

**ENVIRONMENTAL REMEDIATION
IN THE NUCLEAR WEAPON BAN TREATY¹
A Comprehensive and Detailed Approach**

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The environmental consequences of nuclear weapons have been one of the driving factors behind the nuclear weapon ban treaty. During the March 2017 negotiations, states repeatedly highlighted the devastation caused by the use and testing of nuclear weapons. In addition, at least 15 states, plus the Caribbean Community (CARICOM), specifically addressed the value of including environmental remediation obligations in the new treaty.² Remediation consists of rehabilitation of the environment and protective measures that minimize human exposure to radiation. The President's draft text of May 22, 2017 responded, in part, to states' calls with paragraphs about environmental harm and remediation in its preamble and Article 6.

While these provisions of the draft text are a positive first step, the treaty should be strengthened to include more comprehensive and detailed obligations regarding environmental remediation. The preamble makes a strong statement about the "grave implications" of nuclear weapons for the environment. Article 6, however, lays out rights for states parties affected by nuclear weapons use or testing but no clear corresponding duties. The treaty should explicitly place primary responsibility on these affected states parties to remediate the environment and oblige other states parties to provide international cooperation and assistance to help them achieve that

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² The following states, plus CARICOM (which has 15 member countries), expressed support for environmental remediation obligations during the March 2017 negotiations: Algeria, Austria, Bangladesh, Fiji, Guatemala, Holy See, Kazakhstan, Solomon Islands, Sri Lanka, Switzerland, Timor-Leste, Trinidad and Tobago, Venezuela, Vietnam. Thailand spoke in favor of considering international cooperation and assistance for environmental remediation. The statements of some countries have been put online at Reaching Critical Will, "Statements from the Nuclear Weapon Ban Treaty Negotiations," <http://www.reachingcriticalwill.org/disarmament-fora/nuclear-weapon-ban/statements> (accessed May 31, 2017). See also notes of Article 36 and Harvard Law School's International Human Rights Clinic.

goal. Existing humanitarian disarmament treaties include analogous obligations to clear areas contaminated by remnants of war and can serve as models for the nuclear weapon ban treaty. Part I of this paper describes the environmental effects of nuclear weapons and the ways in which environmental remediation can mitigate them. Part II examines how including remediation obligations in the nuclear weapon ban treaty can further the humanitarian goal of the treaty, provide clarity to states parties, influence states not party by setting standards, and advance international law. Part III discusses ways to strengthen the draft text and to establish comprehensive and detailed obligations for affected and non-affected states parties. An annex contains relevant articles from the 2008 Convention on Cluster Munitions that negotiating states could draw from in developing the nuclear weapon ban treaty's victim assistance obligations.³ This paper uses "nuclear weapons" as shorthand for the prohibited objects the draft text concerns, namely nuclear weapons and other nuclear explosive devices.

I. The Importance of Environmental Remediation

As countries noted during the March negotiations, the use and testing of nuclear weapons devastate the environment across time and space. While the scale of harm creates almost insurmountable obstacles to returning the environment to its pre-explosion state, remediation measures can decrease the environmental impact of nuclear weapons by reducing the spread of contamination and minimizing human exposure.

Environmental Impacts of Nuclear Weapons

Nuclear explosions release dangerous levels of long-lasting ionizing radiation over a wide geographic area. Impacted areas can remain contaminated for decades since radioactive isotopes have half-lives that vary from hours to millennia.⁴ Fallout, which occurs when radioactive material is lifted into the atmosphere and gradually falls back to earth, can continue for years after an explosion.⁵ Fallout can also carry radioactive isotopes beyond the immediate site of the

³ Convention on Cluster Munitions, adopted May 30, 2008, Diplomatic Conference for the Adoption of a Convention on Cluster Munitions, CCM/77, entered into force August 1, 2010.

⁴ The amount of time depends on the rate of decay of the radioactive isotope.

⁵ Article 36, "Banning Nuclear Weapons," February 2013, http://www.article36.org/wp-content/uploads/2013/02/Report_web_23.02.13.pdf (accessed May 31, 2017), p. 5. Although not every type of nuclear weapons testing produces fallout, this paper does not deal with the distinctions between different types and

explosion. The reach of the radiation depends on the intensity of the weapon used and weather patterns. For example, fallout from testing at Bikini Atoll in the Marshall Islands spread over thousands of square miles.⁶ Nuclear weapons use or testing on or near the ocean can generate equally far-reaching effects on fragile marine ecosystems. Nuclear explosions, with centers hotter than the sun's surface, also produce thermal radiation, which burns humans and sparks raging fires.⁷

