fallout contamination in the northern hemisphere (NRC, 1994 and references therein). As such, there is no evidence to show that people living on Enewetak have acquired measurable quantities of Pu in their bodies above background.

Together, the individual radiological protection monitoring program based on whole-body counting and Pu bioassay show that the Enewetak population average internal dose rates from exposure to fallout radionuclides are in the range of a few mrem per year, or well below international standards for radiological protection of the public; i.e., 100 mrem per year. The continuing individual monitoring program will provide ongoing assessments of any significant changes in radiological conditions as they occur in real time, and of long-term safety to humans across Enewetak Atoll as a whole, not just that associated with the Cactus Crater containment structure. The monitoring program provides a more direct measure of human exposure to key fallout radionuclides, such as ^{137}Cs and Pu across Enewetak Atoll, independent of dietary assumptions and questions about possible leakage of radioactive waste from Cactus Crater. Results from the monitoring program show that the people on Enewetak are not being exposed to levels of fallout contamination of concern to human health.

The main safety concern to humans associated with leakage of radioactive waste from the Cactus Crater containment structure is the uptake of fallout radioactivity in marine foods. However, leakage of radioactive waste from the containment structure into the marine environment will continue to be dwarfed by the solubilization of sedimentary sources of Pu in the lagoon. While the potential does exist for contaminated dome groundwater to flow into the near-field, subsurface marine environment and possibly form highly localized contamination regimes in and around outflow points in the lagoon or on the ocean reef, any dome-derived groundwater reaching outflow points in the lagoon will be very rapidly diluted and possibly continue to be masked by local sources of marine contamination.

A full quantitative, site-specific assessment of the current and long-term risks posed by the Cactus Crater containment structure cannot be fully realized until the results of the proposed groundwater monitoring program, conducted in response to the *Insular Areas Act of 2011*, are known. The goal is to produce a site-specific dose assessment and quantitative risk analysis that describes conditions that may affect the health status of the people of Enewetak now and into the future.

5. Assessment of how rising sea levels might affect the dome.

Sea level rise is a critical concern for people living on low-lying island areas, such as the RMI. The most notable and immediate impact of rising sea levels on the Cactus Crater containment structure would be that associated with the physical effects of storm surge and wave-driven flooding.

An artificial riprap wall, which is located on the ocean-side of the containment structure and comprised of large-size quarry blast rock, rejected key wall sections, and smaller size rocks and aggregate, provides some protection of the containment structure along the ocean reef. Less protection exists on the lagoon side of the containment structure. The ocean beach front adjacent to the containment structure was inundated by a high-tide storm event in 2009 (Hamilton, 2013). Storm surge opened a sandy channel extending up from the ocean reef towards the containment structure, depositing sand, rubble, and vegetative debris over the bottom segments on the western side of the containment structure. The storm surge also filled in one of two historical groundwater sampling boreholes established on land adjacent to the containment structure with debris. Similar physical forcing events produced by strong westerly winds and high swells within the lagoon could also lead to wave-induced over-wash of lower sections of the dome.

The likely scenario of sea-level rise intensifying wave-driven flooding of the dome is consistent with effects of model simulations reported for Roi-Namur Island on Kwajalein Atoll (Storlazzi *et al.*, 2018). Any future increase in the severity and frequency of storms or other major climatic forcing events may affect local groundwater hydrology beneath the containment structure and potentially increase the flow of contaminated groundwater into the lagoon or onto the ocean reef. However, no definitive data exists on how these events might impact on the environment.

The proposed drilling and groundwater sampling installation project, in response to the *Insular Areas Act of 2011*, is designed to provide some understanding of possible effects of forcing events, such as storm surge on changes in groundwater quality. The baseline groundwater sampling program will be conducted over a period of not less than 12 to 18 months (Hamilton 2013) and involve high-resolution sampling and radiochemical analysis of groundwater every four to six weeks. Initial baseline measurements are needed to establish boundary conditions for interpreting any changes observed in water quality under the *Insular Areas Act of 2011*.

Contemporary measurements on the height of groundwater beneath the containment structure show the hydrologic system is responding to the influence of diurnal tidal cycles. The groundwater can equally be expected to respond to major short-term forcing conditions imposed by storm surge and possible flooding events. Baseline measurements encompassing at least a full seasonal cycle of climactic conditions will be used to elucidate the effects of different forcing conditions on groundwater quality and the possible mass-transport of radioactive contaminants away from the site boundary. Moreover, it is anticipated that any measured or modeled effects of storm events may help provide a better understanding of the long-term consequences of sea level rise on mass-transport of dome-derived radionuclides.

6. Summary of interactions between the Government of the United States and the Government of the Marshall Islands about the dome.

The U.S. Government, through DOE, has had many interactions with the RMI Government regarding the Runit Dome. The most frequent method of interaction between DOE and RMI officials is informal meetings scheduled in Majuro, the capital of the RMI. DOE typically requests meetings with the national (Senator) and local (Mayor) government officials from each of the four atolls (Enewetak, Bikini, Rongelap, and Utrök) prior to conducting any field activities, to provide an update on current program goals, obtain permission to access sites, and to invite the officials to participate in activities. After-action meetings are also conducted to discuss activities completed and planned. These meetings provide an opportunity for RMI officials to ask questions and share any concerns they may have with DOE. Invitations have also been extended on various occasions to staff from various government agencies, such as the Marshall Islands Marine Resources Authority (MIMRA), to participate in field missions.

The following is a summary of recent formal interactions conducted with RMI officials regarding the Runit Dome.

August 6, 2015: The U.S. Ambassador to the Marshall Islands accompanied a delegation from DOE and the RMI, led by the Science Director of the LLNL Marshall Islands Dose Assessment & Radioecology Program, to inspect the condition of the Cactus Crater containment structure in the aftermath of Tropical Storm Nangka.

August 5, 2016: The U.S. Ambassador accompanied DOE officials, including the Associate Under Secretary for Environment, Health, Safety and Security and the Director of the Office of Health and Safety, as well as the Science Director of the LLNL Marshall Islands Dose Assessment & Radioecology Program on a visit to Enewetak Island to meet with the local community and tour the whole body counting facility. The delegation also viewed the Runit Dome and Runit Island. The Mayor of Enewetak travelled with the group and RMI national government officials were also invited.

December 6, 2016: The Science Director of the LLNL Marshall Islands Dose Assessment & Radioecology Program met with the Mayor of the Enewetak Ujelang Local Government (EULG)

to discuss preliminary results of analyses of dome groundwater collected from a re-constituted borehole from inside the Runit Dome.

December 14, 2017: The Science Director of the LLNL Marshall Islands Dose Assessment & Radioecology Program provided an informal briefing for the RMI Minister-in-Assistance and the Senator from Enewetak on the Runit Dome.

October 9, 2018: The U.S. Ambassador accompanied a delegation from DOE, led by the Science Director of the LLNL Marshall Islands Dose Assessment & Radioecology Program, on a tour of the Cactus Crater containment structure to review field operations conducted in support of the *Insular Areas Act of 2011*. RMI officials were also invited.

January 14, 2019: LLNL hosted the RMI National Nuclear Commission (NNC), as well as DOE officials, the U.S. Ambassador to the Marshall Islands, and the RMI Ambassador to the United States in Livermore, California, for a forum on nuclear legacy issues in the Marshall Islands. LLNL provided presentations on the work completed and planned for the Runit Dome under the *Insular Areas Act of 2011*.

May 15-16, 2019: The Science Director of the LLNL Marshall Islands Dose Assessment & Radioecology Program offered a presentation at the 2019 DOE/RMI Annual Meeting in Majuro on the DOE monitoring activities at the Runit Dome under the *Insular Areas Act of 2011*. This meeting was attended by DOE officials, including the Associate Under Secretary for Environment, Health, Safety and Security, the U.S. Ambassador to the Marshall Islands and other officials from the U.S. Embassy, officials from the U.S. Army Garrison Kwajalein Atoll, and Representatives from the RMI national and local government. DOE also responded through the U.S. Embassy after the meeting to issues raised concerning the Runit Dome. Previous annual meetings, which are sometimes held less than annually due to scheduling conflicts, that included discussions of the Runit Dome, were held at the U.S. Army Garrison Kwajalein Atoll on October 11-12, 2017, and in Majuro on January 8-9, 2015.

July 2, 2019: DOE responded to a letter received from the RMI Minister of Justice on May 20, 2019, requesting construction of a fence around the perimeter of Runit Island. DOE indicated it was currently evaluating the request, but noted some challenges, including funding constraints, complex installation logistics, and long-term integrity and maintenance issues.

