GENEVA GRADUATE INSTITUTE

INSTITUT DE HAUTES ÉTUDES INTERNATIONALES ET DU DÉVELOPPEMENT

GRADUATE INSTITUTE OF INTERNATIONAL AND DEVELOPMENT STUDIES

UNCOMPENSATED HARM

A Critical Analysis of Victim Assistance Frameworks for Nuclear Weapons Testing

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with guidance from

International Physicians for the Prevention of Nuclear War
(IPPNW Geneva Liaison Office)

12 May 2026

“[...] we cannot, and will not allow our history and lived experiences to be overshadowed by silence or be forgotten by the passage of time.”

— H.E. President Hilda C. Heine, President of the Republic of the Marshall Islands, Nuclear Victims Remembrance Day, 2 March 2026, "Añin Jitbõn Mar"

EXECUTIVE SUMMARY

Between 1945 and 1996, the United States and France conducted over 1,200 nuclear weapons tests across four principal sites: the Nevada Test Site and the Marshall Islands (United States), and the Algerian Sahara and French Polynesia (France). The environmental and health consequences of these programmes are profound and enduring. Radioactive contamination persists in air, soil, water, and food systems decades after the last detonation; affected communities continue to experience elevated rates of cancer, cardiovascular disease, reproductive harm, and intergenerational genetic damage; and the psychosocial, cultural, and economic disruptions inflicted on colonised and marginalised populations remain largely unaddressed.

This report provides a critical, comparative analysis of the victim assistance frameworks and inherently intertwined environmental remediation established by the United States and France in response to their respective testing legacies. Drawing on international normative frameworks, including the Treaty on the Prohibition of Nuclear Weapons (TPNW), and on extensive case study evidence from all four testing sites, the report examines both the design and the implementation of existing compensation mechanisms and identifies the structural barriers that continue to obstruct adequate redress.

The analysis reveals that while both states have established formal compensation frameworks—including RECA and COFA in the United States and the Morin Law in France—these mechanisms share fundamental shortcomings. Striking financial disparities exist between programmes: RECA alone has disbursed nearly $2.9 billion, while the Marshall Islands' trust fund totals $700 million for all purposes, and the Morin Law has awarded just €90.8 million across 1,026 recognised victims. The standard of causation applied to claims has proven to be the single most consequential design variable, with rejection rates exceeding 88% in both the US and French systems prior to the introduction of presumptive causation. Across all four case studies, affected communities face overly complex application processes, rigid eligibility criteria rooted in colonial hierarchies, and the systematic exclusion of entire categories of harm, including reproductive trauma, chronic non-cancer conditions, psychological suffering, and cultural disruption.

These operational failings are symptomatic of deeper structural flaws. The report identifies four interconnected dimensions of failure. First, the data upon which compensation decisions rest is fundamentally compromised: military organisations conducted tests while simultaneously controlling, monitoring, and conducting health surveillance, creating an inherent conflict of interest that has shaped the knowledge landscape to this day. Second, the definitional frameworks that determine who qualifies as a victim are built on politically constructed categories, including "threshold thinking," the fiction of terra nullius, the Reference Man dosimetric model, and the exclusion of intergenerational harm. Third, barriers to environmental remediation are political rather than technical: in Algeria, the absence of data structurally prevents remediation; in French Polynesia, harm is managed through containment rather than resolution; and in the Marshall Islands, remediation efforts fail to account for the biocultural dimensions of contamination. Fourth, the international legal architecture lacks binding

enforcement mechanisms and judicial recourse for individual victims, while affected communities, and women in particular, remain excluded from the processes that shape their own redress.

The report concludes with 32 policy recommendations, assessed by priority and feasibility, organised across six thematic areas: data and transparency; definitional reform and eligibility; expanding the scope of compensable harm; accessibility and implementation; institutional and legal reform; and environmental remediation. Highlighted recommendations with the highest near-term potential include adopting an irrebuttable presumption of causation, establishing a WHO-based international list of radiogenic diseases, funding proactive outreach and claims navigation for affected communities, and developing independently monitored remediation programmes with particular urgency for Algeria and French Polynesia.

Taken together, the findings of this report demonstrate that the harm caused by nuclear weapons testing is not uncompensated by accident but by design. Addressing this legacy requires a fundamental shift from the military-security model that has shaped responses to date towards a human-centred, rights-based framework in which affected communities are recognised not as recipients of charity but as rights-holders entitled to truth, recognition, redress, and meaningful participation in the processes that shape their future.

DISCLAIMER

This paper was produced in partial fulfilment of the requirements of the master's in International and Development Studies at the Geneva Graduate Institute (IHEID). Throughout the applied research project, the authors received guidance from the IPPNW Geneva Liaison Office. While the paper has been informed by expert interviews and information provided by IPPNW, the authors bear sole responsibility for its content. The views and opinions expressed herein do not necessarily reflect the official positions of IPPNW or any of its members.

ACKNOWLEDGEMENTS

We would like to thank our partner organisation, the IPPNW Geneva Liaison Office, for their support and guidance throughout the ARP process. We are especially grateful for the many opportunities to meet in person and, as their first-ever ARP team, for the chance to set the stage for many more collaborations to come.

The co-authors would also like to express their particular gratitude to Finja Pollen, whose editorial dedication was indispensable to the quality and finalisation of this report.

We express our sincere gratitude to all of the scientists, researchers, and experts who took the time to share their expertise and insights with us throughout this process. Your support greatly enriched both our experience and our findings.

We would also like to acknowledge the Nuclear Truth Project, whose online event we had the opportunity to attend during our research process. The testimonies and perspectives shared during the session deepened our understanding of the lived realities of nuclear-affected communities and left a lasting impression on our work. We are grateful for their continued dedication to centering survivor voices in the nuclear disarmament discourse.

Finally, we wish to extend our sincere thanks to the delegation of the Republic of the Marshall Islands for taking the time to meet and discuss this topic with us. The opportunity to hear directly from those affected by nuclear testing, and to work alongside them towards a more just future, has been one of the most meaningful dimensions of this project.

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ACRONYMS & ABBREVIATIONS

AEC Atomic Energy Commission

ARP Applied Research Project

CEOBS Conflict and Environment Observatory

CIVEN Compensation Committee for Victims of Nuclear Tests

COFA Compact of Free Association

DoE Department of Energy

ER Environmental Remediation

IAEA International Atomic Energy Agency

IHRC Harvard Law School International Human Rights Clinic

IPPNW International Physicians for the Prevention of Nuclear War

MINNC Marshall Islands National Nuclear Commission

NCT Nuclear Claims Tribunal

NPT Nuclear Non-Proliferation Treaty

NNWS Non-Nuclear Weapon State

NWS Nuclear Weapon State

RECA Radiation Exposure Compensation Act

RESEP Radiation Exposure Screening and Education Program

RMI Republic of Marshall Islands

TPNW Treaty on the Prohibition of Nuclear Weapons

TRW Toxic Remnants of War

VA Victim Assistance

IARC International Agency for Research on Cancer

I. INTRODUCTION AND HISTORICAL BACKGROUND

The global security landscape has deteriorated significantly in recent years, with current conflicts such as the war in Ukraine and Iran exacerbating geopolitical divisions and reviving nuclear tensions. Against this backdrop, understanding the history and intergenerational impacts of nuclear weapons testing is not merely an academic exercise but an urgent policy imperative.

World War II triggered an unprecedented global arms race, marking the beginning of the nuclear age. On 16 July 1945, the United States detonated the world's first atomic bomb, the Trinity Test, in the New Mexican desert, irrevocably altering the course of humanity (Burton, 2025). The bombings of Hiroshima and Nagasaki weeks later inaugurated an era of nuclear proliferation that would span decades. Between 1945 and 1996, more than 2,000 nuclear tests were conducted globally, leaving a legacy of environmental contamination and human suffering that persists to this day (Makhijani & Ruff, 2023). Testing sites have spanned the globe, with detonations carried out in or near Algeria, Australia, China, French Polynesia, India, Kazakhstan, the Marshall Islands, Pakistan, Russia, the United States, and Uzbekistan, among others (Bolton & Minor, 2021; see Annex 1). Far from being a contained technological endeavour, nuclear testing has functioned as what French sociologist Marcel Mauss (1923, as cited in Maurer, 2020, p. 372) termed a "total social fact": a phenomenon with economic, legal, political, and psychological ramifications extending far beyond the test sites themselves.

From its inception, nuclear testing has been inseparable from histories of racism and colonialism. Testing sites have overwhelmingly consisted of colonies, former colonies, or the territories of ethnic minorities, frequently selected under colonial claims of *terra nullius*—the fiction that sites were uninhabited (Panchasi, 2019). Different radiation protection standards were applied to local residents than to military personnel, with a 1957 British report permitting dosages up to 15 times higher for those described as "primitive people" than international limits allowed (Makhijani & Ruff, 2023).

The United States and France are the central cases examined in this report. The US conducted the majority of its tests at the Nevada Test Site and in the Marshall Islands, where 67 nuclear tests between 1946 and 1958 carried a cumulative yield equivalent to approximately 7,000 Hiroshima bombs (Casey-Maslen & Østern, 2025). The 1954 Castle Bravo test dispersed radioactive debris across 10,000 square kilometres, displacing entire communities and causing the worst radiological disaster in US history (Burton, 2025). France conducted 17 nuclear tests in the Algerian Sahara between 1960 and 1966 (Hennaoui & Nurzhan, 2023), with its first test, Gerboise Bleue, carrying four times the yield of the Hiroshima bomb (Panchasi, 2022). Fallout spread across Africa and the Mediterranean (Bolton, 2017). Following Algerian independence, France relocated its programme to French Polynesia, where 193 further tests were conducted between 1966 and 1996 (Sağır & Akkaya, 2025).

The consequences of these programmes are profound and enduring, yet adequate compensation mechanisms remain greatly lacking. This report aims to fill a persistent gap in comparative analysis by outlining the environmental and health impacts across all four sites, examining

international normative frameworks for environmental remediation and victim assistance, and conducting a detailed comparative analysis of the compensation mechanisms established by the United States and France. While some states have established additional compensation frameworks for military personnel and veterans exposed during testing, these fall outside the scope of this report, which focuses on civilian populations and affected communities only; however, a comprehensive comparative analysis of military compensation schemes would constitute a valuable complement to this research.

The report concludes with 32 policy recommendations, assessed by priority and feasibility, calling for a fundamental shift towards a human-centred, rights-based framework. The cases of the United States and France illustrate a pattern that is global in scale yet deeply local in consequence: nuclear testing conducted at a distance from the metropole, on colonised or marginalised populations, with costs that have never been fully reckoned with. It is this reckoning, or its absence, that forms the central subject of this report.

II. OVERVIEW OF HEALTH AND ENVIRONMENTAL HARMS

The harm resulting from nuclear testing is both profound and multidimensional, encompassing the enduring degradation of ecosystems, human health, and societal structures. Across all four sites examined in this report, radioactive fallout extended far beyond intended test boundaries, contaminating air, water, soil, and food systems. Staple crops remain primary exposure pathways decades after testing, and elevated radioactivity is still detected in locally grown produce as recently as 2017 (Topping et al., 2019; Makhijani & Ruff, 2023). The disruption of traditional food systems has constituted both a direct health hazard and an erosion of food sovereignty across affected communities.

The physical health consequences are severe and wide-ranging, spanning acute radiation sickness, elevated rates of thyroid, bone, breast, and blood cancers, chronic cardiovascular and respiratory illness, and intergenerational biological effects including genomic instability and epigenetic abnormalities (Herota, 2018; Ruff, 2023; Sueur, 2018). Women and girls have consistently borne a disproportionate burden: thyroid cancer prevalence was found to be nearly twice as high in females as in males in the Marshall Islands (Takahashi et al., 2003), while French Polynesian women recorded the highest global incidence of thyroid cancer and myeloid leukaemia between 1998 and 2002 (Ruff, 2023). Reproductive harm has been particularly devastating, with dramatic rises in miscarriages, stillbirths, and severe congenital anomalies documented across testing communities (Herota, 2018; Keown, 2019).