November 1, 2019: DOE officials met in Majuro with the Senator and Mayor of Enewetak Atoll. During the meeting, DOE officials provided a brief update on the drilling project planned as part of the implementation of the groundwater monitoring program for the Runit Dome.

December 3, 2019: DOE officials joined the U.S. Ambassador to the Marshall Islands for a meeting in Majuro with the RMI Minister of Foreign Affairs and Trade and staff. During the meeting, DOE officials provided an update on the activities completed and planned for the Runit Dome under the *Insular Areas Act of 2011*.

IV. Conclusion

The Runit Dome is a containment structure on Runit Island, located on Enewetak Atoll. Enewetak Atoll is a former U.S. atmospheric nuclear weapons test site located in the RMI, approximately 2,300 miles west of Hawaii in the northwest Pacific Ocean. The Runit Dome, which was built in the late 1970s, contains over 100,000 cubic yards of contaminated soil and debris that were encapsulated in concrete inside an unlined nuclear test crater, the Cactus Crater, on the north end of Runit Island. The site has remained a concern to the people of Enewetak and their leadership.

The Runit Dome is not in any immediate danger of collapse or failure, and the exterior concrete covering the containment structure is still serving its intended purpose, effectively reducing the natural erosion of the waste pile below by wind and water. Visual surveys of the exterior concrete of the Cactus Crater containment structure have revealed the presence of cracks and spalls in the concrete cap. However, these cracks and spalls in the exterior concrete cap do not form sites for external or internal radiation exposure that impact or endanger human health or the environment, or wildlife. DOE has performed preventative maintenance on exterior surfaces of the containment structure, which will aid in the determination of any changes that may occur in the condition of the concrete in the future. Any concerns about the imminent failure or collapse of the structure are unfounded.

The main safety concern to humans associated with leakage of radioactive waste from the Cactus Crater containment structure is the uptake of fallout radioactivity in marine foods. There are no data to suggest that the Cactus Crater containment structure, or more specifically, the radioactive material encapsulated in Cactus Crater, is currently having a measurable adverse effect on the surrounding environment or on the health of the people of Enewetak. However, DOE is in the process of establishing a groundwater radiochemical analysis program that is designed to provide scientifically substantiated data that can be used to determine what, if any, effects the dome contents are having, or will have, on the surrounding environment now and in the future. Long-term trends in the concentration of Pu in lagoon waters derived from retrospective analysis of a coral core collected off Runit Island show levels of Pu in lagoon waters are systematically decreasing. These data provide compelling evidence that the construction of the Runit Dome has had, and continues to have, a negligible impact on the wider marine environment.

Individual radiological protection monitoring data collected from the Department's Marshall Islands Program indicate that radiation dose rates to individuals on Enewetak from internal exposure to fallout radionuclides are well below international standards for radiological protection of the public; i.e., 100 mrem per year. There is no evidence to suggest that the containment structure represents a significant source of radiation exposure relative to other sources of residual radioactive fallout contamination on the atoll. The continuing individual monitoring program will provide ongoing assessments of any significant changes in radiological conditions as they occur in real time, and of long-term safety to humans across Enewetak Atoll

as a whole. In addition, DOE's groundwater radiochemical analysis program is intended to produce a site-specific dose assessment and quantitative risk analysis that describes conditions that may affect the health status of the people of Enewetak now and into the future.

The Cactus Crater containment structure remains vulnerable to wave driven over wash and flooding caused by storm surge and potential effects of sea level rise. DOE's groundwater radiochemical analysis program is also designed to provide some understanding of possible effects of forcing events, such as storm surge, on changes in groundwater quality. It is anticipated that any measured or modeled effects of storm events may help provide a better understanding of the long-term consequences of sea-level rise on mass-transport of dome derived radionuclides.

The Department consistently communicates with the Government and people of the Marshall Islands regarding activities associated with the Runit Dome and remains committed to maintaining this open dialogue in the future.

V. References and Suggested Reading

The following references contain additional details that support the assessments and summaries provided in this report. Additional information may be obtained upon request from the Department through the Office of Environment, Health, Safety and Security.

DNA (1980). *Fact Sheet-Enewetak Operation*, Defense Nuclear Agency (DNA), Washington D.C.

DNA (1981). *The Radiological Cleanup of Enewetak Atoll*, Defense Nuclear Agency (DNA), Washington, D.C.

DOE (1982). *Enewetak Radiological Support Project*, Final Report, NVO-213, edited by B. Friesen and Holmes & Narver, Inc., U.S. Department of Energy (DOE), Nevada Operation Office, Las Vegas, Nevada.

Hamilton, T.F. (2013). *A Visual Description of the Concrete Exterior of the Cactus Crater Containment Structure*, Report, Lawrence Livermore National Laboratory, LLNL-TR-648143.

Hamilton T.F. (2015). *LLNL Marshal Islands Program Briefing Slides*, Lawrence Livermore National Laboratory, LLNL-PRES-665899. U.S. DOE-GRMI Annual Meeting, Majuro, January 12-13, 2015.

Hamilton T.F. (2016). *Talking Points: Enewetak Ujelang (EULG) Local Government Briefing*, Lawrence Livermore National Laboratory, LLNL-PRES-713239.

Hamilton T.F. (2017). *Science Program Briefing: The Runit Dome Project, Briefing Slides*, Lawrence Livermore National Laboratory, LLNL-PRES-739333. U.S. DOE-GRMI Annual Meeting, Kwajalein Atoll, October 12-13, 2017.

Hamilton T.F. (2018). *Fact Sheet: The Runit Island Waste Containment Structure*, Lawrence Livermore National Laboratory, LLNL-BR-755391.

Hamilton, T.F. (2019a). *Science Program Briefing: Public Law 112-149 Continued Monitoring of Runit Island*, Lawrence Livermore National Laboratory, LLNL-PRES-774030. U.S. DOE-GRMI Annual Meeting, Majuro, May 15-16, 2019.

Hamilton, T.F. (2019b). *Runit Dome Drilling Animation, Public Law 112-149 Continued Monitoring of Runit Dome*, Lawrence Livermore National Laboratory, LLNL-PRES-776890.

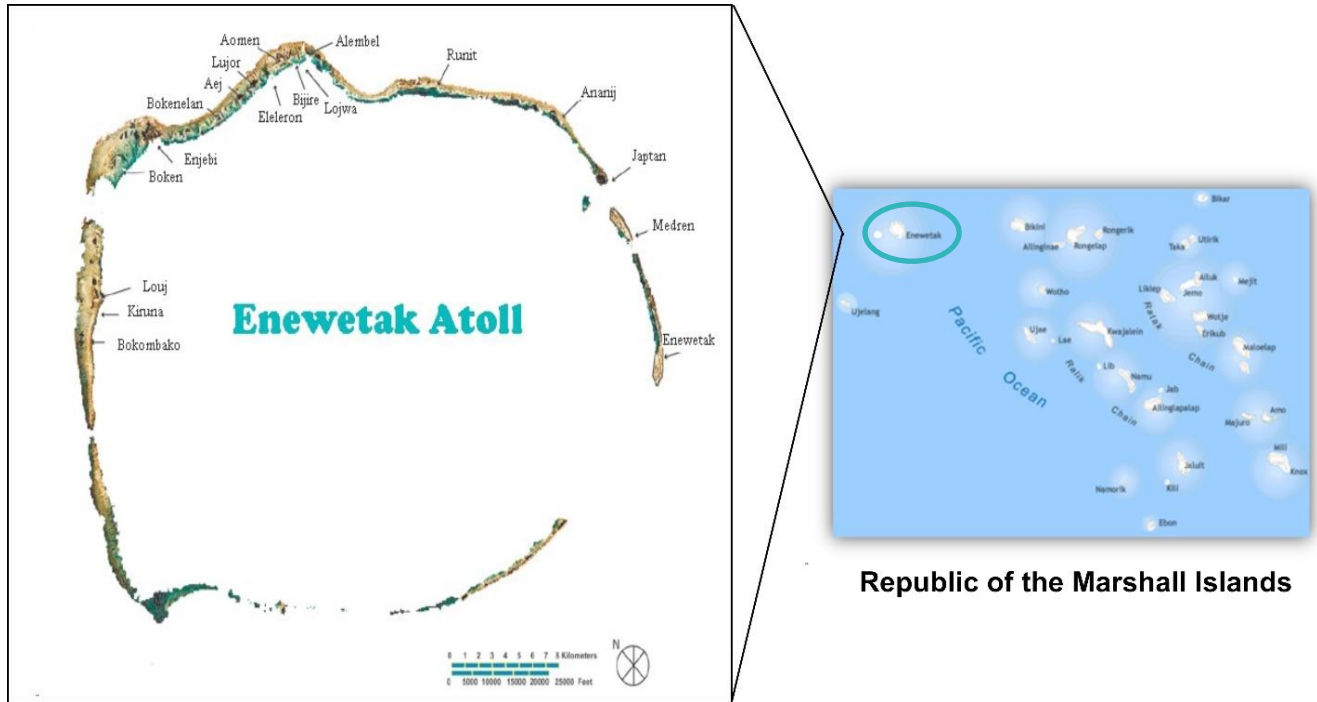
Hamilton T.F. (2020a). *Web based mosaic and interactive showing results of a drone visual survey of the exterior concrete of the Cactus Crater containment structure on Runit Island, Enewetak Atoll.* <https://marshallislands.llnl.gov/>, Lawrence Livermore National Laboratory (under construction).

Hamilton, T.F. (2020b). *Runit Project: Data Report—Exterior Concrete Core Test Results*, Lawrence Livermore National Laboratory, LLNL-TR-810020.

Hamilton, T.F. (2020c). *Runit Project: Data Report—Non-destructive Testing and Evaluation Investigation of Runit Island Containment Structure*, Lawrence Livermore National Laboratory, LLNL-TR-810290.

- Hamilton, T.F., P. Nyholm, J.S. Stewart and A.S. Connel (2018). *Runit Dome 3-D Animation*. Lawrence Livermore National Laboratory, LLNL-VIDEO-765357.
- Hamilton, T.F., P. Nyholm, and J.S. Wynn (2019). *Runit Dome Flyover*, Lawrence Livermore National Laboratory, LLNL-VIDEO-765358.
- Hamilton T.F. and R.W. Chen (2019). *Runit Dome Groundwater Bore Hole Drilling Animation_V2.0*, Lawrence Livermore National Laboratory, LLNL-WEB-777157.
- H&N (1983a). *Structural Monitoring of Cactus Crater Storage Facility (Runit Dome)*, Holmes & Narver Report A83, Field Survey December 1982, Energy Support Division, Pacific Operations, DOE/NV Technical Information Resource Center, Las Vegas, NV.
- H&N (1983b). *Structural Monitoring of Cactus Crater Storage Facility, Runit Dome*, Holmes & Narver Report B83, Field Survey June 29, 1983, Energy Support Division, Pacific Operations, DOE/NV Technical Information Resource Center, Las Vegas, NV.
- H&N (1984). *Structural Monitoring of Cactus Crater Storage Facility, Runit Dome*, Holmes & Narver Report A84, Field Survey January 4, 1984, Energy Support Division, Pacific Operations, DOE/NV Technical Information Resource Center, Las Vegas, NV.
- H&N (1990). *Runit Dome Survey*, Holmes & Narver Report E.091, Energy Support Division, Pacific Operations, DOE/NV Technical Information Resource Center, Las Vegas, NV.
- Master Plan (1975). *Enewetak Atoll Master Plan for Island Rehabilitation and Resettlement*, March 1975, TTPI/H&N, Volume I.
- Noshkin, V.E. (1980). *Transuranium radionuclides in components of the benthic environment of Enewetak Atoll*, In: *Transuranic Elements in the Environment*; ed. W.C. Hanson, U.S. Department of Commerce, National Technical Information Service, Springfield, VA; DOE/TIC 22800, p 578-601.
- NRC (1994). *Radiological Assessments for Resettlement of Rongelap in the Republic of the Marshall Islands*, National Research Council, National Academy Press, 1994, 108 pp.
- NSTec (2008). *Field Survey of Cactus Crater Storage Facility (Runit Dome)*, Report A08, National Security Technologies, LLC, Environmental Management Directorate, Las Vegas, DOE/NV/25946-569.
- NV-140 (1973), *Enewetak Radiological Survey*, Volume I, II and III, United States Atomic Energy Commission, Nevada Operations Office, Las Vegas, Nevada.
- Ristvet, B.L. (1980). *Summary of drilling operations conducted at Cactus Dome, Runit Island, Enewetak Atoll, in support of the National Academy of Sciences investigations, 11-28 March 1980*, Defense Nuclear Agency, Kirtland Air Force Base, NM.
- Storlazzi, C.D., S.B. Gingerich, A. van Dongeren, O.M. Cheriton, P.W. Swarzenski, E. Quataert, C.I. Voss, D.W. Field, H. Annamalai, G.A. Piniak and R. McCall (2018). *Most atolls will be uninhabitable by the mid-21st century because of sea-level rise exacerbating wave-driven flooding*, *Sci. Adv.*, 4.

VI. Appendix



Map of Enewetak Atoll in the Marshall Islands



Cactus Crater before (left) and after (right) construction of the Cactus Crater containment structure (i.e., Runit Dome)



Design elements of the Cactus Crater containment structure



Republic of the Marshall Islands

PO Box 2
Majuro, MH 96960

September 24, 2020

The Honorable Deb Fischer
Chairman, Subcommittee on Strategic Forces
Senate Committee on Armed Services
454 Russell Senate Office Building
Washington, DC 20510

The Honorable Martin Heinrich
Ranking Member, Subcommittee on Strategic Forces
Senate Committee on Armed Services
303 Hart Senate Office Building
Washington, D.C. 20510

Dear Chairperson Fischer and Ranking Member Heinrich,

Warm greetings from the Republic of the Marshall Islands (RMI) and thank you for your continued leadership to ensure that the Compact of Free Association actively maintains our bilateral friendship and mutual commitments.

We are writing to you today regarding the recent report by the U.S. Department of Energy (DOE) on the status of the Runit Dome on Enewetak Atoll. The report was submitted to the Committees on Armed Services of the Senate and House of Representatives last June as required by Section 364 of Public Law 116-92, National Defense Authorization Act (NDAA) for Fiscal Year 2020. The RMI welcomed the request in the NDAA for this report and we thank you and your colleagues in the Senate for your support for its inclusion. We note that there was an element in the original House version of the bill to ask the DOE to provide options for relocating the waste in the Runit Dome, but this was removed in the final version adopted by the Senate. We would be interested in revisiting this request in the future.

The attached review of the DOE report conducted by the RMI National Nuclear Commission provides a detailed assessment of our concerns, summarized as follows:

1. The U.S. continues to be responsible for the hazardous waste inside the Runit Dome, contrary to statements by the DOE that the Compact ended the U.S. role and responsibility.

2. The RMI strongly objects to DOE's use of an international radiation safety standard of 100 mrem for U.S. activities in the RMI, rather than the 15 mrem radiation safety standard used in the United States.
3. DOE's assessment was limited in that it did not include information on the many radionuclides that are still present in or around the Runit Dome, that were either buried in "crypts" or dumped in the lagoon and ocean. Likewise, DOE's report makes no mention of the presence of hazardous materials resulting from biological and chemical weapons tests.
4. DOE has not done any of the periodic groundwater monitoring required by law (see 48 U.S.C. 1921b(f)(1)).
5. DOE has never monitored the cumulative impact of radiation exposure on the local community that still resides at Enewetak Atoll in close proximity to the Runit Dome.
6. DOE's studies on the Runit Dome are not peer reviewed, evidenced by the report's extensive citation of studies carried out by DOE's principal contractor.
7. DOE has not identified any health threats from the Runit Dome because their research does not take into consideration the many ways in which the Dome interacts with the surrounding environment, which would include taking into account the knowledge of the local residents.

We respectfully refer you to the attached review for an elaboration of the key points raised above. We have also submitted our views to the leadership of the Senate Committee on Armed Services. Finally, we welcome an opportunity to explore options with your Committee or the Sub-Committee to address the concerns we raised with DOE's report, including the possibility of convening a hearing on these matters.

With sincere regards,


Casten N. Nemra
Minister of Foreign Affairs


Kessai H. Note
Minister of Justice, Immigration & Labor

Cc: H.E. Gerald Zackios
RMI Ambassador to the United States of America

Rhea Moss-Christian
Chair, Marshall Islands National Nuclear Commission

Review of the Report on the Status of the Runit Dome in the Marshall Islands
Prepared by: The Marshall Islands National Nuclear Commission

The Marshall Islands National Nuclear Commission presents this review of the report prepared by the U.S. Department of Energy (DOE), as required by the National Defense Authorization Act of 2020. The DOE was required to prepare a report for Congress to outline the status of the Runit Dome, to contain the following elements:

- (1) A detailed plan to repair the dome to ensure that does not have any harmful effects to the local population, environment, or wildlife, including the projected costs of implementing such plan.
- (2) The effects on the environment that the dome has currently and is projected to have in 5 years, 10 years, and 20 years.
- (3) An assessment of the current condition of the outer constructs of the dome.
- (4) An assessment of the current and long-term safety to local humans posed by the site.
- (5) An assessment of how rising sea levels might affect the dome.
- (6) A summary of interactions between the Government of the United States and the government of the Marshall Islands about the dome.