Nuclear testing also inflicted profound psychosocial and cultural harm. Contamination rendered traditional foods and ancestral lands taboo, eroding ecological knowledge and intergenerational cultural continuity (Johnston & Barker, 2008, as cited in Hahn, 2020). In the matrilineal Marshallese society, forced displacement severed women's cultural identity and social standing, while the shame surrounding reproductive harm drove many women into silence and isolation—a pattern that has become intergenerational (Eknilang, 2003; Maurer, 2020). At multiple sites, affected populations were also subjected to deliberate human experimentation

without informed consent, including Project 4.1 in the Marshall Islands and the use of Algerian prisoners during French atmospheric tests (Herota, 2018; Hennaoui & Nurzhan, 2023).

A comprehensive overview of the environmental and health harms across all four case studies, including detailed evidence on ecological degradation, gendered harm, and psychosocial impacts, is provided in Annex 2.

III. COMPENSATION MECHANISMS

1. Environmental Remediation

Environmental remediation (ER) is defined as an iterative, long-term process designed to mitigate unacceptable future radiological hazards and rectify current ecological damage caused by nuclear testing, which represents the "largest ever human source of radioactive contamination". The core objective of ER is to reduce radiation doses to levels "as low as reasonably achievable" (ALARA) for a site's intended use, thereby prioritizing the protection of fundamental human rights, including the rights to life, health, and a healthy environment, while acknowledging that complete restoration to a pristine state is rarely technically feasible. Achieving this requires a multifaceted strategy blending physical treatments like containment and stabilization with administrative interventions such as culturally appropriate risk education and fencing. The process is governed by the core principles of justification and optimization, ensuring that the benefits of intervention outweigh detriments and that the chosen strategy maximizes the margin of good over harm for affected communities. This necessity is driven by six goals: 1) mitigating severe, persistent health hazards, especially for vulnerable populations whose risks were historically underestimated by the "Reference Man" model; 2) managing persistent and migratory contaminants that bioaccumulate over centuries or millennia; 3) restoring ecosystems and biodiversity damaged by "catastrophic" events; 4) fulfilling legal obligations, particularly the positive duty to remediate under the TPNW; 5) serving as cultural and social restitution for communities displaced by "nuclear colonialism"; and 6) preventing climate-induced re-contamination, as environmental changes threaten the integrity of existing containment structures.

Recognized as a shared and global responsibility, the operational framework for ER shifts from a purely "internal matter" to a collaborative model involving four key actors. The "Affected States" assume the primary lead, responsible for developing a comprehensive National Strategy and prioritizing action plans through the assessment and surveying of contamination levels on their territory. However, the "Harming States"—those that conducted the tests—bear a "primary and unequivocal responsibility" to support remediation by providing financial, material, and technical assistance, and critically, by releasing formerly classified scientific data on test yields and burial sites to enable accurate risk assessments. International Organisations (IOs) are tasked with bridging the recognized "mandate gap" in the international architecture by promoting capacity building, sharing best practices, and actively supporting national authorities in implementation. Finally, the framework mandates that "Affected Communities," particularly Indigenous and colonized populations, must be transitioned from passive subjects to active

partners in inclusivity, ensuring their involvement at every stage, from site characterization to defining the desired "end state" for land use, thereby recognizing remediation as social and cultural restitution.

A comprehensive overview of environmental remediation goals, purposes, and frameworks is provided in Annex 3.

2. Victim Assistance

Victim assistance (VA) is a well-established pillar of humanitarian disarmament law, given concrete expression through the Mine Ban Treaty, the Convention on Cluster Munitions, and the Treaty on the Prohibition of Nuclear Weapons (TPNW). All three instruments require states parties to assist individuals harmed by banned weapons or their remnants. For this report, the TPNW is the most directly relevant framework, as it specifically addresses the impacts of nuclear weapons. Crucially, the principles underpinning VA do not constitute a mechanism of compensation for unlawful acts; rather, they embody a collective commitment to supporting victims' full participation in society and the realisation of their human rights (IHRC & CEOBS, 2020).

Victims are defined broadly as individuals, families, and communities who have suffered harm caused or aggravated by toxic remnants of war, with victim status not dependent on identifying the responsible actor. The scope of harm encompassed by VA includes physical and psychological injury, mortality, social marginalisation, economic loss, barriers to cultural participation, environmental degradation, and broader human rights violations (IHRC & CEOBS, 2020). In terms of provision, Article 6(1) of the TPNW specifies that VA should encompass medical care, rehabilitation, psychological support, and measures for social and economic inclusion without discrimination. The IHRC and CEOBS (2020) identify additional components, including acknowledgement of harm, facilitation of cultural participation, environmental remediation, and access to accurate information about harms and risks. The guiding principles are non-discrimination, accessibility, inclusivity, and transparency, with the TPNW notably requiring "age- and gender-sensitive assistance"—a provision reflecting the growing recognition of the differentiated impacts of nuclear weapons across genders and life stages (Nichols & Olson, 2024).

On responsibility, the TPNW establishes both a collective obligation on all states parties in a position to assist (Art. 7(4)) and, more significantly, an explicit duty on states that have used or tested nuclear weapons to provide adequate assistance and environmental remediation (Art. 7(6)). This marks a meaningful departure from all previous disarmament treaties (Singh, 2020). Beyond individual state responsibility, effective implementation requires sustained information management, strategic planning, capacity building, and the sharing of scientific and technical information with affected states (IHRC & CEOBS, 2020).

Despite these normative advances, the translation of VA commitments into practice remains limited and uneven. Only a small number of states have established formal mechanisms, many

of which restrict eligibility to veterans or military personnel, excluding large segments of affected civilian populations (see Annex 5 for an overview of existing national frameworks).

For a detailed elaboration of victim assistance definitions, frameworks, and responsibilities, see Annex 6.

3. Case Studies

The following case studies examine how the frameworks and principles outlined above translate into practice, analysing the environmental remediation and victim assistance mechanisms established by France and the United States across their respective testing sites in Nevada, the Marshall Islands, Algeria, and French Polynesia.

3.1. France

3.1.1 Environmental Remediation

The French nuclear testing programme generated long-lasting environmental contamination across both Algeria and French Polynesia that continues to shape the ecological and human landscape of each region. In Algeria, radioactive materials, including plutonium, were often buried in unmarked locations, and identified sites remain insufficiently secured (IAEA, 2005). In French Polynesia, atmospheric tests produced widespread radioactive fallout across the entire territory, contradicting official claims of limited exposure. In contrast, underground tests caused structural damage to the atolls with radioactive elements such as plutonium and tritium persisting in soils and lagoon sediments (Adams et al., 2006). Across both sites, contamination is mobile and bioaccumulative: radioactive particles travel through air currents, ocean currents, and food chains, with fallout from Algeria detected as far as West Africa and Southern Europe. This aligns with established remediation frameworks, which conceptualise contamination as requiring long-term management rather than a one-time clean-up (Hennaoui et al., 2025).

France has never provided intergovernmental compensation to Algeria as a state for the harm caused by its nuclear testing programme, in direct contradiction of the principle that polluting states bear primary responsibility for remediation (IHRC & CEOBS, 2022). In both Algeria and French Polynesia, where the absence of a separate sovereign government forecloses intergovernmental reparations, the primary mechanism of redress has been the Morin Law. In Algeria, while some bilateral initiatives have taken place— in 2007, 2014, and 2022—none has produced substantive cleanup commitments, and France has never compensated Algeria as a state (Hennaoui et al., 2025; Sağır & Akkaya, 2025). In 2025, a joint statement by ICAN and several international organisations called on France to disclose archival documents and maps identifying radioactive waste burial sites, expand compensation mechanisms, and provide long-term technical and financial support for environmental remediation, while also criticising both France and Algeria for slow implementation and continued opacity (ICAN et al., 2026). The same year, the Algerian National People's Assembly addressed the nuclear testing legacy for the first time in a parliamentary session, calling for greater transparency, victim assistance, environmental monitoring, and historical accountability. In France, parallel discussions have

emerged around reforming the compensation framework and expanding access to nuclear archives (Hennaoui et al., 2025).

3.1.2 Victim Assistance

Compensation stemming from nuclear testing conducted by France in both French Polynesia and Algeria is governed by LAW No. 2010-2, referred to as the Morin Law, and applies to French Atomic Veterans, individuals suffering from occupational radiation exposure related to nuclear testing, and civilians living in impacted areas at the time of testing (Loi n° 2010-2, 2010/2021). The Morin Law was originally enacted in 2010, establishing an annual budget of 10 million euros to provide compensation to eligible victims of French nuclear testing (Mashimo, 2022). The 2010 law established conditions victims must meet to be eligible for compensation, including presence in an affected area and diagnosis with a recognized radiogenic disease. Under the original law, cases were individually reviewed by a compensation committee, which would determine if the criteria for eligibility were met. If conditions for compensation were met, a presumption of causality was established, unless the potential impact of radiation exposure was considered to be negligible based on disease presentation and level of exposure. Following this investigation, the Minister of Defense determined whether compensation would be granted to the applicant.

The Morin Law has been amended several times to establish recognized radiation thresholds, increase the number of compensable radiogenic diseases, and alter the state's ability to challenge the presumption of causation (Mashimo, 2022). The first amendment went into effect in 2013, only three years after the Morin law was entered into force, in order to address the 98.7% claim rejection rate. This revision expanded the list of recognized radiogenic cancers from 18 to 21, allowed individuals living anywhere within French Polynesia, rather than only Mururoa and Fangataufa Atolls, to seek compensation, and established the Compensation Committee for Victims of Nuclear Tests (CIVEN) as independent from the Ministry of Defense. In the following years, rejection rates remained high, with the law resulting in a lifetime rejection rate of 97.5% by the end of 2017, having approved only 31 claims over 7 years. In 2017, the Morin Law was modified again, leading to the short-lived removal of the 'negligible risk' clause and establishing an 'irrefutable presumption' of causation in submitted cases. The concept of irrefutable presumption was challenged by the courts within the same year, with the Council d'Etat issuing an opinion establishing that presumption could be removed if a disease could be proven to be caused solely through an alternative pathway. In 2018, CIVEN established a 1mSv/year threshold for radiation exposure for the general public, which was later codified into law.

The most recent version of the Morin Law recognizes 23 compensable diseases for victims of French nuclear testing (Philippe et al., 2023). Under current law, successful claimants must have been exposed to more than 1mSv of radiation within a single year. Additionally, in French Polynesia, individuals seeking compensation related to testing must provide a documented diagnosis of a recognized radiogenic disease and proof of presence in the islands between July 1966 and December 1998 (Loi n° 2010-2, 2010/2021). In Algeria, individuals impacted by

testing must provide proof of presence near the Saharan Center for Military Experiments between February 1967 and December 1967 or the Center for Military Experiments between November 1961 and December 1967.

Successful claims under the Morin Law result in a lump-sum payment, the value of which is determined on a case-by-case basis (Loi n° 2010-2, 2010/2021). As of December 2024, a total of 1,026 individuals have been recognized as victims of French nuclear testing, 219 of whom have been recognized through the courts rather than CIVEN, resulting in a total of 90.8 million Euros awarded to recognized victims (CIVEN, 2025). If an otherwise eligible individual is deceased, a claim may be filed by a beneficiary. This mechanism does not acknowledge the transgenerational impacts of nuclear testing; rather, it serves to compensate family members for the suffering of their decedent. As of 2025, a proposed amendment to the Morin Law seeks to extend compensation to the children of victims recognized under the Morin Law (Hennaoui et al., 2025).

3.2. United States of America

3.2.1 Environmental Remediation

Remediation efforts at the Nevada Test Site are overseen by the DoE's Environmental Management Nevada Program. The programme's primary strategy weighs the removal and disposal of contaminated material against closing sites in place with permanent land use restrictions, thereby reflecting both the scale of contamination and the limits of available technology. Some progress has been made: in October 2020, the DoE announced the completion of soil remediation from atmospheric testing at the Tonopah Test Range, and less than 1% of surface soils at the site are currently reported as radiologically contaminated. However, full clean-up of the broader Nevada National Security Site is not expected until 2032, with waste storage requirements projected to extend for centuries. The most persistent challenge remains the management of irradiated underground aquifers and soil resulting from 828 subterranean tests. Across the country, radiation levels are tracked by the Environmental Protection Agency's (EPA) RadNet, a nationwide monitoring network originally designed to detect nuclear fallout (Casey-Maslen & Casey-Maslen, 2025).

3.2.2 Victim Assistance

Within the United States, compensation to individuals impacted by nuclear testing is managed on the federal level through three primary programs and is supplemented by a grant program for education and outreach related to radiogenic disease. Claims made by veterans exposed during nuclear testing, referred to as Atomic Veterans, are managed through the United States Department of Veterans Affairs under two complementary statutes: the Veterans' Dioxin and Radiation Exposure Compensation Standards Act, which establishes the case-by-case adjudication framework, and the Radiation-Exposed Veterans Compensation Act, which provides a presumptive service-connection pathway for qualifying atomic veterans (Panangala et al., 2014). Claims made by those exposed through occupational hazards are managed primarily through the United States Department of Labor under the Energy Employees

Occupational Illness Compensation Program Act (U.S. Department of Labor, n.d.). The only federal program applicable to non-occupational civilian radiation exposure claims related to nuclear testing is the Radiation Exposure Compensation Act (RECA), which is managed by the United States Department of Justice (Szymendera, 2017).

RECA was passed in its original form in 1990 and provided a non-adversarial alternative to litigation for victims seeking compensation for individuals who developed radiogenic diseases following exposure to radiation from US atmospheric nuclear weapons testing or through employment in the uranium industry (Szymendera, 2017). The original bill was narrow in scope, capping compensation for downwinders at $50,000 and limiting recognized downwinders to individuals living in Arizona, north of the Grand Canyon and west of the Colorado River, or in 13 counties spread across Nevada and Utah. RECA has been substantively amended twice, once in 2000 and once in its 2025 reauthorization following expiration in 2024 (Szymendera, 2017; One Big Beautiful Bill Act, 2025, §§ 100201-100205). Both amendments served to expand eligibility criteria for downwinders by expanding dates of eligibility, recognized geographic areas of exposure, and diseases presumed to be caused by radiation exposure. The current iteration of RECA provides compensation of $100,000 for eligible downwinders, which are defined as individuals diagnosed with one of 19 recognized radiogenic diseases after being present in any impacted area for at least a year between January 1951 and November 1962, for the entirety of June 30, 1962, to July 31, 1962, or present in the state of New Mexico for at least a year between September 1944 and November 1962 (U.S. Department of Justice, 2026). Areas recognized as impacted include the entirety of Idaho, New Mexico, and Utah, as well as six counties in Arizona and six counties and several townships in Nevada. Notably, the 2025 reauthorization of RECA further expanded compensation to non-occupational victims of Manhattan Project Waste, allowing compensation of up to $50,000 for individuals living in specified zip codes across Missouri, Alaska, Tennessee, and Kentucky, and diagnosed with a recognized radiogenic disease.

As of March 2026, RECA has awarded over 2.9 billion dollars in total compensation, over 1.4 billion and 71 million of which have been awarded to downwinders and Manhattan Project Waste victims, respectively (U.S. Department of Justice, 2026). RECA benefits are paid out of general revenue and are not associated with a capped fund, although all claims must be submitted either online or via mail prior to the slated program sunset on December 31, 2027 (Szymendera, 2017; U.S. Department of Justice, 2026). Additionally, relatives are able to claim compensation on behalf of deceased parents or spouses who meet eligibility criteria. These benefits are capped at half of the total possible benefits available to a victim meeting the same criteria who is alive at the time of filing for compensation.

In addition to direct monetary compensation, the United States Health Resources and Services Administration operates the Radiation Exposure Screening and Education Program (RESEP) (Health Resources and Services Administration [HRSA], 2024). RESEP provides annual grants to healthcare organizations working to provide screening, health education, and care for those at risk of radiogenic disease within the geographic areas outlined under RECA. Organizations receiving grants through RESEP are explicitly required to assist clients in compiling and

submitting medical documentation for compensation under RECA. A total of $1.7 million is available in grants annually, with individual grants awarded at a value of $250,000. These grants, and the work these grants enable, serve to support RECA and direct victims of nuclear testing towards available government compensation programs.

3.3. Republic of Marshall Islands (RMI)

3.3.1 Environmental Remediation

Remediation in the Marshall Islands has been sporadic and focused on specific atolls rather than a nationwide effort: Between 1978 and 1980, an extensive radiological clean-up at Enewetak Atoll involved the physical removal of topsoil to eliminate radioactive contamination; however, this effort was limited to certain islands, resulting in the loss of vital nutrients and vegetation and leaving the population reliant on imported food (Docherty & Sickel, 2025). Concurrently, the Runit Dome was constructed in the Cactus crater as a concrete repository to contain nuclear waste from the islands and material transported from the Nevada test site (Docherty & Sickel, 2025). Despite these containment efforts, the 2020 Department of Energy (DoE) report to the US Congress acknowledged ongoing risks from contaminated groundwater associated with the dome.

Nevertheless, remediation of caesium-137 contamination was indeed effective when it included the application of potassium-based fertilizers to reduce radionuclide uptake by plants, combined with topsoil removal around inhabited areas and backfilling with crushed coral. This local practice effectively reduced radiation exposure in places where residents spent most of their time (Nikolić Hughes & Kilma, 2025; Robison et al., 2006). Earlier restoration projects, which did not properly address the source of the contamination, such as the 1960s planting of over 50,000 coconut palms and the construction of concrete homes on Bikini Island, failed to account for the invisible caesium-137 contamination absorbed by the trees, which led to premature resettlement and a subsequent forced evacuation in 1978 (Niedenthal, 1997). Robert C. Kiste (1974) critically highlighted how the U.S. Department of Agriculture's promotion of local food consumption before completing long-term radiological monitoring contributed to this false sense of security. Since 2012, following appeals from local leaders, the DoE has conducted groundwater radiochemical analyses to monitor the Runit Dome. The DoE report to Congress later acknowledged the risks of contamination and mentioned cracks in the surface of the dome (U.S. Department of Energy, 2020).

3.3.2 Victim Assistance

In 1986, the United States and the Republic of the Marshall Islands adopted the Compact of Free Association (COFA), including Section 177 of the agreement, designed to establish a compensation mechanism for the damage caused by the United States nuclear testing program (Stiles, 2024). Section 177 of COFA established both the $150 million compensation fund and the Nuclear Claims Tribunal, the body charged with reviewing claims and awarding damages (Compact of Free Association, 1986, § 177). The agreement barred both the RMI government and Marshallese citizens from pursuing further legal action against the United States government or affiliates, including its employees, citizens, and contractors, for claims related

to nuclear testing in the Marshall Islands, although a petition by the RMI to the US Congress was permitted under the Changed Circumstances provision. This clause preserves the ability of the Marshallese government to request additional compensation for injuries discovered after the adoption of the Section 177 agreement that could not have been reasonably anticipated at the time of the agreement.

The RMI government submitted a petition to the US Congress under the Changed Circumstances Clause in late 2000, requesting additional funding to partially satisfy awards made by the Nuclear Claims Tribunal, support existing and establish additional healthcare programs, and expand medical monitoring (Marshall Islands National Nuclear Commission, 2019). In 2004, the US Congress found that the RMI was not legally entitled to additional compensation under COFA (Stiles, 2024). While the United States formally rejected the petition through executive and congressional channels, the Marshallese government and advocacy documents later characterize this as a lack of response, reflecting disagreement over whether procedural rejection constitutes substantive engagement.

The Compact of Free Association, along with Section 177, has been renewed twice by the US Congress, most recently in 2023 (Stiles, 2024). This renewal established an additional $700 million fund designed to further address the nuclear legacy of the Marshall Islands. Between 1991 and 2006, the Nuclear Claims Tribunal awarded $91 million to 1,999 impacted individuals, recognizing 36 compensable diseases (Marshall Islands National Nuclear Commission [MINNC], 2019). To file a claim with the Nuclear Claims Tribunal, a claimant was required to provide proof of residency in the Marshall Islands during the years of nuclear testing between July 1, 1946, and August 19, 1958, and demonstrate a diagnosis of one of the listed compensable diseases, which the Tribunal presumed to be caused by radiation exposure (Louka, 2023). To date, no claimant has received the full amount awarded to them by the tribunal, which has awarded $2.3 billion in damages to residents of the Marshall Islands (United Nations Human Rights Council [UNHRC], 2024). The exhaustion of the original fund in 2009 has left $2.2 Billion dollars in property damage awards and $23 million in personal injury awards unable to be paid (MINNC, 2019). While no active individual claims mechanism has been reestablished, the $700 million trust fund established under the 2023 COFA renewal provides a potential pathway for satisfying previously awarded and future claims, the mechanism for which has not yet been publicly determined.

Beyond direct compensation, Section 177 of COFA established the 177 Health Program, alternatively called the Four Atolls Health Program. Although the funding mechanism has changed through various COFA renewals, this program is currently funded through the United States Department of the Interior and seeks to provide healthcare to individuals living in communities that have been highly impacted by the US nuclear program (U.S. Department of the Interior, 2025). This program, however, remains underfunded, and funding for the program is currently tagged as ‘under review’ by the Department of the Interior. Problems with this program are not new—in 2019, the Marshall Islands issued calls for increased funding, a review of protocols, and discussions to address concerns by Marshallese participants (MINNC, 2019). Additionally, the Department of Energy administers a separate Special Medical Care Program,

explicitly limited to members of the Rongelap and Utrik populations directly exposed to fallout from the 1954 Castle Bravo test, providing ongoing cancer screening and treatment distinct from the broader 177 Health Program administered by the Department of the Interior (US Department of Energy, n.d.).

In addition to funds awarded through Section 177 of COFA, the United States government has made a reported $850 million in ex gratia payments (UNHRC, 2024). These payments are not acknowledged by the United States government as being a form of reparations or as being legally required, with some of these payments predating the establishment of COFA.

IV. ANALYSIS / DISCUSSION

The preceding case studies reveal that while the United States and France have each established formal mechanisms for victim assistance and environmental remediation, both systems share fundamental structural shortcomings. Across all four testing sites examined, affected communities face similar barriers to adequate redress: overly complex application processes, rigid and often unprovable causality requirements, and compensation sums that bear little relation to the scale of harm inflicted. These operational failings are not incidental but symptomatic of deeper, systemic flaws in the data upon which compensation decisions rest, the definitional frameworks that determine who qualifies as a victim and what counts as harm, and the international legal architecture that governs accountability. The following analysis examines these interconnected dimensions in turn, drawing on the evidence presented throughout this report to identify the structural patterns that perpetuate what this report terms uncompensated harm.

1. Total Value of Compensation Mechanisms

Disparity exists across the three programs examined in the total value of compensation made available to victims, although analysis of these disparities must consider the goals of these programs and the contexts in which they exist.

The Morin Law operates on an annual budget of 10 million euros, providing lump-sum payments to recognized victims on a case-by-case basis, averaging approximately 65,000 euros per successful claimant (CIVEN, 2025). Since 2010, the program has awarded a total of 90.8 million euros across 1,026 recognized victims, which, when considered against estimates that up to 110,000 individuals in French Polynesia alone may have been affected by French nuclear testing, illustrates the vast gap between the scale of harm and the reach of existing compensation (Philippe et al., 2023; CIVEN, 2025). The program's fixed annual budget functions as a structural ceiling on recognition. Regardless of how many individuals are eligible, the French state's financial commitment to its nuclear victims remains limited.

RECA operates as an uncapped entitlement program with every eligible claimant holding a legal right to compensation (Szymendera, 2017). To date, RECA has awarded nearly $2.9 billion in total compensation, over $1.4 billion of which has gone directly to civilian downwinders (U.S. Department of Justice, 2026). This represents only one component of a

broader federal compensation architecture that includes the VA atomic veterans system and EEOICPA for occupational victims and does not include the budget allocated to environmental remediation. The full scope of US nuclear testing compensation, across all programs, is substantially larger. The $700 million trust fund established under the 2024 COFA renewal for the Marshall Islands must be understood in this context. Unlike RECA, the COFA fund is an intergovernmental transfer designed to address the entire nuclear legacy of a sovereign nation, including individual compensation, environmental remediation, and healthcare (Stiles, 2024). This disparity reflects the structural advantage of domestic victims over foreign nationals in the administration of nuclear justice.

This is not to say that RECA is without significant gaps. A lump-sum payment of $100,000 is insufficient to compensate for lifelong damage or the potential decades of treatment a radiogenic diagnosis requires. Additionally, while both the American and French systems allow survivors to collect compensation on behalf of deceased victims, neither program currently recognizes the intergenerational harm caused by nuclear testing, which may come with additional financial requirements.