The DOE report addresses each of the above elements, in turn, however there are significant deficiencies in their responses that warrant attention.

The DOE report states that the Compact "end[ed] the U.S. role and responsibility for the Runit Dome." The RMI Government strongly disagrees with this statement. Article VII of the Section 177 Agreement pursuant to the Compact, entitled "Utilization of Lands," provides that the U.S. Government "is relieved of and has no responsibility for, and the Government of the Republic of the Marshall Islands...shall have and exercise responsibility for, controlling the utilization of" areas affected by the nuclear tests (emphasis added). To say that the RMI controls *the utilization* of the land, including Runit Dome, is not the same thing as "ending the U.S. role and responsibility for the Runit Dome" (particularly the hazards that were left there). This was recognized by the U.S. Congress when it passed the Insular Areas Act of 2011 and the National Defense Authorization Act for FY2020 and further acknowledged by Representative Tulsi Gabbard when she proposed the DOE survey and stated that the U.S. is responsible for the dome.

Given that the U.S. was the government authority in the RMI for the duration of the trust territory, a time where the U.S. used its authority to approve the testing of nuclear, chemical and biological weapons in the Marshall Islands, the RMI Government requests equity in terms of U.S. responses to the legacies of those tests. This equity extends to areas such as environmental protection and clean-up, storage of hazardous materials, compensation for damages and injuries, and healthcare for people exposed to hazardous materials. The recent report on the Runit Dome by DOE maintains that it is acceptable for the people of the Marshall Islands to live with more than six times the amount of radiation that is the standard for American citizens. The RMI strongly objects to DOE's use of an international standard of 100 mrem rather than the 15 mrem standard used in the United States. As

attorney Michael Gerrard emphasized in a piece he wrote for the *New York Times*, household garbage in the United States could not be stored in the way that plutonium and other radionuclides are currently stored on Enewetak Atoll.

Regarding the content of DOE's report on the Runit Dome, the RMI Government has major concerns about numerous aspects of the report beyond the larger issues related to equity. For example, the RMI Government is concerned about the many omissions from DOE's report. There is no mention of the crypts adjacent to the dome that contain radionuclides and hazardous materials, nor any mention of the radionuclides and hazardous materials that would not fit into the facility, and are buried on the islands or were dumped directly into the lagoon or ocean around the Dome. The report, as well as DOE monitoring over the years, fails to account for numerous radionuclides and hazardous materials connected to the detonations (e.g. many of the weapons tested on Enewetak were uranium bombs, but the environmental monitoring focuses primarily on plutonium and cesium). The RMI Government learned from DOE just this year that 99% of the radiation on Enewetak remains free flowing in the lagoon, and only 1% of the radiation released by the testing program is contained in the Dome. Prior to this, and quite significantly during the negotiations of the Compact of Free Association, the RMI Government understood that the presence of the Runit Dome represented a full clean-up of the atoll, not containment of just a tiny fraction of hazardous materials.

The absence of data showing harm does not mean there is no harm as DOE suggests; the report indicates there is no data to suggest measurable adverse impacts on the surrounding environment, yet DOE has not done any of the periodic groundwater analyses required by law. Additionally, a groundwater analysis program that only monitors the area around Runit Dome cannot accurately assess safety impacts on the people of Enewetak. The program should be expanded to monitor the safety of the people's actual water source, a well on the main island that is close to the contaminated lagoon.

DOE maintains that the local Enewetak community faces no health threats based on the Whole Body Counter studies for cesium. This data is not presented to individuals cumulatively. People receive individual readings, but they do not have an understanding of their exposure levels over time, information that is critical for determining risks. Furthermore, DOE does not differentiate between age groups and exposure risks in the RMI although this is a practice in the United States to acknowledge different risks for the elderly or children.

The RMI Government is concerned by the lack of peer review for decades on the scope of the environmental monitoring noted clearly in the number of times the report's major author, Terry Hamilton, is cited as a source throughout. The report does not provide the RMI with assurances that there are no health threats to the Enewetak community, and in fact, it compounds our concerns because there is no effort to talk to the people of Enewetak in any of this work to understand the ways that the people interact with the environment, or to consider their traditional knowledge about water, fish, plants, climate, tides, or other issues that have direct impacts on health.

It is irresponsible for a report that does not consider the full range of radionuclides released during the tests, nor biological or chemical hazards present on Enewetak from U.S. Government activities, to claim

that there are no health threats to the community. Furthermore, environmental monitoring by the weapons laboratory contractor fails to account for radionuclides and hazardous materials from sources other than weapons detonations brought into the Marshall Islands, including radioactive soil brought in from Nevada to conceal a misfired weapon in the Fig-Quince area of Enewetak, nor the presence of health impacts of exposure to beryllium as a result of rocket tests conducted by the U.S. Government.

DOE's report finds no discernible health threats because the weapons laboratory that oversees the environmental monitoring does not consider all potential health factors. This is of great concern to the RMI because these reports are the basis for policies regarding the well-being of our people and the health of our environment. Currently, there is no fence around the Runit Dome to prevent the Marshallese people, or even passengers from boats in the area, from potential exposures on the island, including sites where large amounts of radiation are covered only with sand or soil.

DOE science is not provided to the people who need it the most in a way that is understandable or can impact decision making for our leaders. Despite decades of research and millions of dollars appropriated annually, the RMI cannot answer basic questions about radiation safety and health: Is the groundwater used by the people of Enewetak safe as a source for drinking water? Do storms that stir up the sediment on the lagoon floor impact water safety for nearby communities? Is it safe to dig below the surface for burials or agriculture? Are radionuclides from weapons detonations on Bikini evident in Enewetak's environment? Are there synergistic health concerns to biological and chemical materials, like beryllium, in addition to radiation? Are there toxins from the U.S. biological and chemical weapons tests evident on Enewetak, and if DOE only looks for radiation, what entity is responsible for a complete accounting of U.S. military impacts on the atoll? What are the health impacts of radiation on Enewetak from sources other than detonations? What is contained in the crypts on Enewetak and why is there no accounting for the contents of the crypts in U.S. Government reports? What is buried in the raised mounds around the atoll, or the man-made peninsula adjacent to the dome that was not present before cleanup activities? Is it safe for the resettled population to continue to reside on Enewetak given all the data that DOE does not look for or consider in its consideration of health impacts? Why are DOE's environmental and medical monitoring programs not audited to consider scope of work, or best practices? The RMI Government is deeply troubled by the extremely narrow scope of DOE's monitoring program, and a report that misleadingly concludes that there are no health threats to the people without considering the full context or range of factors influencing environmental health.

The RMI Government remains concerned with DOE's continued inability to fulfil its legal mandate outlined in the Insular Areas Act of 2011. Section 2 of that Act (48 USC 1921b(f)(1)(B)) requires DOE, starting on January 1, 2012, to conduct the following two studies on Runit Dome at least every four years: a visual study of the concrete exterior of the dome, and a radiochemical analysis of the groundwater surrounding and in the facility. In the almost nine years since the Act has been in effect, DOE has only completed one visual study of Runit Dome's exterior, in 2013. It has never conducted any of the required groundwater studies, citing a lack of adequate funding. Perhaps the DOE report's conclusion that "[t]here are no data to suggest that the dome, or more specifically, the radioactive material encapsulated within the containment structure, is currently having a measurable adverse effect on the surrounding environment or is expected to have any adverse effect on the environment in 5, 10,

on the surrounding environment or is expected to have any adverse effect on the environment in 5, 10, or 20 years” is due to the failure of the DOE to develop such data through groundwater analyses, as required by the Insular Areas Act of 2011.

DOE has pointed us to information that the beryllium spilled on Enjebi Island at Enewetak Atoll was cleaned up and buried there after the failed rocket test in 1968. But the Enewetak cleanup a decade later would result in digging up tens of thousands of cubic yards of soil on Enjebi. Could this have resulted in beryllium exposure to the cleanup workers and to the islanders who have subsequently visited Enjebi? It is this unsettling likelihood that also leads the RMI Government to be concerned about the well-being of the U.S. veterans assigned to construct the Runit Dome as part of their service both to the U.S. military and to the people of Enewetak. The cleanup veterans did their best to contain the hazards on Runit so the Enewetak people could return to their home islands, and it pains the people of the Marshall Islands that the cleanup veterans’ experience has insufficient support for illnesses connected to their acute exposures to radiation. The RMI Government greatly appreciates the service and efforts of the cleanup veterans and supports their inclusion in the S. 947 amendments to the Radiation Exposure Compensation Act (RECA).

Many Marshallese also participated in the cleanup efforts at Enewetak and Bikini atolls and their health care needs have never been fully addressed by the U.S. Government. Similar to the U.S. cleanup veterans who worked on Enewetak, the Marshallese cleanup workers responded to a call for service without having the benefit of understanding the health risks they were undertaking, only to learn much later the extent of health damages they would endure. Because the Marshallese cleanup workers came from different atolls throughout the Marshall Islands, they have fallen outside the U.S. assertion that only four atolls were impacted by the nuclear testing program. This is a grave omission of a group of people from any programs to support their unique health care needs.

The RMI continues to face numerous challenges related to the U.S. testing of nuclear, chemical and biological weapons in the RMI during the Cold War that require attention, including questions about the safety of the resettled population on Enewetak Atoll. New information continues to emerge, such as the recent studies by Columbia University scientists that revealed the presence of plutonium-238 on Runit Island, a radionuclide that apparently does not result from nuclear tests. Only with the knowledge of all nuclear-testing related activities can we collectively understand and adequately address the ongoing health and environmental impacts in the Marshall Islands.

The RMI did not create the waste that is on Runit, nor do we have the technical or financial resources to maintain the structure, and the RMI has no desire to house the radioactive, chemical and biological materials brought into our country by the United States during the trusteeship. As noted by the 2012 U.N. Special Rapporteur Mission Report, removal of the nuclear waste from the RMI on a scale and standard comparable to the clean-up of domestic testing sites in the U.S. is an important element of addressing the legacy of U.S. nuclear weapons testing in the Marshall Islands.



Department of Energy

Washington, DC 20585

January 19, 2021

The Honorable Casten N. Nemra
Minister of Foreign Affairs
Republic of the Marshall Islands
P.O. Box 2
Majuro, Marshall Islands 96960

The Honorable Kessai H. Note
Minister of Justice, Immigration & Labor
Republic of the Marshall Islands
P.O. Box 2
Majuro, Marshall Islands 96960

Dear Ministers Nemra and Note:

I am writing in response to your September 24, 2020, letter to the Honorable Martin Heinrich, and the Honorable Deb Fischer, United States Senators, expressing your concerns regarding the June 2020 U.S. Department of Energy (DOE) *Report on the Status of the Runit Dome In the Marshall Islands* (Runit Report). Senator Heinrich wrote to Secretary of Energy Dan Brouillette regarding your concerns and requested that DOE respond directly to you.

In your letter, you raised seven specific concerns regarding the Runit Report. We appreciate your feedback and provide the following responses to your concerns. It is important to note that the groundwater monitoring program at Runit Island is not completed, and that DOE plans to drill several new boreholes and install groundwater monitoring wells, as described in the Runit Report (pages 6-7). The Lawrence Livermore National Laboratory (LLNL) has designed this groundwater monitoring program to provide scientifically substantiated data that will hopefully address many of your concerns more fully, including a clearer determination of what, if any, effects the Dome contents are having, or may have, on the surrounding environment and health status of the people of Enewetak. As I am sure you understand, the Department's work is currently delayed due to international travel restrictions imposed as a result of the COVID-19 pandemic. We look forward to resuming on-site work when these restrictions are lifted.

I would like to take the opportunity to address each of the individual concerns raised in your letter:

1. *“The U.S. continues to be responsible for the hazardous waste inside the Runit Dome, contrary to statements by the DOE that the Compact ended the U.S. role and responsibility.”*

DOE remains committed to fulfilling the United States’ commitments regarding the health and safety of the people of the Marshall Islands from the effects of past nuclear weapons testing. The Runit Report provides a brief legislative history and refers to language in P.L. 99–239, *Compact of Free Association Act of 1985*, which provided for the assumption by the Government of the Marshall Islands of responsibility for enforcement of limitations on the utilization of affected areas. P.L. 112-149, *Insular Areas Act of 2011*, which amended P.L. 108-188, the *Compact of Free Association Amendments Act of 2003*, assigned Cactus Crater containment monitoring and reporting requirements to the Secretary of Energy. These monitoring requirements include periodic visual surveys of the concrete exterior of the Dome, as well as radiochemical analyses of the groundwater surrounding and in the Dome (see 48 U.S.C. 1921b(f)(1)(B)). Any other responsibilities, as may be required by U.S. law, remain in effect. As stated in the Runit Report, “Results from the groundwater monitoring program will ultimately be used to make an informed decision about management of the site. In the interim, DOE will continue to provide preventative maintenance of the external concrete” (page 4).

2. *“The RMI strongly objects to DOE’s use of an international radiation safety standard of 100 mrem for U.S. activities in the RMI, rather than the 15 mrem radiation safety standard used in the United States.”*

The 15 mrem (0.15 mSv) radiation standard cited in your letter refers to a conservatively calculated annual dose level representing 10^{-4} – 10^{-6} risk, recommended by the U.S. Environmental Protection Agency (EPA) as a protective dose-based Applicable or Relevant and Appropriate Requirement (ARAR) for cleanup operations at EPA Superfund sites (see <https://www.epa.gov/superfund/radiation-superfund-sites>). This level was subsequently adopted by the Marshall Islands Nuclear Claims Tribunal (NCT). The 15 mrem level recommended by the EPA is a screening level for selecting dose-based ARARs in the Superfund program, not a requirement. DOE and the U.S. Nuclear Regulatory Commission (NRC) have other dose limits for members of the public for exposure resulting from DOE and NRC-licensed activities.

The use of an annual dose limit of 100 mrem (1 mSv) is consistent with the reference level value recommended by the International Commission on Radiological Protection (ICRP) and the International Atomic Energy Agency (IAEA) for existing exposure situations (see <https://www.icrp.org/publication.asp?id=ICRP%20Publication%20103>, Section 6.3, and https://www-pub.iaea.org/MTCD/Publications/PDF/PUB1781_web.pdf, respectively). Both DOE and the NRC also use a standard of 100 mrem (1 mSv), exclusive of the dose contributions from background radiation, in the U.S. for protection of the public from DOE radiological activities and NRC-licensed activities (see <https://www.directives.doe.gov/directives-documents/400-series/0458.1-border-chg4-ltdchg/@/@images/file> and <https://www.nrc.gov/reading-rm/doc-collections/cfr/part020/part020-1301.html>, respectively).

3. *“DOE’s assessment was limited in that it did not include information on the many radionuclides that are still present in or around the Runit Dome, that were either buried in ‘crypts’ or dumped in the lagoon and ocean. Likewise, DOE’s report makes no mention of the presence of hazardous materials resulting from biological and chemical weapons tests.”*

Congress’ direction to DOE in Section 364 of the NDAA for Fiscal Year 2020 was to report on the status of the Runit Dome. As discussed in the Runit Report, the most abundant radionuclides present in and around the Runit Dome are transuranic (TRU) elements: plutonium (Pu) isotopes and americium-241 (²⁴¹Am). The waste placed in the Dome was from cleanup operations conducted by “stripping off successive layers of contaminated soil” to reduce the level of TRU contamination in surface soils (page 2, Runit Report). The sum of TRU elements from contaminated soil placed inside the Dome was estimated to be approximately 545 giga Becquerel (GBq) (page 2, Runit Report).

We appreciate your concerns regarding the lagoon disposal sites and debris boxes adjacent to the Runit Dome, referred to as “crypts.” DOE has previously discussed the lagoon disposal sites and the debris boxes with the leaders of Enewetak. In June, 2020, we provided to the Enewetak leadership publicly available documents describing three lagoon disposal sites used during the radiological cleanup of Enewetak Atoll in the 1970s. We are currently looking into options to conduct a monitoring survey of the lagoon disposal sites.

Regarding the debris boxes adjacent to the Runit Dome, DOE did not uncover them during previous visual surveys due to the need to move significant quantities of contaminated soil. We plan to uncover and survey the debris boxes during the drilling project for the installation of the groundwater monitoring wells when heavy equipment is available on Runit Island.

With respect to whether hazardous materials from biological or chemical weapons tests are present on Runit Island, we were not aware of this non-radiological issue, which is unconnected to the nuclear testing legacy in RMI, until recent discussions with the Enewetak leadership. We have since searched DOE historical records for information on the Department of Defense (DoD) testing of chemical and biological agents at Enewetak. Unfortunately, we did not find any further information in DOE records regarding this issue. We have requested information from DoD and are waiting for a response.