2. Presumption of Causation

Perhaps the most consequential design choice in any nuclear compensation program is the standard of causation applied to individual claims. As Mashimo (2022, para. 55) observes, "as long as it is impossible to prove perfect causality, introduction of some sort of presumption of causality is indispensable for any compensation and relief system for the victims of low-level ionizing radiation around the world". This is illustrated within the case studies.

The Morin Law's original "negligible risk" standard produced a 97.5% rejection rate over its first seven years of operation, with only 31 claims approved between 2010 and the end of 2017 (Mashimo, 2022). The introduction of presumptive causation through the 2017 Loi EROM, and its subsequent codification through the 1 mSv threshold in 2018, produced a dramatic increase in approval rates. However, the 1 mSv threshold preserves a basis for denial that pure presumption does not. In 2024 alone, 243 victims who met all other criteria for compensation were rejected based solely on estimated radiation dose (CIVEN, 2025). Individual dose reconstruction is inherently unreliable. Exposure to ionizing radiation leaves no definitive biological marker, and dose estimates are generated using data produced by the French government, the same state whose financial interests are served by minimizing the number of recognized victims. Where dose reconstruction determines eligibility, the testing state retains the ability to draw the boundaries of compensable harm. Under RECA, no individual dose reconstruction is required, and no dose threshold must be met. Claimants qualify for compensation by establishing a diagnosis of a recognized radiogenic disease and proof of presence in a designated area for a specified period, with the government's own delineation of impacted areas substituting for any individual assessment of exposure (U.S. Department of Justice, 2026). This model represents the clearest operationalization of irrebuttable presumption available in existing nuclear compensation frameworks. In France, advocates have called for irrebuttable presumed causation without threshold limits based on the RECA model since

before the adoption of the Morin Law, and the state's continued resistance to adopting it signals a persistent unwillingness to fully acknowledge the scope of nuclear harm (Mashimo, 2022).

3. Accessibility of Compensation

The diseases recognized as compensable under a nuclear compensation program dictate who can access compensation and who is recognized as a victim under the law. Under RECA, civilian downwinders are eligible for compensation only if diagnosed with one of 19 recognized radiogenic diseases (U.S. Department of Justice, 2026). The Morin Law currently recognizes 23 compensable diseases for victims of French nuclear testing (Philippe et al., 2023). In contrast, the Nuclear Claims Tribunal recognized 36 compensable diseases (MINNC, 2019). This disparity is not incidental. The Nuclear Claims Tribunal was the only compensation body examined in this paper that was not administered by the state responsible for inflicting nuclear harm. Instead, the NCT operated as an independent Marshallese institution funded by the United States. The program that recognized the broadest range of radiogenic diseases was also the only program administered by the affected population rather than the testing state, suggesting that the number of diseases recognized under a compensation program reflects the political interests of the administering state as much as the scientific evidence of radiogenic harm. Where the testing state controls both the program design and the disease list, the boundaries of compensable harm have consistently been drawn more narrowly than the science of radiation exposure would warrant.

Variability in access is also seen in cases where multiple groups are governed under the same law, as illustrated by the Morin Law, where the requirements set forth by the French government have proven to be nearly insurmountable for Algerian victims. The period of potential damage to Algerians recognized by the French government is notably shorter than the period of potential damage to French Polynesians. The French government has not provided intergovernmental compensation to the Algerian government, and the Morin law remains the primary avenue of recourse for Algerians impacted by the French nuclear program (Hennaoui et al., 2025). Despite governance under the same law, Algerian victims of French nuclear testing face additional barriers to compensation. Obtaining medical records reflecting diagnosis or documents proving residence at or around recognized testing sites is often difficult for nomadic populations within Algeria. Even Algerians employed by the French government at testing sites during ongoing experiments face difficulty proving their eligibility. In these cases, employment was often conducted without formal contracts, leaving Algerian victims without the necessary paperwork to file for compensation under the Morin Law. Additionally, the Morin Law was not translated into Algerian Arabic until 2023, creating a significant barrier to individuals seeking to understand their right to compensation. These barriers have resulted in disproportionate application of the Morin Law. To date, only two successful claims under the Morin Law have originated from Algeria.

Access to compensation is contingent not only on program eligibility but on whether affected populations are aware that compensation mechanisms exist and are supported in navigating claims processes. Within the United States, RESEP funds healthcare organizations across

affected states to provide free medical screening and direct claims assistance, explicitly requiring grantees to assist clients in compiling and submitting documentation for RECA claims (HRSA, 2024). Despite this, the funding for this program is limited, and additional outreach efforts are necessary to further increase awareness and thus access to victim compensation. In French Polynesia, the "Aller vers" mission established in 2022 provides claim assistance across all archipelagos and is cited by CIVEN as being a driver of the increasing number of submissions in 2024 (CIVEN, 2025). These submissions are coming almost exclusively from French Polynesia, with only two submissions originating from Algeria in 2024. Notably, no analogous education or outreach program exists in Algeria. In the Marshall Islands, President Hilda Heine delivered her keynote address at the 2026 Nuclear Victims Remembrance Day in Marshallese, centring the language of the affected population in acts of public commemoration. While no active individual claims system is active, addressing the nation’s nuclear legacy in both Marshallese and English is a method of increasing awareness among impacted populations and bringing awareness to the need for further action.

4. Absence of Judicial Mechanisms

Neither the TPNW nor existing humanitarian disarmament treaties provide individual victims with judicial recourse. As Singh (2020) notes, Article 11 of the TPNW addresses disputes only between states; no mechanism exists through which individual victims can submit grievances, seek enforcement of treaty provisions, or challenge violations of their rights before an independent forum. Similarly, the Marshall Islands' attempt to seek accountability through the International Court of Justice, filing suit against all nine nuclear-armed states for failure to pursue disarmament negotiations under the NPT, was dismissed in 2016 on jurisdictional grounds (Herota, 2018). This leaves victims dependent on the political will of the very states responsible for the harm inflicted upon them.

5. Compromised Data and Controlled Access

Any compensation framework is only as reliable as the evidence upon which it rests. Across all four case studies, this evidence base is fundamentally compromised by design.

A structural conflict of interest has shaped data collection from the outset. In every testing programme examined, the military organisations conducting the tests were simultaneously responsible for monitoring their environmental and health impacts (Ruff, 2025). The overriding institutional priority was weapons development; protecting affected populations was, at best, secondary. In French Polynesia, the civil-military monitoring apparatus deployed from 1966 onward functioned primarily to demonstrate an "absence of risk" rather than to evaluate ecological or human harm independently (Coulon et al., 2009). In the Marshall Islands, the US Atomic Energy Commission had at least six hours' notice that wind patterns would carry Castle Bravo fallout toward inhabited atolls yet proceeded with detonation without evacuating residents. This was only revealed decades later through declassified documents (Keown, 2019). More troublingly still, declassified records show that the AEC actively encouraged the return of Rongelapese communities to contaminated lands in 1957, not for their safety, but because it afforded what internal documents described as a "most valuable ecological radiation study on

human beings" (Nikolić Hughes & Kilma, 2025). In 1971, the US administration went further, blocking an independent medical team from the Japan Congress against Atomic and Hydrogen Bombs from reaching Rongelap Atoll to assist fallout victims (Casey-Maslen & Østern, 2025). These were not failures of oversight but deliberate acts of suppression that served to maintain a culture of secrecy around the testing programme.

The resulting data gaps are severe. In French Polynesia, no cancer registry existed until 1988, no systematic medical follow-up was conducted for the estimated 13,000 Polynesian workers involved in the testing programme, and the registry that was eventually established has yielded no peer-reviewed publications in its 40-year history (Ruff, 2023). In Algeria, France has failed to disclose topographic maps of buried nuclear waste sites and has refused cooperation with the Algerian government on waste disposal (Sağır & Akkaya, 2025). Most dose reconstructions for French Polynesia rely on French military measurements from 2006 and 2014 that contain large uncertainties, while pre-1980s environmental data are fragmented and based on proxies never designed for epidemiological reconstruction. These margins of uncertainty are, in several cases, larger than the dose values themselves and are fundamentally undermining the official claim that residual contamination is "low" or "insignificant" (Bard et al., 2021).

Access to what data does exist has been systematically restricted. France's stringent laws have helped, in the words of one historian, to "ghost all but the faintest traces" of its Saharan tests from both professional historiography and public knowledge (Jarvis, 2022). Workers who attempted to document environmental changes in French Polynesia were silenced, and Polynesian communities were structurally excluded from scientific oversight processes (Coulon et al., 2009; Makhijani & Ruff, 2023). Medical practice itself was compromised: in French Polynesia, military doctors bound by state secrecy dominated healthcare provision until 1984 (Veeken, 1995). This creates what can be understood as an asymmetry of epistemic authority: the same actor responsible for the contamination controls the data used to assess it. Independent studies showing wider fallout patterns (Willis, 2006) suggest that this uncertainty is not neutral but systematically minimises the perceived scale of harm, thereby narrowing the scope of both remediation and compensation. The result, across all cases, is not simply an absence of data but a knowledge landscape shaped by institutional incentives to minimise harm, suppress independent inquiry, and control the narrative. It is on this compromised foundation that compensation eligibility has been determined.

6. Structural Barriers to Environmental Remediation

The politics of data and knowledge control extend directly into the domain of environmental remediation, producing distinct but equally consequential patterns of inaction across the case studies.

In Algeria, the barriers are the most fundamental. The absence of transparency regarding test data, waste locations, and military archives does not merely delay remediation; it structurally prevents it. Since effective remediation depends on accurate site assessment, the absence of reliable data blocks the process at its very first stage. Even international assessments, such as

the IAEA's 1998 report, rely heavily on French-provided data, reproducing this dependency and raising concerns about biased knowledge production (IAEA, 1998). France's failure to disclose topographic maps of buried waste sites and its refusal to cooperate with the Algerian government on disposal compounds this opacity (Sağır & Akkaya, 2025). The near absence of clean-up efforts since France's withdrawal in 1967, with contaminated materials remaining in place and waste locations still unknown, points to institutional abandonment rather than technical limitation.

In French Polynesia, more data exists, but access to military archives and radiological information remains controlled by the French state, creating an asymmetry of epistemic authority in which the actor responsible for contamination also controls the data used to assess it. Independent studies showing wider fallout patterns suggest that this asymmetry systematically minimises the perceived scale of harm (Willis, 2006). France's approach since 1996 reflects a shift from active remediation to risk management: monitoring systems aim not to eliminate contamination but to contain it over time. This strategic choice becomes increasingly untenable as climate change intensifies. Rising sea levels and erosion heighten the risk of radioactive leakage in fragile atoll ecosystems, rendering contamination not only persistent but progressively unstable, yet remediation frameworks remain static and fail to integrate these evolving risks.

In the Marshall Islands, technical remediation efforts are compounded by what scholars have described as "biocultural violation." For Indigenous Marshallese communities, the environment constitutes a sacred living space; contamination, therefore, represents not only a radiological hazard but a spiritual and cultural rupture that cannot be addressed through soil removal alone (IHRC & CEOBS, 2022; Nikolić Hughes & Kilma, 2025). Climate change further compounds this challenge, particularly as rising sea levels threaten to mobilise buried waste contained in structures such as the Runit Dome (Nikolić Hughes & Kilma, 2025).

Across all three contexts, the key variable determining the adequacy of remediation is not the existence of damage, but the degree of recognition, visibility, and political accountability attached to it. Remediation is failing not because the technical means are absent, but because the political will to act remains insufficient.

7. Defining Victims: Eligibility and Exclusion

The question of who qualifies as a victim is not merely technical but deeply political. Across the cases examined, the definitional frameworks used to determine eligibility have systematically narrowed the scope of recognised harm, excluding vast segments of affected populations.

7.1. Eligibility Criteria and Colonial Hierarchies

Existing compensation mechanisms have consistently applied different standards to different populations along colonial lines. Radiation protection limits were set lower for local residents than for military personnel, with one 1956 British report explicitly noting that reduced safety

thresholds would pose a health risk "only to primitive peoples" (Makhijani & Ruff, 2023). Similar attitudes underpinned US decision-making in the Marshall Islands, where Henry Kissinger's remark: "there are only ninety thousand people out there. Who gives a damn?" encapsulated the dehumanisation of affected populations (Herota, 2018). These attitudes were not merely rhetorical; they shaped the material design of eligibility criteria, burden-of-proof requirements, and the geographic boundaries within which compensation could be claimed.