4. *“DOE has not done any of the periodic groundwater monitoring required by law (see 48 U.S.C. 1921b(f)(1)).”*

In 2013, DOE re-established two existing borehole locations, one in an area outside the Dome and one in the Dome. Water samples have since been collected and analyzed from these boreholes, the nearshore lagoon, and the open ocean. Results were most recently presented at the 2019 RMI/DOE Annual Meeting and in the Runit Report (page 5). As

noted in the Runit Report, these results are preliminary. DOE plans to drill several new boreholes and install groundwater monitoring wells (pages 6-7, Runit Report). In 2019, the U.S. Department of the Interior made available \$1.689 million to DOE to co-fund the development of a groundwater monitoring program consistent with the requirements of P.L. 112-149. Although on-site work has been delayed due to international travel restrictions resulting from the COVID-19 pandemic, DOE is actively working on plans to implement this logistically and scientifically complex project. We welcome the opportunity to brief the RMI government on this work.

5. *“DOE has never monitored the cumulative impact of radiation exposure on the local community that still resides at Enewetak Atoll in close proximity to the Runit Dome.”*

This concern was also raised at the 2019 RMI/DOE Annual Meeting. An assessment of cumulative exposures from 1948 to 1970 and lifetime cancer risks for residents of the Marshall Islands was reported in a special issue of the journal of *Health Physics* (Volume 99, No. 2, August, 2010). The conclusion of this assessment indicated a projected 170 excess (radiation-related) cancers out of a projected 10,600 baseline cancers among 24,783 residents of the Marshall Islands (12,175 residents born before 1948, and 12,608 born in the years 1948 through 1970) (see Simon et al, 2010, available at <https://journals.lww.com/health-physics/pages/articleviewer.aspx?year=2010&issue=08000&article=00001&type=Fulltext>). DOE is currently preparing a compilation of papers from this and an earlier special issue of *Health Physics* to provide to the RMI Government. We will also provide a summary of these materials. In addition, the Chief Scientist of the DOE Marshall Islands Program is exploring the feasibility of including cumulative exposure reporting under the whole-body counting program. We will provide an update on this issue at the next RMI/DOE Annual Meeting.

6. *“DOE’s studies on the Runit Dome are not peer reviewed, evidenced by the report’s extensive citation of studies carried out by DOE’s principal contractor.”*

In the Runit Report, we addressed the questions posed by Congress and presented a summary of the work that DOE has conducted concerning the Runit Dome, as well as the work that is planned. As you would expect, many of the references and suggested resources in the report would be authored by DOE’s principal contractor or previous agencies and contractors involved with the program. Dr. Terry Hamilton is the Chief Scientist of the DOE Marshall Islands Program, and has extensive experience conducting environmental monitoring activities in the Marshall Islands, including the Runit Dome. He has authored numerous publications on his work in the Marshall Islands, including both peer-reviewed journal articles and LLNL technical reports. Since 1997, LLNL scientists have published four peer-reviewed journal articles related to radiological conditions on or around Runit Island along with numerous technical reports and presentation materials. DOE is focused on transparency, sharing data when it becomes available, and submitting results for publication in peer-reviewed journals. In addition, there is extensive work planned for Runit Island, with the installation of the groundwater monitoring program and continued visual surveys. Data from this work will allow DOE

to further assess the questions posed by Congress and pursue ways to strengthen the data review process, including submission to peer-reviewed journals.

7. “DOE has not identified any health threats from the Runit Dome because their research does not take into consideration the many ways in which the Dome interacts with the surrounding environment, which would include taking into account the knowledge of the local residents.”

DOE welcomes the opportunity to incorporate additional knowledge of local residents and, as a result, regularly recruits local workers in the collection of representative field samples. Once international travel restrictions are lifted, we plan to host meetings with representatives from the RMI national government and Enewetak local government, and Enewetak local residents to discuss the plans to install the groundwater monitoring system at the Runit Dome and incorporate any feedback received. We are also currently preparing signs indicating that Runit Island is “off-limits” due to subsurface plutonium levels, and will erect these signs once the text of these signs has been reviewed by Enewetak leaders. However, it is worth noting that DOE’s analysis, as reflected in the Runit Report, included consideration of exposure pathways of inhalation and ingestion of locally produced and marine foods.

Also as discussed in the Runit Report, a major goal of the groundwater monitoring program is to determine what, if any, effects the Dome contents are having, or may have, on the surrounding environment and the health status of the people of Enewetak. Although individual radiological protection monitoring data indicate that the people on Enewetak are not being exposed to levels of fallout contamination of concern to human health, and preliminary data from the re-established boreholes shed some light on how the concentrations of radionuclides compare between the Dome and surrounding environments (page 5, Runit Report), much work remains to be done at Runit Island. Substantial amounts of data are expected from the planned groundwater monitoring program.

Thank you for sharing your concerns regarding the Runit Report. We value your feedback, and hope that our responses to your concerns will help to allay some of those concerns. We very much look forward to working with you as we move forward and welcome the opportunity to meet with you to discuss the DOE Marshall Islands Program. DOE remains committed to fulfilling the United States’ commitments regarding the health and safety of the people of the Marshall Islands from the effects of past nuclear weapons testing.

If you have any questions, please feel free to contact me at (202) 586-6740 or via e-mail at todd.lapointe@hq.doe.gov.

Sincerely,

A handwritten signature in black ink, appearing to read 'T. Lapointe', with a long horizontal flourish extending to the right.

Todd N. Lapointe
Deputy Associate Under Secretary
Office of Environment, Health,
Safety and Security

cc: The Honorable Martin Heinrich
United States Senator

The Honorable Deb Fischer
United States Senator

His Excellency Gerald Zackios
RMI Ambassador to the United States of America

Her Excellency Roxanne Cabral
U.S. Ambassador to the Republic of the Marshall Islands



REPUBLIC OF THE MARSHALL ISLANDS

P.O. Box 2
Majuro, MH 96960

June 11, 2021

The Honorable Angus S. King
Chairman, Subcommittee on Strategic Forces
Committee on Armed Services
United States Senate
Washington, DC 20510

The Honorable Deb Fischer
Ranking Member, Subcommittee on Strategic Forces
Committee on Armed Services
United States Senate
Washington, D.C. 20510

Dear Chairman King and Ranking Member Fischer:

We write regarding a letter dated January 19th of this year from Todd Lapointe, Deputy Associate Under Secretary of Environment, Health, Safety and Security in the Department of Energy concerning a June 2020 report to Congress by DOE on Runit Dome in the Marshall Islands (RMI), a state in free association with the United States.

The Dome is a storage facility for radioactive waste from U.S. nuclear bomb testing conducted in the Marshall Islands while the U.S. administered our islands in trust for the United Nations. Nearly 80% of all U.S. nuclear bomb testing was conducted here, the equivalent of 1.7 Hiroshima bombs every day for 12 years. Radioactive waste from testing in Nevada was also shipped to Enewetak Atoll of which Runit Island is a part. DOE's report was required by the FY 2020 NDAA.

We appreciate your predecessor's request to former Secretary of Energy Brouillette to respond to our concerns regarding DOE's report, which we sent the Subcommittee last September. Mr. Lapointe's letter addressed the concerns, however, like DOE's report, his responses fell short in addressing questions regarding the nuclear weapons testing and its legacy. Copies of these communications are attached, for your reference.

We are disappointed that the letter did not acknowledge DOE's failure to comply with the requirements of the Insular Areas Act of 2011. Under that law, DOE was required to conduct radiochemical analyses of the groundwater in and surrounding Runit Dome at least once every four years, starting on January 1, 2012. In the decade since the law was enacted, DOE has not conducted even one of the required analyses. The Act also required DOE to conduct a visual study of Runit Dome's concrete exterior at least once every four years. DOE has published only one such study, in 2013. The attempt to blame the COVID-19 pandemic for these delays – which go back for several years before the pandemic – is particularly disappointing.

We respectfully suggest that there should be accountability for failing to comply with the law.

Let us address each of the letter's responses to our concerns.

1. We disagree that the RMI is responsible for the Runit Dome, built by the U.S. to cover radioactive waste from its bomb tests. As we wrote last September, to assert that the RMI controls *the utilization* of the Dome is not akin to "ending the U.S. role and responsibility for the Runit Dome." This is especially the case regarding the dangers left at Runit as a result of U.S. activities. The RMI does not have the resources to protect its citizens from the nuclear waste and other toxins left by the U.S. at Enewetak Atoll, and it would be unconscionable for the U.S. to suggest that it has somehow been absolved of its responsibilities in this regard.
2. The RMI rejects the 100 mrem radiation safety standard applied by DOE in the Marshall Islands, especially because it runs counter to the 15 mrem standard adopted by the Marshall Islands Nuclear Claims Tribunal regarding property damage awards. The Government of Marshall Islands exercises its responsibilities in protecting our people who were direct recipients of harmful radiation and toxins released by nuclear weapons. Our radiation safety standard ensures that we prioritize health and environment with equivalent rehabilitation standards that will restore people's ancestral lands to their original condition. The DOE's usage of the 100 mrem standard, on the other hand, does not match its stated commitment to supporting the Marshallese people in our efforts to provide basic access to clean water, air, and a healthy environment to support thriving communities impacted by the U.S. nuclear weapons tests. The weapons testing program took place during the time when the U.S. governed the islands, and the RMI wants the same level of cleanup as U.S. citizens would have had the same activities taken place on U.S. soil. This is a matter of simple environmental justice.
3. The RMI rejects the assertion that the U.S. testing of biological and chemical weapons at Enewetak Atoll is disconnected from the nuclear weapons tests. In our discussions with former U.S. military and civilian personnel involved in clean-up activities at Enewetak in the 1970s, we learned of additional toxins that were included in clean-up activities, but the reason they were there has never been fully explained. We do know that there were biological and chemical tracers inside the nuclear weapons tested at Enewetak. This itself means these issues are not separate. Any information on any toxins that have been left on Enewetak from any U.S. activity should be shared with our Government, especially to the

extent that any such toxins have threatened or could continue to threaten the health and safety of Marshallese citizens. We look forward to DOE's plans to uncover and survey the debris boxes buried adjacent to the Runit Dome.

4. We note the letter's response to concerns we raised with the lack of DOE's focus on cumulative exposure impacts, that a summary of past studies will be provided along with consideration for inclusion of cumulative impacts in the whole-body counting program. Unfortunately, this does little to ease our concerns. The Enewetak community was resettled in 1980 and there has been no effort to combine exposure data collected for individuals by Brookhaven National Laboratory with data collected by the Lawrence Livermore National Laboratory (LLNL). The emphasis on LLNL's research is to give single snapshots in time of readings of individuals, which does not help people understand cumulative exposures over time. Any monitoring of radiation impacts on human health must include cumulative exposures in order for findings to be complete and to have any integrity.
5. The lack of inclusion of local community knowledge in DOE's environmental monitoring misses key opportunities to enhance its work. Indigenous knowledge provides immeasurable value to scientific findings by grounding it in generations of awareness that cannot be gained through periodic research visits. Peer review should not be limited to select professionals. It should also come from Indigenous communities, regional specialists, and practitioners in a variety of fields not limited to radiation science. Likewise, development and design of research should be equally inclusive and seek to not only engage, but to inform and empower our communities to understand and address radiation-related challenges. We are prepared to work closely with DOE to ensure that all radiation research is translated into layman's terms and also into the Marshallese language.

The Marshall Islands has a Research Protocol in place since 2018 to guide external research of the legacy of nuclear bomb testing here. It requires that local community members participate in every phase of research so it will build capacity and understanding of communities as well as ensure that findings are understood and disseminated to the local people. Our National Nuclear Commission welcomes DOE's engagement in understanding and implementing the set of ethics outlined in the Research Protocol. Further initiatives are underway to secure greater community engagement in radiation research. We look forward to including DOE in these efforts.

6. Increasing threats from climate change and sea level rise continue to impact the integrity of the Runit Dome and the surrounding coastal environment as well as nearby communities. The high level of uncertainties, as acknowledged by DOE in its study, requires a recalibration of DOE's efforts to ensure that their environmental monitoring work is adequately accounting for the Dome's interactions with the surrounding environment, particularly in the context of climate change impacts. It is common knowledge that the Dome was not designed to be a permanent structure and that its

construction over an unlined bomb crater would require future mitigating action. Current knowledge and understanding of the interactions between the Dome's contents and the immediate adjacent environment during tidal events is strong justification for additional environmental monitoring.

In light of new information and the need for environmental monitoring to include broader issues affecting the Runit Dome, we request an independent review of DOE's current environmental monitoring program. The goals should be to assess its adequacy and relevance to current issues, as well as to ensure that the work is meaningfully addressing community concerns. We welcome an opportunity to jointly organize this review with the appropriate U.S. officials.

Finally, we hope that there will be a U.S. congressional visit to Enewetak when it is safe to travel internationally and the RMI's borders re-open. The Enewetak community, in particular the landowners, deserve the opportunity to engage directly with U.S. officials to share their concerns and ask questions about the health and safety of their environment.

The people of Enewetak are entitled to all information relevant to any health, safety, and environmental risks they may continue to face as a result of all past U.S. activities on their islands, whether these risks arise from the nuclear testing program, the radiological cleanup (including the disposal of nuclear waste into Runit Dome, the lagoon, and undisclosed crypts), rocket tests, the testing of chemical and biological warfare agents, or other activities. Rather than having these risks compartmentalized, the people of Enewetak need -- and deserve -- a comprehensive understanding of whether it is safe for them to continue living on Enewetak, on the shores of the lagoon, in the shadow of Runit Dome, eating the food that they eat and drinking the water that they drink.

We look forward to your Subcommittee's continued effort to address the U.S. legacy of nuclear testing in the Marshall Islands and its impact on the Marshallese people.

Sincerely,



Casten N. Nemra
Minister of Foreign Affairs and Trade



Kessal H. Note
Minister of Justice

Cc: H.E. Gerald Zackios, RMI Ambassador to the United States
H.E. Roxanne Cabral, United States Ambassador to the RMI
The Honorable Martin Heinrich, United States Senator



**REPUBLIC OF THE MARSHALL ISLANDS
NATIONAL NUCLEAR COMMISSION
PO BOX 2
MAJURO, MARSHALL ISLANDS 96960**

ETHICS PROTOCOL FOR RESEARCHERS AND STUDY ABROAD INSTRUCTORS

Thank you for your interest in building knowledge related to the impacts of U.S. Government nuclear weapons testing and its long-term impacts on the land and people of the Marshall Islands. The National Nuclear Commission (NNC) of the Republic of the Marshall Islands acknowledges with gratitude the long history and importance of knowledge-generation, and the NNC would like research to continue. Indeed, the Marshall Islands needs for research to continue as there are many areas where that we do not understand. If of interest, the NNC can support potential researchers with the design of questions and projects that can best support the interests and capacity-building of the Marshall Islands. The protocols discussed below are in no way designed to discourage research about the nuclear legacy in the Marshall Islands; quite the opposite as the NNC developed these protocols to create stronger partnerships and linkages between researchers and the Marshallese people so we can work constructively, and in collaboration. We invite prospective researchers to attend March 1 events each year as an opportunity to learn about the nuclear issues that are most pressing to communities and the RMI national government, to meet community members, and to brainstorm potential research projects that can build on the strengths of researchers and Marshallese communities.

Researchers and journalists often publish their narratives about the Marshall Islands to advance their own careers. The viewpoints of researchers and instructors impact public perspectives about the Marshall Islands. It is the Marshallese people, not visitors, who live with the consequences of circulated narratives. In no way does the NNC want to influence the findings of independent research; please be mindful, however, that one-dimensional portrayals of the Marshallese people as victims harms efforts to bolster resilience and self-reliance. Please consider the role that you can play in bringing forward positive narratives that amplify the strengths of the Marshallese people. The NNC would be pleased to suggest any resources regarding ethical research practices, including: <https://scholarspace.manoa.hawaii.edu/handle/10125/32892>.

Section I: Pre-departure written submissions to the NNC

Please submit to the NNC to written documents: 1. Approval for your activities, in writing, from local governments, communities or institutions in the Marshall Islands, and 2. An ethics review, on letterhead, to the eight areas defined below in “Ethics Review: Written Submissions #2.”

Local permission: Written Submission #1. Prior to any site visits, data gathering, filming, or photography, please provide to the NNC copies of permissions granted by the local governments or appropriate entities in the RMI. (The NNC can assist with securing these permissions ahead of time, but will not serve as an intermediary as it is essential for researchers to develop relationships directly with atoll representatives). Your agreements with local entities must communicate your plans for data transfer, storage and privacy; this includes physical or biological specimens, material culture, images, recordings, and cultural practices. These protections extend to study abroad programs as well. Please be mindful that requests from local entities may take time given different levels of infrastructure in the Marshall Islands, including computer and telephone access on the remote islands. Visitors to the Marshall Islands should plan many months in advance to secure permission.