The dehumanisation of Indigenous peoples was not incidental to nuclear testing but integral to its logic. An AEC memorandum explicitly described the populations living downwind of the Nevada Test Site, primarily Native Americans, as a "low-use segment of the population" (Casey-Maslen & Casey-Maslen, 2025, p. 282). Testing sites such as Western Shoshone territory were used in direct violation of the 1863 Treaty of Ruby Valley, illustrating a total disregard for Indigenous sovereignty. In the Marshall Islands, official newsreels referred to displaced inhabitants as "savages, but happy savages," a dehumanising framing designed to minimise the moral weight of their forced migration (Casey-Maslen & Østern, 2025, p. 194). These attitudes were not merely rhetorical; they shaped the material design of eligibility criteria, burden-of-proof requirements, and the geographic boundaries within which compensation could be claimed.

This resulted in radiation protection limits being set lower for local residents than for military personnel. Thus, in the United States, downwinder communities began challenging RECA's eligibility criteria from the moment of its enactment (Boutté, 2002). Native American communities such as the Southern Paiute and Western Shoshone, though falling squarely within the downwind category, have faced additional barriers to recognition and redress. Similarly, in the Marshall Islands, compensation has been formally limited to four atolls, creating arbitrary geographic boundaries that have generated inter-community tensions, a dynamic in which those excluded from eligibility are perceived as seeking "a piece of the pie," thereby fracturing social cohesion among populations already profoundly harmed (Marshall Islands National Nuclear Commission, 2019). The double standard is most visible in the structural architecture of US compensation: RECA provides compensation to domestic downwinders and veterans yet categorically excludes Marshallese people who were downwind of the same atmospheric tests (Nikolić Hughes & Kilma, 2025).

7.2. Threshold Thinking

Bolton (2022) identifies the ideological foundation underpinning these eligibility restrictions as "threshold thinking": the politically constructed assumption that fallout can be contained within fixed spatial boundaries, that there exists a dose below which radiation is harmless, and that only a narrow set of harms, typically a limited list of cancers, should be recognised. These assumptions were not derived from scientific consensus but were constructed by nuclear-armed states to minimise liability and restrict the scope of compensation. The fiction of terra nullius, that testing sites were empty, uninhabited land, served a parallel function, erasing the presence of communities who would later be denied victim status. Colonial powers claimed that the Algerian Sahara and remote Pacific atolls were vast areas devoid of people and thus natural containers of radioactive contamination, while deliberately spreading misinformation regarding

the risks and dangers of testing (Panchasi, 2019; Hennaoui & Nurzhan, 2023). The impossibility of establishing genuinely "unexposed" comparison groups, as demonstrated in both the Marshall Islands (Hahn, 2020; Schwartz, 2022) and French Polynesia (Sueur, 2018; Ruff, 2023), reveals that these spatial and categorical boundaries have always been artificial, yet they continue to determine who receives compensation and who does not.

7.3. The Lifecycle Model and Intergenerational Harm

Most existing mechanisms fail to account for the intergenerational dimensions of radiological harm. The lifecycle model, as articulated by Nichols & Olson (2024), holds that reproductive cells are present at all stages of human life, meaning that radiation exposure at any point has the potential to cause heritable damage that manifests in subsequent generations. Compensation frameworks that limit eligibility to those physically "present" at the time of testing, therefore, exclude, by design, the very populations in whom intergenerational harm has been most clearly documented. This includes especially children born with congenital anomalies and communities experiencing elevated rates of heritable conditions decades after the last detonation. The earliest data pointing to lifecycle impacts were apparent in the Trinity Test records, including shifts in infant mortality in surrounding areas, yet these indicators were ignored from the outset (Tucker & Alvarez, 2019). Some recent legislative developments in the United States, such as provisions allowing family members to recover compensation for deceased relatives, begin to acknowledge this intergenerational dimension, but such steps remain the exception rather than the norm.

7.4. The Reference Man

The inadequacy of existing definitional frameworks is further compounded by the dosimetric model upon which they rest. The "Reference Man," established by the International Commission on Radiological Protection (ICRP) in 1975, defines the standard human body for radiation dose assessment as a Caucasian male, aged 20–30, weighing 70 kg, living in a temperate climate (Nichols & Olson, 2024). This model cannot accurately represent harm to children; it inadequately reflects women's exposure pathways and biological radiosensitivity; and by centring a white male body, it actively erases the disproportionate impacts on Black, Indigenous, and other affected populations. The Reference Man originated in the context of occupational protection for military workers; it was never developed for application to general civilian populations, yet it underpins the dose thresholds used to determine compensation eligibility across all four cases examined in this report (Nichols & Olson, 2024).

The TPNW's inclusion of "age- and gender-sensitive assistance" represents a meaningful normative advance, but without revision of the Reference Man standard in dosimetry and compensation policy, this commitment risks remaining aspirational. A recent update—the "2021 Reference Body"—now differentiates by sex and age group, yet its primary applications remain pharmacokinetic and metabolic rather than radiological, leaving the fundamental gap in radiation protection unaddressed (Müller et al., 2022).

8. Uncompensated Categories of Harm

Existing compensation frameworks systematically exclude entire categories of harm. Psychological trauma, cultural disruption, economic loss, environmental degradation, and violations of sovereignty have all been extensively documented across the four case studies yet fall outside the scope of recognised compensable harm (Bolton, 2022; Palafox et al., 2007). The narrowness of existing frameworks is further evident in their near-exclusive focus on cancer: chronic non-cancer conditions linked to radiation exposure remain largely unrecognised as compensable harm. Diabetes, for instance, is now one of the most significant health issues among the Marshallese, and while it is not classified as a radiogenic disease, childhood radiation exposure has been identified as a potential biological risk factor for its development later in life (Tatsukawa et al., 2021; Yamada, 2004). BEIR VII (2006) findings further demonstrate dose-response relationships for a range of non-cancer diseases, as well as the biological plausibility of hereditary effects—neither of which is reflected in existing eligibility criteria.

The consequences are particularly stark for gendered harms: reproductive trauma, including miscarriages, stillbirths, and congenital anomalies, has rarely been formally recognised as a compensable condition, despite being among the most devastating and well-documented consequences of nuclear testing. The cultural dimensions of this harm are equally unaddressed: in the matrilineal Marshallese society, where a woman's social standing and cultural identity are tied to the land she inhabits and passes to her children, forced displacement severed not only physical ties but the very basis of women's social personhood (Borrie et al., 2016). The shame surrounding reproductive abnormalities, compounded by cultural and religious norms associating such outcomes with moral failure, has driven women into silence and isolation, a pattern that has become intergenerational (Eknilang, 2003; Maurer, 2020). For Indigenous communities more broadly, environmental contamination constitutes what scholars have termed a "biocultural violation": a spiritual and cultural rupture that cannot be remedied through technical or financial measures alone (IHRC & CEOBS, 2022; Nikolić Hughes & Kilma, 2025). Existing frameworks capture none of these harms.

Overall, reducing suffering to quantifiable categories reflects what Bolton (2022) identifies as a broader pattern in which state narratives are privileged over survivor testimony and the full spectrum of human experience is rendered invisible by administrative categories. As Veeken (1995) observed of French Polynesia, over 30 years, Polynesian society was transformed from a subsistence economy to a money-driven society dependent on France. Existing frameworks have no capacity to recognise, let alone remedy, such transformations.

9. Structural and Normative Gaps

9.1. Weak Accountability and Enforcement

The international legal architecture governing harm from nuclear testing lacks binding enforcement mechanisms. The NPT's disarmament obligation was deliberately left without an explicit timeline, a compromise that permitted its ratification but rendered its core promise effectively unenforceable (Goddard et al., 2025). The TPNW advances the normative

framework significantly—particularly through its provisions on victim assistance and environmental remediation—but the non-participation of nuclear-armed states means that those with the greatest obligation to provide redress remain outside the treaty's scope. As Yamada (2019, as cited in Takemine, 2022) observes, fundamental questions remain unresolved from an international law perspective: who the "victims" to be assisted are, what qualifies someone as a "victim," how to prove causality, and what measures are necessary for adequate assistance.

9.2. Exclusion of Affected Voices

Perhaps the most fundamental structural failing is the systematic exclusion of affected populations—and of women in particular—from the processes that shape their own redress. Compensation mechanisms have been designed, implemented, and evaluated without meaningful participation of the communities they purport to serve. Women have been doubly excluded: first, as a population disproportionately affected by nuclear testing but inadequately represented in the scientific and medical research that determines eligibility; and second, as voices largely absent from the policy-making processes that define the scope and terms of compensation. The secrecy surrounding nuclear weapons programmes has historically prohibited broad societal engagement, ensuring that decisions with profound consequences for women, children, and Indigenous communities were made exclusively by military and political actors with no accountability to those most affected (M. Olson, personal communication, March 19, 2025). This exclusion extends beyond the design of mechanisms to the production of knowledge itself: the persistent lack of data on sex-differentiated exposure pathways is not merely a research gap but a reflection of whose harm has been considered worth measuring.

Today's challenges cannot be resolved through technical remediation alone because the harm is built upon layers of biocultural violation, institutional abandonment, and political unwillingness to confront accountability. As the Marshall Islands government has stated, this is not a legacy issue but a major contemporary challenge (Nikolić Hughes & Kilma, 2025)—one that will only intensify as climate change threatens to mobilise buried radioactive waste and further destabilise already contaminated environments.

V. POLICY RECOMMENDATIONS

The structural shortcomings identified in the preceding analysis call for a fundamental shift in how victim assistance and environmental remediation frameworks are designed, governed, and funded. The recommendations below are grounded in the gaps documented across the four case studies and are assessed against two dimensions: priority and feasibility.

Priority is assessed across three levels. *High-priority* recommendations address the most fundamental and urgent barriers to redress, without which other reforms cannot function. *Medium* priority recommendations represent important structural improvements that depend on political negotiation or legislative change. *Nice-to-have* recommendations are meaningful long-term improvements that would strengthen the overall framework but are less immediately actionable.

Feasibility is assessed across three levels. *Actionable* recommendations could be implemented within existing legal and institutional frameworks with sufficient political will. *Requires political will* recommendations are technically feasible but depend on state-level decisions, often in contexts where affected states have limited leverage over testing states. *Structural reform* recommendations require new international institutions, treaty amendments, or fundamental shifts in international law and are therefore longer-term in nature.

Recommendations highlighted in blue represent the most immediately actionable high-priority reforms, which could be advanced within existing legal and institutional frameworks and therefore offer the most tangible near-term pathway to meaningful redress.

A full elaboration of each recommendation, organised thematically, is provided in Annex 7.