Ethics Review: Written Submission #2. To meet expectations for ethical engagement with communities in the Marshall Islands, including the full participation of community members during every phase of your inquiry, submit to the RMI National Nuclear Commission written demonstration that you have integrated the following principles into your proposal:

1. No further harm. The Marshallese people and land have been harmed greatly by research. It is imperative to consider this before undertaking your work given the history of violent and exploitative knowledge extraction that predates your arrival and activities. Your work must acknowledge previous harms as well as ensure no further physical, psychological, political, or economic harm to the Marshallese. Please explain how your inquiry will protect from further harms.
2. Previous research has not benefited the Marshallese people. The Marshallese people and land is often violently exploited by outsiders who use the Marshall Islands to advance their own interests, careers, learning, or power. The exploitive and extractive activities reached an apex during the testing program, but these practices are not limited to the past, nor only to U.S. Government researchers. Please explain how your inquiry will benefit the Marshallese people.
3. Expectations and respect. The NNC encourages you to familiarize yourself with Marshallese custom, including learning some phrases in the Marshallese language, so you can model for others, including outsiders who will visit the islands after you, the importance of respectful engagement with the people and place. Please do not expect that people should share their stories, images, lives or experiences with you just because you are interested. Nuclear issues in the Marshall Islands are extremely sensitive, personal, and in many cases painful. Working with our elders requires the

utmost respect, including respect for their exhaustion in talking to outsiders without seeing any demonstrated benefits to their communities. Please explain your plans for thoughtful engagement of the people, and in particular the elders.

4. Supporting research is a burden. Knowledge production – through research, teaching (e.g. study abroad), and media representations -- is not benign, and often serves the interests and priorities of those seeking the knowledge rather than the Marshallese people. Even well-intentioned research or knowledge production is invasive and creates hardships for communities. Please describe the previously recorded or existing research you have accessed in preparation for your research and provide a justification for your inquiry.
5. Capacity building. If you are coming to the Marshall Islands to undertake investigations that will advance your own career, education, or interests, you should ensure that your activities build the capacity of the Marshallese people to conduct similar inquiries and to better understand the topics of your exploration. Whenever possible, your research should employ and build the skills of the Marshallese people, including the mentoring of our young people to explore university-based research.

It is the expectation of the NNC that any research includes paid positions for community members to serve as on-going liaisons, translators, and cultural guides whether you are researching in the Marshall Islands for the first time or have long-term relationships with communities. If you applied for and received funding for research in the Marshall Islands that does not include funding to hire local collaborators, then please obtain additional funding to provide paid positions for local Marshallese. This requirement is in response to economic inequalities between researchers and their institutions and local communities in the RMI. Local collaborators can also guide researchers through cultural protocols, permissions, and serve as interpreters. Please describe your plans for capacity building and hiring local community members to support your projects.

6. Data transfer. It is NNC's understanding that any physical specimens or interviews collected during research belong to landowners and community members where you propose to conduct research. It is the expectation that raw data collected in the RMI will be shared with communities, not just the final interpretations of data analysis in the form of a publication. For the communities where you work, it is important to provide not just a copy of your final research, but a summary of your thoughts and findings in layperson terms, translated into Marshallese. Please describe your plans for data transfer, including translation.
7. Informed consent and permissions. Prior to data collection, researchers must obtain appropriate informed consent from community members in the Marshallese language which explains the purpose of the research, and how data collected in the RMI will be used by the data collection. Oral permission may be appropriate in some cases, but it

must be recorded and documented. Researchers conducting interviews must always give permission for informants to use pseudonyms to protect privacy. If you are affiliated with an academic institution, provide the NNC with a copy of your Institutional Review Board approval. If you are leading a study abroad, provide a copy of your approved study abroad proposal to your institution, and syllabus. If you are a U.S. Government worker, provide copies of any authorization for research, including Congressional mandates. Also, please provide a copy of your consent procedures for use with Marshallese informants for your inquiry.

8. Suggested donations. Supporting researchers takes time, resources, and energy away from other vital tasks. Researchers should consider making donations to non-profit agencies that provide support inquiry.

Section II: Pre-departure conversation with an NNC Commissioner

After submitting your written responses to Section I to the NNC, please arrange a telephone or in-person meeting with one of the three Commissioners for the National Nuclear Commission to discuss the sensitive aspects noted above and how they relate to your activities in the Marshall Islands. The purpose of this step is to explore the ways that your inquiry fits into other activities and undertakings related to the nuclear legacy.

After satisfactory submission of the two written requirements as well as your conversation with an NNC Commissioner, the NNC will provide you with signed acknowledgement of the approval for your research or teaching related to nuclear issues in the Marshall Islands. The NNC verification will accompany your approval from local entities in the RMI and will be kept on file in the NNC office. You must provide a copy of your research approval to the RMI Customs official at the airport upon arrival as this demonstrates transparency as a fundamental component of community engagement.

Section III: Data transfer

Upon return to your home institution, please provide to relevant local governments and non-governmental organizations, and the NNC any publications or materials based on your research or teaching related to the nuclear legacy, including media productions. This transfer of data should include your layperson summary and translation into Marshallese (the NNC can provide the names of excellent translators to hire). Students in study abroad programs should demonstrate consideration of ethics into final projects submitted to their instructors, even if they are not published.

The final products submitted to the NNC will be kept on file as evidence of commitment to undertake ethical research in the RMI, including the return of data, and will be considered for any future requests for research visits.

Contact information for the RMI National Nuclear Commission:

Ms. Rhea Moss-Christian, NNC Chair: rhea.mosschristian@rminuclearcommission.net

Mr. Alson Kelen, NNC Commissioner: alson.kelen@rminuclearcommission.net

Dr. Holly Barker, NNC Commissioner: holly.barker@rminuclearcommission.net

Ms. Keyoka Kabua, NNC Secretary: secretary@rminuclearcommission.net

Research Permission

Date: _____

To: RMI National Nuclear Commission

From: _____ (local government or RMI organization)

The leadership of either our local government or organization acknowledges that _____ received approval to undertake research or study abroad activities according to our local requirements.

Signature

Date:

Print Name

Date _____

To: RMI Customs

From: RMI National Nuclear Commission

The undersigned NNC Commissioner verifies that the proposed research by _____ was approved by local governments with full consent and transparency, and demonstrates the integration of research ethics, including full community participation, into every phase of the proposed research.

Signature

Date:

AMENDMENT TO H.R. 2500
OFFERED BY MS. GABBARD OF HAWAII

At the appropriate place in title III, insert the following:

1 SEC. 3 ____ . REPORT ON RUNIT DOME.

2 (a) REPORT REQUIRED.—Not later than 180 days
3 after the date of the enactment of this Act, the Secretary
4 of Energy, in coordination with the Administrator of the
5 Environmental Protection Agency and Secretary of De-
6 fense, shall submit to the Committee on Energy and Com-
7 merce and the Committee on Armed Services of the House
8 of Representatives and the Committee on Armed Services
9 and the Committee on Energy and Natural Resources of
10 the Senate a report on the status of the Runit Dome in
11 the Marshal Islands.

12 (b) MATTERS FOR INCLUSION.—The report required
13 by subsection (a) shall include each of the following:

14 (1) A detailed plan to remove the radioactive
15 materials in the dome to a safer and more stable lo-
16 cation, including a predicted timeline and associated
17 costs.

18 (2) A detailed plan to repair the dome to ensure
19 that it does not have any harmful effects to the local

1 population, environment, or wildlife, including the
2 projected costs of implementing such plan.

3 (3) The effects on the environment that the
4 dome has currently and is projected to have in 5
5 years, 10 years, and 20 years.

6 (4) An assessment on the safety of food gath-
7 ered from local food sources.

8 (5) An assessment of the current condition of
9 the outer constructs of the dome.

10 (6) An assessment of the current and long-term
11 safety to local humans posed by the site.

12 (7) How climate change and rising sea levels
13 are predicted to affect the dome, including a descrip-
14 tion of projected scenarios if the dome becomes par-
15 tially or fully submerged by ocean water.

16 (8) A summary of interactions between the
17 Government of the United States and the govern-
18 ment of the Marshall Islands about the dome.

19 (9) A detailed description of the physical health
20 effects on Pacific Islanders, including residents of
21 Hawaii, Fiji, and Samoa, of nuclear testing con-
22 ducted at Runit Dome.

23 (10) A detailed description of the pre- and post-
24 nuclear test communications between the United
25 States and the governments of the territories and

1 nations of the Pacific Islands, including Hawaii,
2 Fuji, and Samoa.

3 (c) FORM OF REPORT.—The report required by sub-
4 section (a) shall be submitted in unclassified form and
5 made publicly available.