#	Recommendation	Theme	Priority	Feasibility
1	Fund comprehensive cancer and health registries with mandatory reporting to the IARC	**Data**	High	Actionable
2	Mandate full declassification of testing-related archives, monitoring data, and military health records	Data	High	Requires political will
3	Establish an independent international scientific body for mapping, dose reconstruction, and environmental assessment	Data	High	Structural reform

4	Replace military-controlled oversight with independent, civilian-led monitoring programmes	Data	High	Requires political will
5	Support non-English language research on the colonial dimensions of nuclear testing	Data	Nice to have	Actionable
6	Adopt an irrebuttable presumption of causation	**Eligibility**	High	Actionable
7	Establish a WHO-based internationally recognised list of radiogenic diseases as a shared eligibility baseline	Eligibility	High	Actionable
8	Abolish the "exposed/unexposed" binary in epidemiological research and compensation eligibility	Eligibility	High	Requires political will
9	Replace the Reference Man with sex- and age-differentiated dosimetric standards	Eligibility	High	Structural reform
10	Integrate the lifecycle model into compensation frameworks	Eligibility	High	Structural reform
11	Remove arbitrary geographic restrictions on eligibility, including transboundary populations	Eligibility	High	Requires political will
12	Broaden compensable harm beyond cancer	**Scope of harm**	High	Requires political will

13	Formally recognise and compensate gendered harms	Scope of harm	High	Requires political will
14	Provide redress for victims of documented human experimentation programmes	Scope of harm	High	Requires political will
15	Establish community-governed psychosocial support and cultural restoration programmes	Scope of harm	Medium	Actionable
16	Fund proactive outreach, multilingual materials, and assisted claims navigation	**Accessibility**	High	Actionable
17	Ensure processes are culturally appropriate and accessible	Accessibility	High	Actionable
18	Lift cost caps and ensure access to interpreters and family support for healthcare abroad	Accessibility	High	Actionable
19	Replace military-linked claims administration with independent civilian bodies	Accessibility	High	Requires political will
20	Fund staffing, training, and interpretation capacity alongside specialist equipment	Accessibility	Medium	Actionable
21	Establish an independent international complaints mechanism for individual victims	**Legal reform**	High	Structural reform
22	Close the mandate gap by establishing an independent international body free from NWS influence	Legal reform	High	Structural reform

23	Reform bilateral arrangements that foreclose judicial recourse	Legal reform	High	Requires political will
24	Call on NWS to accede to the TPNW; press for compliance with Articles 6 and 7	Legal reform	High	Requires political will
25	Introduce binding benchmarks for victim assistance and remediation in the NPT review process	Legal reform	Medium	Structural reform
26	Reform domestic compensation laws to introduce intergovernmental reparations alongside individual compensation	Legal reform	Medium	Requires political will
27	Adopt a biocultural approach to remediation, recognising contamination as a spiritual and cultural violation	**Remediation**	High	Actionable
28	Mandate meaningful community participation in all remediation programmes	Remediation	High	Actionable
29	Integrate climate change projections into remediation planning	Remediation	High	Actionable
30	Develop comprehensive, independently monitored remediation programmes	Remediation	High	Requires political will
31	Require testing states to bear primary financial responsibility for remediation under TPNW Article 7(6)	Remediation	High	Structural reform
32	Establish stewardship and monitoring commitments extending across centuries	Remediation	Medium	Requires political will

Towards a Rights-Based Framework

Taken together, these recommendations represent a fundamental shift away from the military-security model that has shaped nuclear testing harm responses to date, and towards a human-centred, rights-based framework. Such a shift is not merely aspirational; it is a pragmatic necessity. As long as compensation and remediation are administered by the states responsible for the harm, and as long as affected communities are treated as passive subjects rather than essential partners, the structural conditions that produced uncompensated harm will continue to reproduce it. Reform must therefore begin from the recognition that affected communities are not recipients of charity, but rights-holders entitled to truth, recognition, redress, and meaningful participation in the processes that shape their own future. As President Hilda C. Heine of the Republic of the Marshall Islands affirmed on Nuclear Victims Remembrance Day 2026, the way forward must be one "grounded in acknowledgement, accountability, and a shared commitment to justice". It is on this foundation, and only on this foundation, that the legacy of uncompensated harm can begin to be repaired.

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ANNEXES

Annex 1: Details of nuclear weapons testing locations and states

Table 1. States/territories where nuclear weapon detonations have taken place[2].

Affected State/Territory	In Atmosphere (Tests or, Where Indicated, Use in War)	Underground Tests (Includes 'Peaceful Nuclear Explosions')	Total
Algeria	4 (by France)	13 (by France)	17
Australia	12 (by UK)		12
China*	23	22	45
DPRK (North Korea)		6	6
French Polynesia (Non-Self Governing Territory administered by France)	46 (by France)	147 (by France)	193
India		6	6
Japan	2 (WWII atomic bombings by USA)		2
Kazakhstan	125 (by Soviet Union; including 9 missile tests fired from Russia)	372 (by Soviet Union)	497
Kiribati	33 (9 by UK and 24 by USA)		33
Marshall Islands	66 (by USA; not including 1 detonation over open ocean)		66
Pakistan		6	6
Russia	88 (by Soviet Union; not including launches of 9 missile tests that detonated inside Kazakhstan)	125 (by Soviet Union)	213
Turkmenistan		1 (by Soviet Union)	1
Ukraine		2 (by Soviet Union)	2
United States	113 (including 12 at Johnston Atoll and the Trinity test)	939 (24 with UK)	1,052
Uzbekistan		2 (by Soviet Union)	2
Total within Territories Controlled by States	512	1,641	2,153
Open ocean (not under jurisdiction of any one state)	7 (by USA, 3 in South Atlantic; 4 in Pacific)**		7
TOTAL	519	1,641	2,160

*The three failed Chinese tests, including two in 1979 (one underground, one atmospheric) and one in 1992 (underground), are not included in this table.; **The 1979 'South Atlantic Flash' is not included in this table, given lack of confirmation.

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Nuclear tests since 16 July 1945

Countries	First nuclear test	Final nuclear test	Atmospheric tests	Underground tests	Total
United States	16 July 1945	23 September 1992	215	817	1032
USSR	29 August 1949	24 October 1990	221	494	715
France	13 February 1960	27 January 1996	50	160	210
China	16 October 1964	29 July 1996	23	22	45
United Kingdom	3 October 1952	26 November 1991	21	24	45
India	18 May 1974	13 May 1998	-	3	3
Pakistan	28 May 1998	30 May 1998	-	2	2
North Korea	9 October 2006	3 September 2017	-	6	6
Israel and South Africa	22 September 1979	22 September 1979	1	-	1
			531	1528	2059

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Annex 2: Overview of Health and Environmental Harms

The harm resulting from nuclear testing is both profound and multidimensional, encompassing the enduring degradation of ecosystems, human health, and societal structures through the release of ionising radiation and chemical pollutants. Its consequences span environmental degradation and biodiversity loss; severe physical and psychological injury; social marginalisation and displacement from ancestral lands; and the substantial impairment of fundamental human rights (Casey-Maslen & Østern, 2025; IHRC & CEOBS, 2022).

1. Environmental Contamination and Ecological Degradation

The environmental harm from nuclear testing is geographically dependent, requiring a critical overview that distinguishes between the effects on arid continental deserts and Pacific atolls and islands. Across all sites, radioactive contamination of air, water, and soil constitutes a multidimensional threat, leading to degradation of ecosystems, loss of biodiversity, and impairment of basic human needs, including the right to a healthy environment.

Radioactive fallout from nuclear testing has consistently extended far beyond intended test sites. In Nevada, fallout coated orchards, livestock, and water supplies across a vast region, with an estimated half a million people within 150 miles of the Trinity Test receiving no warnings (Blume, 2023). In Algeria, contamination spread across hundreds of thousands of square kilometres, reaching into the Mediterranean (Bolton, 2017). In French Polynesia, fission products including iodine-131 and caesium-134 have been documented leaking into coral and lagoon sediments far faster than officially projected (IPPNW & IEER, 1991; Thakur, 1996). In the Marshall Islands, explosions destroyed coral reefs, triggered persistent ciguatera fish poisoning, and left radiation levels in some areas approaching double safe habitation thresholds as recently as 2016 (Makhijani & Ruff, 2023; Atomic Heritage Foundation, n.d.).

The contamination of food systems is particularly enduring. In the Marshall Islands, staple subsistence crops such as coconut, pandanus, and breadfruit remain primary exposure pathways decades after testing, as coral soils promote high radionuclide uptake; caesium-137 intake through local food accounts for approximately 90% of total radiation dose for potential resettlers (IAEA, 1998; Simon & Bouville, 2002). Even as recently as 2017, elevated radioactivity was still detected in locally grown produce (Topping et al., 2019). In French Polynesia, workers repeatedly encountered contaminated environments through irradiated debris, altered lagoon waters, and a food chain marked by radionuclide-affected fish (Schoenberger, 2024). The disruption of traditional food systems, therefore, has not only constituted a direct health hazard but has also eroded food sovereignty and the intergenerational transmission of ecological knowledge across affected communities.

2. Physical Health Consequences

The physical health consequences of nuclear testing are severe and wide-ranging: documented immediate effects include acute radiation sickness, while long-term outcomes involve elevated rates of thyroid, bone, breast, blood, and other cancers, as well as chronic cardiovascular and

respiratory illness (Herota, 2018; Palafox et al., 2007). In Nevada, statistically significant correlations have been established between fallout deposition levels and elevated cancer mortality rates across the Midwestern United States, including cancers of the thyroid, brain, colon, uterus, and breast (Peterson & Miller, 2008). In French Polynesia, updated dose estimates following the 2013 declassification of official documents reveal significant underreporting of exposure levels, with newer analyses attributing a measurable proportion of differentiated thyroid cancers directly to nuclear fallout (Ruff, 2023). Exposure to ionising radiation also carries intergenerational biological consequences, including genomic instability, minisatellite mutations, telomere damage, and epigenetic abnormalities (Sueur, 2018; BEIR VII, 2006).

3. Human Experimentation

A particularly grave dimension of nuclear testing across multiple sites is the documented use of affected populations as unwitting subjects of human experimentation. In the Marshall Islands, at least 539 Marshallese women, men, and children were subjected to Project 4.1, a covert US research programme involving radioisotope injections and non-therapeutic surgical procedures, conducted without informed consent (Herota, 2018). Community members had long suspected that their exposure was not accidental but served to facilitate radiation studies, as one survivor's testimony starkly illustrates: the US government was accused of treating the Marshallese not as people but as "guinea pigs" for bomb research (Anjain, 1975, as cited in Hahn, 2020, p. 54). Declassified documents eventually confirmed these suspicions (Keown, 2019). In Algeria, testimonies similarly document that approximately 150 Algerian prisoners were tied to poles near the site of the third atmospheric test to study human behaviour during a nuclear explosion (Hennaoui & Nurzhan, 2023). These cases illustrate that for certain populations, the harm of nuclear testing was not merely an unintended consequence but a deliberate instrument of research conducted without consent and under conditions of colonial subjugation.

4. Gendered and Reproductive Harm

Women and girls have consistently borne a disproportionate burden of the health consequences of nuclear testing, both biologically and socially. Female populations have exhibited higher rates of thyroid cancer across multiple testing contexts: thyroid cancer prevalence was found to be nearly twice as high in females as in males in the Marshall Islands (Takahashi et al., 2003), while French Polynesian women recorded the highest global incidence of thyroid cancer and myeloid leukaemia between 1998 and 2002 (Ruff, 2023). Radiation exposure has also been associated with shifts in birth sex ratios, with studies documenting rising male-to-female birth ratios in temporal association with above-ground nuclear testing (Scherb et al., 2015).

Reproductive harm has been particularly devastating. Across testing communities, multiple sources report dramatic rises in miscarriages, stillbirths, maternal deaths, and severe congenital anomalies (Herota, 2018; Keown, 2019). In the Marshall Islands, such anomalies, including infants born without bones or limbs, are referred to locally as "jellyfish babies". Nevertheless, US medical personnel routinely denied any link to radiation, leaving women without explanation or care (Hahn, 2020). Repeated pregnancies have additionally been shown to

exacerbate radiation-induced thyroid damage, a finding of particular relevance in communities with high birth rates (De Vathaire et al., 2010).

5. Psychosocial, Cultural, and Intergenerational Harm

Beyond measurable physiological effects, nuclear testing has inflicted profound psychosocial and cultural harm on affected communities. The contamination of ancestral lands and traditional food sources has disrupted community integrity, traditional health practices, and sociopolitical relationships (Palafox, 2010). Johnston and Barker (2008, as cited in Hahn, 2020) describe the emergence of "cultural agony" as radiation rendered traditional foods and lands taboo, eroding ecological knowledge, cultural identity, and intergenerational continuity. In the Marshall Islands, those affected by nuclear testing have been described as "radiogenic communities"—people whose social, cultural, economic, and psychological well-being has been fundamentally altered by an invisible, enduring threat.

The cultural consequences have been especially acute for women in the Marshall Islands, where society is organised along matrilineal lines: status, land rights, and cultural identity are passed from mother to child, making a woman's connection to her land central to her place within the community (Schwartz, 2022). Forced evacuation, therefore, represented not only physical displacement but the severing of women's cultural identity and social standing. The shame and silence surrounding reproductive harm compounded this loss further: as widespread cultural and religious norms associated congenital abnormalities with moral failure, many women gave birth alone and in hiding, with this emotional trauma becoming intergenerationally transmitted alongside biological harm (Eknilang, 2003; Maurer, 2020).

Annex 3: Environmental Remediation: Goals, Purposes, and Frameworks

Environmental remediation (ER) is an iterative, long-term process designed to rectify current ecological damage and mitigate unacceptable future hazards to human populations and biota resulting from radiological contamination. It functions by neutralizing underlying pollution sources and systematically disrupting exposure pathways to protect human health and restore vital ecosystem services. Ultimately, the goal is to reduce radiation doses to levels that are as low as reasonably achievable (ALARA) for a site's intended use (Harvard Law School International Human Rights Clinic [IHRC] & Conflict and Environment Observatory [CEOBS], 2022, p. 41), thereby acknowledging that returning land to its pristine, pre-detonation state is rarely technically feasible (Docherty & Sickel, 2025). This framework prioritizes the protection of fundamental human rights, including the rights to life, health, and a healthy environment, through the systematic reduction of radiological risks.

This objective is pursued through a multifaceted strategy that includes physical treatments, such as containment and stabilization, alongside "low-threshold" administrative interventions like culturally appropriate risk education, marking, and fencing. Crucially, the process is governed by the core principles of justification (Docherty & Sickel, 2025), ensuring that the benefits of intervention outweigh detriments like habitat destruction or risks to workers, and optimization (Docherty & Sickel, 2025), which seeks to implement the specific strategy that provides the maximum margin of good over harm for affected communities. Modern remediation frameworks must also integrate climate-change risk assessments, as sea-level rise or increased storm intensity can mobilize contaminants or create entirely new exposure pathways. Because radioactive isotopes can persist for centuries or even millennia, remediation is recognized as a shared and global responsibility (Bolton, 2025). While affected states should lead the planning and implementation on their territory, they are entitled to long-term international cooperation, including capacity building and technical assistance from the states responsible for the testing to manage the risks posed by radioactive isotopes that may persist for centuries.

1. Goals and Purpose

The remediation of the environment following nuclear weapons testing is a crucial humanitarian and ecological necessity. The following review details why these interventions are essential to address the enduring legacies of the "largest ever human source of radioactive contamination" (Ruff, 2025, p. 74).

1.1. Mitigation of Chronic and Acute Health Hazards

The primary necessity for remediation stems from the severe and persistent threat to human physiology. Nuclear detonations release ionizing radiation that causes DNA damage, various cancers (notably thyroid cancer and leukaemia), cardiovascular diseases, and respiratory illnesses. As established by the IHRC & CEOBS (2022, p. 17), this harm is not limited to those present during testing; it includes the "premature curtailment" of life for countless individuals decades later. Furthermore, standard radiation protection historically relied on the "Reference

Man" (an adult male) (Olson, 2025), which systematically underestimated the risks to more vulnerable populations, such as women, children, and fetuses, who suffer significantly higher rates of harm. Remediation is necessary to protect these most at-risk groups from ongoing exposure.

1.2. Management of Persistent and Migratory Contaminants

Moreover, ER is required because many radioactive isotopes have remained hazardous for centuries or even millennia. For instance, carbon-14 has a half-life of nearly 6,000 years, while plutonium-239 persists for 24,000 years (Friess, 2025). These contaminants do not remain static; they migrate through the air, water, and soil, eventually bioaccumulating in the food chain. Remediation is necessary to disrupt these exposure pathways, preventing the ingestion of contaminated wildlife and vegetation, such as the "lichen-reindeer-human" chain in the Arctic or contaminated milk in the United States, which continues to deliver radiation doses to unsuspecting populations.

1.3. Restoration of Ecosystems and Biodiversity

Nuclear testing has caused "catastrophic" damage to the environment, resulting in mass flora death, depressed reproduction rates in fauna, and morphological changes, such as reduced brain sizes in birds. The environment is the "living space" for humanity; thus, its degradation directly impairs the quality of human life. Remediation is necessary to restore vital ecosystem services and protect biodiversity from ongoing radiological stress that disrupts the "delicate equilibrium" of nature (IHRC & CEOBS, 2022, pp. 10, 19).

1.4. Cultural and Social Restitution

A significant driver for remediation is the concept of "biocultural restoration." Many test sites were established on the territories of Indigenous and colonized people. This phenomenon, termed "nuclear colonialism", led to the forced displacement of communities from their ancestral lands. Remediation serves as a formal recognition of these historic wrongs (IHRC & CEOBS, 2022, p. 39). It is necessary to enable displaced communities, such as those in the Marshall Islands or Maralinga, Australia, to safely return to their home-lands and resume traditional livelihoods like fishing and foraging, which are currently restricted due to contamination.

1.5. Fulfilment of Human Rights and Legal Obligations

Remediation is a legal and ethical imperative to safeguard fundamental human rights. Contamination from testing infringes upon the rights to life, health, water, and a "clean, healthy and sustainable environment". The Treaty on the Prohibition of Nuclear Weapons (TPNW) now incorporates a positive obligation for states to remediate contaminated areas under their jurisdiction (Docherty & Sickel, 2025). This transitions the issue from an "internal matter" of sovereign states to a shared global responsibility, ensuring that affected states receive the international cooperation and technical assistance necessary to protect their citizens.

1.6. Prevention of Climate-Induced Re-contamination

The urgency of remediation is exacerbated by climate change. As highlighted by Linsey Cottrell (2025), rising sea levels, increased storm intensity, and shifting precipitation patterns threaten the integrity of existing containment structures, such as the Runit Dome in the Marshall Islands. Without active remediation and long-term site management, these environmental shifts risk mobilizing buried contaminants, creating entirely new exposure pathways for future generations.

2. The Framework to operate within

As discussed earlier, the operational framework for environmental remediation following nuclear testing is defined by a shift from treating contamination as a purely "internal matter" of sovereign states to a model of shared responsibility, establishing a collaborative ecosystem involving affected states, testing states, international organizations, and local communities.

2.1. Affected States: The Lead Actors

According to Principle 4 of IHRC & CEOBS (2022, p. 24), the state under whose jurisdiction or control the contamination exists—the "affected state"—takes the primary lead in remediation. This leadership is pragmatic, as geographic proximity allows for better assessment and tailoring of interventions to local needs, while also protecting the state's sovereignty.

Affected states are responsible for developing a comprehensive National Strategy (IHRC & CEOBS, 2022, p. 33), which includes designating a focal point, setting budgets and timelines, and adopting and implementing laws. Moreover, they are tasked with leading the assessment, surveying, and recording of contamination levels to prioritize action plans (IHRC & CEOBS, 2022, p. 35).

2.2. Harming States: The Primary Duty Bearers

While all states are encouraged to contribute, the states that conducted the tests bear a "primary and unequivocal responsibility" to support remediation. This responsibility is moral, ethical, and increasingly legal under international frameworks like the TPNW.

Testing states are expected to provide the financial, material, and technical assistance necessary for affected states to meet their obligations (IHRC & CEOBS, 2022, p. 24). Additionally, it’s a critical duty of harming states to reveal scientific and technical information (IHRC & CEOBS, 2022, p. 28). They must release formerly classified data on test yields, fallout patterns, and burial sites to facilitate accurate risk assessments.

2.3. International Organisations (IOs): Bridging the "Mandate Gap"

The Report *Is it Safe*, 2025, makes it clear that there is a significant "mandate gap" in the current international architecture: no single international body is currently mandated or equipped to assist affected states in implementing remediation.

Principle 6 of *Facing Fallout*, 2022, thus calls on IOs to promote capacity building through training, establishing monitoring networks, and sharing best practices. Moreover, existing bodies like the IAEA and UNSCEAR provide technical assessments, but, as authors have argued in the conclusions of the report, *Is it Safe?* (Casey-Maslen & Østern, 2025), these bodies must be empowered to actively support national authorities in planning and implementing interventions.

2.4. Affected Communities: Partners in Inclusivity

A central pillar of the modern framework is the transition from treating affected populations as passive subjects to active partners. Principle 17 of *Facing Fallout*, 2022, mandates that remediation must be inclusive.

Communities, particularly Indigenous and colonized people who have been disproportionately harmed by "nuclear colonialism," must be involved at every stage from site characterization to defining the desired "end state" for land use. Furthermore, it must be ensured that communities have proactive access to data to make autonomous decisions about their own health and environment (IHRC & CEOBS, 2022, p. 66). Overall, the framework must recognize that remediation is not just physical but serves as social and cultural restitution, also enabling the restoration of spiritual relationships with sacred lands.

Annex 4: Consequences with Possible Implications for Human Rights

Consequences with Possible Implications for **Rights to Life and Health**	● Blast trauma and burns ● Health effects of exposure to ionizing radiation ● Deterministic effects (at high levels of exposure), including acute radiation syndrome, skin burns, loss of hair and sterility ● Stochastic effects, including cancers (at all levels of exposure) and heritable diseases ● Non-radioactive environmental damage (such as damage to coral atolls or dumping of toxic chemicals at test sites) ● Psycho-social effects
Consequences with Possible Implications for **Other Economic and Social Rights**	● Blast and fire damage to buildings, infrastructure and environment ● Displacement ● Socio-economic marginalization, including stigmatization of affected communities ● Economic disruption ● Cultural disruption
Consequences with Possible Implications for **Civil and Political Rights**	● Political repression in areas affected by use and testing ● Suppression of accurate information about nuclear weapons programs and the effects of radiation

Bolton, M. B., & Minor, E. (2021). Addressing the ongoing humanitarian and environmental consequences of nuclear weapons: an introductory review. *Global Policy*, *12*(1), 81-99.

Annex 5: Relevant Laws by Jurisdiction around the World (English versions)

United States of America	• Radiation-Exposed Veterans Compensation Act (REVCA) • Radiation Exposure Compensation Act (RECA) • Energy Employees Occupational Illness Compensation Program Act (EEOICPA) • Veterans Dioxin and Radiation Exposure Compensation Standards Act (VDRECSA)
Marshall Islands	• Agreement Between the Government of the United States and the Government of the Marshall Islands for the Implementation of Section 177 of the Compact of Free Association
China	• Department of Civil Affairs (2006) No. 32 Notice on Doing well with Veterans of the Former Unit 8023
Japan	• Law No. 117 of 1994/ The Atomic Bomb Survivors' Support Law
Kazakhstan	• "On social protection of citizens who suffered from nuclear tests at the Semipalatinsk nuclear test site"
France	• LAW No. 2010-2 of January 5, 2010 on the recognition and compensation of victims of French nuclear tests (1)
Australia	• Veterans' Entitlements Act 1986

Nuclear Justice Network. (n.d.). *Relevant laws*. https://nuclear-justice.net/relevantlaws/

Annex 6: Victim Assistance

Nuclear testing and military activities more broadly inflict severe and enduring harm on both human populations and ecosystems. In response, states, international organisations (IOs), and civil society have developed a growing body of coordinated international efforts over the past decades to address these consequences. One of the key concepts to emerge from this process is "victim assistance" (VA), now a well-established pillar of humanitarian disarmament law. Three principal treaties give concrete expression to this concept: the Mine Ban Treaty, the Convention on Cluster Munitions, and the Treaty on the Prohibition of Nuclear Weapons (TPNW). All three instruments require states parties to assist individuals harmed by banned weapons or their remnants (Harvard Law School International Human Rights Clinic [IHRC] & Conflict and Environment Observatory [CEOBS], 2020).

For this report, the TPNW is the most directly relevant framework, as it specifically addresses the impacts of nuclear weapons. The following analysis, therefore, focuses primarily on the TPNW, drawing on its provisions to examine how the general principles of victim assistance apply in the nuclear testing context. It should be noted at the outset, however, that the core principles established by the IHRC and CEOBS (2020) extend across all relevant frameworks. Crucially, these principles do not constitute a mechanism of compensation for unlawful acts; rather, they embody a collective commitment to supporting victims' full and effective participation in society and to helping them realise their human rights (IHRC & CEOBS, 2020).

1. Defining Victims and the Scope of Harm

A foundational question for any victim assistance framework is who qualifies as a victim. The IHRC and CEOBS (2020, p. 4) define victims broadly as "individuals who have suffered harm caused or aggravated by [toxic remnants of war] as well as their affected families and communities." Importantly, where a certain level and duration of exposure to a toxic or radiological substance is strongly associated with a particular harm, that exposure should be presumed to be its cause. Crucially, victim status under these principles does not depend on identifying the specific actor responsible for the harm (IHRC & CEOBS, 2020). This proves to be a provision of particular significance in the nuclear testing context, where accountability has historically been contested or denied. Similarly, the Convention on Cluster Munitions defines victim assistance as designed to help those who have suffered physical or psychological injury, economic loss, and social marginalisation, with the ultimate aim of enabling victims to realise their human rights (Docherty, 2021).

This inclusive definition is especially pertinent in the context of nuclear weapons testing. Such activities may directly infringe upon a range of human rights—including the rights to health, culture, and a healthy environment—and indirectly affect others, such as the right to education (Docherty, 2021; see Annex 4 for a comprehensive overview of consequences and their human rights implications). Accordingly, victim assistance must be designed to address the full spectrum of harms caused or exacerbated by nuclear testing: physical and psychological injury, mortality, social marginalisation, economic loss, barriers to cultural participation, environmental degradation, and broader human rights violations (IHRC & CEOBS, 2020).

2. Forms and Guiding Principles of Victim Assistance

Victim assistance may take several forms. Article 6(1) of the TPNW specifies that VA should encompass medical care, rehabilitation, and psychological support, as well as measures to ensure victims' social and economic inclusion without discrimination. Scholars such as Singh (2020) have argued that adequacy of assistance must be assessed against these criteria, though the list is not exhaustive. Building on this, the IHRC and CEOBS (2020, p. 4) identify additional components that constitute meaningful VA, including:

- acknowledgement of harm;
- measures to facilitate participation in cultural life;
- remediation of contaminated environments;
- access to accurate and comprehensive information regarding harms and risks; and
- measures to ensure victims can fully realise their human rights.

The TPNW's prohibition of discrimination in the provision of assistance reflects the core principle underpinning the entire VA framework. Alongside non-discrimination, the guiding principles include accessibility, inclusivity, and transparency. These require, respectively: the removal of practical and informational barriers to access; the meaningful involvement of affected communities at all stages of planning, implementation, and evaluation; the provision of support based on need rather than identity; and openness in the design and management of assistance programmes (IHRC & CEOBS, 2020). The TPNW is particularly notable for its explicit requirement of "age- and gender-sensitive assistance", a provision that reflects a growing recognition of the differentiated impacts of nuclear weapons across genders and life stages, as discussed in previous sections of this report (Nichols & Olson, 2024).

3. Responsibility, Accountability, and Implementation

Meaningful victim assistance requires clarity not only about what kind of assistance should be provided, but also about who bears responsibility for providing it. The TPNW addresses both dimensions: Article 7(4) establishes a collective obligation, stating that "[e]ach State Party in a position to do so shall provide assistance for the victims of the use or testing of nuclear weapons or other nuclear explosive devices." This formulation ensures that victim assistance programmes can be implemented regardless of whether nuclear-armed states have joined the treaty, thereby addressing a key limitation of earlier frameworks (Docherty, 2021).

More significantly, Article 7(6) places an explicit responsibility on states that have used or tested nuclear weapons, stipulating that such states "shall have a responsibility to provide adequate assistance to affected States Parties, for the purpose of victim assistance and environmental remediation." This provision marks a meaningful departure from previous disarmament treaties, none of which imposed an equivalent obligation on user states (Singh, 2020). In doing so, the TPNW establishes a clear moral and legal accountability on the part of nuclear-armed states to remediate the harm they caused.

Beyond individual state responsibility, the IHRC and CEOBS (2020) call upon states, IOs, and other relevant actors to share scientific and technical information on toxic remnants and response measures with affected states wherever possible, in recognition of the shared and collective dimensions of responsibility. For effective implementation, the same authors emphasise the need for sustained information management, strategic planning, and capacity building. This entails the continuous collection and dissemination of data on the presence and impacts of toxic remnants; the development of comprehensive national strategies addressing both short- and long-term victim needs; and collaboration with international and non-governmental actors to strengthen institutional capacity for delivering assistance over time.

4. Normative Progress and Implementation Gaps

Taken together, existing international frameworks articulate a clear normative expectation for comprehensive victim assistance and compensation. However, the translation of these commitments into practice remains limited and uneven. To date, only a small number of states have established formal VA mechanisms, many of which are narrowly designed (see Annex 5 for an overview of existing national frameworks). A recurring shortcoming is the restriction of eligibility to veterans or military personnel, thereby excluding large segments of the affected civilian population from any form of redress. This persistent gap between normative commitments and actual provision underscores the need for empirical examination of how VA operates in practice.

The following sections, therefore, analyse victim assistance frameworks in the United States and France. These cases are particularly instructive given their geographically and politically diverse testing contexts: the United States conducted nuclear tests both on its mainland (Nevada) and in an overseas territory (the Marshall Islands), while France tested in Algeria and French Polynesia. Taken together, these cases enable a comparative analysis of how compensation mechanisms function across metropolitan and colonial settings and of the structural barriers that continue to obstruct adequate victim assistance.

Annex 7: Policy Recommendations

The structural shortcomings identified in this report's analysis call for a fundamental shift in how victim assistance and environmental remediation frameworks are designed, governed, and funded. The recommendations below are not aspirational ideals but rather actionable reforms grounded in the gaps documented across the four case studies. They are organised into six interconnected areas, each addressing a distinct dimension of the structural failures examined in this report.

Data, Transparency, and Knowledge Production

A precondition for meaningful redress is breaking the state monopoly over data. Without independent, accessible information on the scale and nature of harm, no compensation or remediation framework can function adequately.

1. Mandate the **full declassification** and public release of all testing-related archives, monitoring data, and military health records by nuclear-testing states.
2. Establish an **independent international scientific body** to conduct mapping, environmental assessment, and dose reconstruction at former testing sites, replacing the current model in which the same actors responsible for contamination control the data used to assess it. Such a body could be modelled on existing independent scientific mechanisms within the UN system, such as the International Panel on Chemical Pollution (IPCP) or the Intergovernmental Panel on Climate Change (IPCC), and could operate under the auspices of the TPNW or a dedicated mandate from the UN General Assembly. To ensure independence, the body should be governed by a board that includes representatives of affected states and communities alongside scientific experts, with explicit provisions excluding representatives of nuclear-armed states from oversight of assessments related to their own testing programmes. Funding could draw on assessed contributions from testing states under the principle of polluter responsibility, supplemented by voluntary contributions and existing UN funding mechanisms.
3. Establish **independent, civilian-led health and environmental monitoring programmes** at all former testing sites, replacing military-controlled oversight structures.
4. Fund the creation and long-term maintenance of **comprehensive cancer and health registries** in all affected territories, with mandatory reporting to the International Agency for Research on Cancer.
5. Support **further research on the colonial and imperial dimensions of nuclear testing in non-English language scholarship**, particularly in French and Russian, where such analysis remains comparatively underdeveloped despite the scale of these states' nuclear legacies (Hennaoui & Nurzhan, 2023).

Definitional Reform and Eligibility

The definitional frameworks underpinning existing compensation mechanisms systematically exclude vast segments of affected populations. Reform must begin by replacing rigid, exclusionary criteria with inclusive, evidence-based standards.

1. Adopt an **irrebuttable presumption of causation** for individuals present in recognised impact areas who have developed a diagnosed radiogenic disease.
2. Establish an **internationally recognised, evidence-based list of radiogenic diseases**, drawing on the forthcoming WHO report on the health impacts of nuclear weapons testing, which national compensation programmes can adopt as a shared baseline to reduce arbitrary disparities in eligibility between jurisdictions.
3. **Abolish the use of the "exposed/unexposed" binary** in both epidemiological research and compensation eligibility, recognising that no genuinely unexposed population exists in affected regions.
4. **Replace the Reference Man model** in **radiation** dose assessment with updated, sex- and age-differentiated dosimetric standards that reflect the biological diversity of affected populations, including children, women, and elderly persons.
5. **Integrate the lifecycle model** into compensation frameworks, formally recognising intergenerational harm and extending eligibility to descendants of exposed populations, including those born after testing ceased.
6. **Remove arbitrary geographic restrictions** on eligibility and extend compensation to all communities demonstrably affected by fallout, including transboundary populations in neighbouring states.

Expanding the Scope of Compensable Harm

Existing frameworks reduce suffering to narrow administrative categories, primarily cancer diagnoses, while ignoring the full spectrum of harm documented across affected communities.

1. **Broaden recognised categories of compensable harm** beyond cancer to include reproductive harm; chronic non-cancer conditions linked to radiation exposure, such as diabetes and cardiovascular disease; psychological trauma; cultural disruption; loss of land and food sovereignty; economic displacement; and environmental degradation.
2. Formally **recognise and compensate gendered harms**, including the disproportionate burden of thyroid cancer, reproductive trauma, and psychosocial harm borne by women and girls.
3. **Acknowledge and provide redress for victims of documented human experimentation programmes**, including Project 4.1 in the Marshall Islands and the use of Algerian prisoners during French atmospheric tests.
4. **Establish dedicated psychosocial support and cultural restoration programmes** in affected communities, designed and governed in partnership with those communities.

Accessibility and Implementation

Compensation programmes are only as effective as their accessibility to eligible claimants. Documentation barriers, language access, and geographic isolation systematically exclude the most vulnerable populations from existing mechanisms.

1. Require governments administering nuclear compensation programmes to fund **proactive outreach efforts**, provide **multilingual programme materials,** and offer **assisted claims navigation** to populations facing structural barriers to access.
2. **Ensure that compensation application processes are accessible, culturally appropriate,** and available in local languages, with dedicated support for communities facing low literacy or limited bureaucratic capacity.
3. **Address the structural conflict of interest** in compensation administration by ensuring that claims are assessed by independent civilian bodies, not by agencies linked to military or nuclear establishments.
4. **Provide accessible specialist healthcare**, including by lifting cost caps and ensuring access to interpreters and family support during treatment abroad.
5. **Address the technical-capacity gap in affected states**: Where specialist medical equipment has been provided, ensure that funding includes long-term staffing, training, and interpretation capacity, not merely the equipment itself.

Institutional and Legal Reform

Existing international and bilateral frameworks lack binding accountability mechanisms and judicial recourse for affected individuals.

1. **Establish an independent international complaints mechanism**, either under the TPNW or through a dedicated body, through which individual victims can submit grievances, seek redress, and hold states accountable for non-compliance with victim assistance obligations.
2. **Address the "mandate gap"** by establishing or empowering an independent international body capable of supporting affected states without the influence of nuclear-armed powers.
3. **Reform bilateral arrangements** that foreclose judicial recourse for affected populations.
4. **Call upon all nuclear-armed states to accede to the TPNW**, and in the interim, urge states parties to use diplomatic channels to press for compliance with Articles 6 and 7 obligations on victim assistance and environmental remediation.
5. **Strengthen the NPT review process** by introducing binding benchmarks for progress on victim assistance and environmental remediation, not only disarmament.
6. **Reform domestic compensation laws to introduce intergovernmental reparations** alongside individual compensation, shifting the framing from technical compensation to historical and political accountability.

Environmental Remediation

The case studies demonstrate that barriers to remediation are political rather than technical. Reform must therefore centre political accountability, community partnership, and long-term commitment.

1. **Develop and implement comprehensive, transparent, and independently monitored remediation programmes** at all former testing sites, with particular urgency for Algeria and French Polynesia, where no large-scale remediation has been undertaken.
2. **Adopt a biocultural approach to remediation**, recognising that for Indigenous communities, the environment constitutes a sacred living space and that radiological contamination represents an ongoing spiritual and cultural violation that cannot be remedied through technical soil removal alone.
3. **Mandate the meaningful participation of affected communities**, particularly women and Indigenous populations, in the design, implementation, and evaluation of all remediation programmes, from initial site assessment to the definition of acceptable end-state land use.
4. **Integrate climate change projections into remediation planning,** recognising that rising sea levels, saltwater intrusion, and extreme weather events are compounding existing contamination and accelerating ecological degradation, particularly at sites such as the Runit Dome.
5. **Establish long-term stewardship and monitoring commitments** extending across centuries, reflecting the persistence of radionuclides such as plutonium and caesium-137 in affected environments.
6. **Require nuclear-testing states to bear the primary financial responsibility for remediation,** in accordance with Article 7(6) of the TPNW, with supplementary international funding mechanisms for affected states lacking capacity.

Statement on the Usage of Artificial Intelligence

The authors acknowledge the use of artificial intelligence tools (Grammarly, NotebookLM, Claude, and Paperpal) for the purposes of language refinement, grammatical editing, and citation formatting. All arguments, analysis, research, and structural decisions were developed and authored by the group, ensuring full alignment with the report's objectives and academic standards.