Radiation from nuclear weapons harms the environment in a range of ways. After a nuclear explosion, water, soil, plants, animals, and the atmosphere all absorb ionizing radiation. Animals—whether insects, fish, birds, or mammals—also ingest contaminated water or plants, causing them to experience health problems; their meat and byproducts may in turn contain harmful levels of radiation, affecting the rest of the food chain. Since some wildlife travels long distances, contaminated animals can appear in locations far from the fallout zone. Large-scale use or testing of nuclear weapons can have even more wide-reaching impacts: fires caused by thermal radiation produce enough smoke and soot that they can contribute to the depletion of the ozone layer and affect global weather patterns.⁸

The environmental consequences of nuclear weapons severely affect humans living in contaminated areas. Nuclear fallout and the results of thermal radiation can render large tracts of land unusable, interfering with the ability to grow crops and raise livestock. The radiation in wildlife can also make it too dangerous to hunt and fish, meaning only imported food is safe to consume. Living in a contaminated environment or eating contaminated plants or animals can cause health effects, such as cancer, birth defects, and infectious diseases.⁹ These impacts can ultimately lead to large-scale displacement of populations, which implicates a host of socioeconomic and cultural issues as communities lose their homelands and are forced to find new employment.

instead addresses testing generally.

⁶ Robert Alvarez, "The Marshall Islands and the NPT," *Bulletin of the Atomic Scientists*, May 27, 2015, <http://thebulletin.org/marshall-islands-and-npt8341> (accessed May 31, 2017). For more information on nuclear testing and health effects in the Pacific Islands, see International Campaign to Abolish Nuclear Weapons (ICAN), "Prohibiting Nuclear Weapons: A Pacific Islands Priority," March 2017, <http://www.icanw.org/wp-content/uploads/2017/03/Pacific.pdf> (accessed May 29, 2017), pp. 6-7, 11-15.

⁷ Article 36, "Banning Nuclear Weapons," p. 8.

⁸ *Ibid.*

⁹ *Ibid.*, p. 7.

Environmental Consequences of Nuclear Weapons Testing in the Marshall Islands

From 1946 to 1958, the United States performed 67 atmospheric nuclear weapons tests in the Marshall Islands, producing environmental devastation that still persists more than 70 years later. Castle Bravo, a 15-megaton weapon over 1,000 times more powerful than the Hiroshima atomic bomb, caused especially significant damage across Bikini Atoll. According to the US Radiochemical Society, Castle Bravo created the “worst radiological disaster in US history.”¹⁰ The explosion produced a radioactive fallout area that covered 27,000 square miles.¹¹ The fallout affected surrounding islands, contaminating the drinking water and food supply and leading to radiation sickness. Some of the Bikini people whom the United States had resettled to nearby islands returned to the atoll 15 years later due to reports by the US Energy Department that the levels of radiation on the island were now safe for habitation. Further tests revealed, however, that the contamination of the local food supply was still at a dangerously high level, and the inhabitants were again forced to evacuate.¹² To this day, the northern islands of the atoll, where most food had been gathered, “remain off-limits indefinitely because of radioactive cesium contamination comparable to levels in the exclusionary zone near the Chernobyl reactor.”¹³ The forced displacement of the Bikini people deprived residents not only of their homes, but also of their cultural heritage and traditional customs and skills.¹⁴

The radiological effects extended far beyond the Marshall Islands as fallout entered the stratosphere and raised global background radiation levels 10 to 20 times. Monitoring of Japanese fishing vessels revealed that one in eight boats held contaminated fish, which they then had to destroy. Radioactive iodine reached the milk consumed in the United States, increasing radiation exposure to millions of Americans. At some locations in the United States, radiation levels were as much as 200 times greater than normal.¹⁵

¹⁰ Radiochemical Society, “Operation Castle: 1954—Pacific Proving Ground,” http://www.radiochemistry.org/history/nuke_tests/castle/index.html (accessed May 31, 2017).

¹¹ Alvarez, “The Marshall Islands and the NPT,” *Bulletin of the Atomic Scientists*.

¹² Ibid.

¹³ Ibid.

¹⁴ “Bikini Atoll Nuclear Test: 60 Years Later and Islands Still Unlivable,” *The Guardian*, March 1, 2014, <https://www.theguardian.com/world/2014/mar/02/bikini-atoll-nuclear-test-60-years> (accessed May 31, 2017).

¹⁵ Alvarez, “The Marshall Islands and the NPT,” *Bulletin of the Atomic Scientists*.

Components of Environmental Remediation

The severe environmental damage caused by the use and testing of nuclear weapons necessitates effective remediation. Remediation can help reduce levels of radiation, prevent radioactive materials from migrating, and minimize the contact that humans have with such contamination.

Rehabilitation of the environment after a nuclear explosion can take different forms. Some methods aim to reduce the amount of radioactive material in an area by separating contaminated particles from non-contaminated particles and removing the former. Others methods seek to contain radioactive material, by trapping it in the soil where the isotopes can decay over time, or create a barrier to prevent human contact.¹⁶ While more effective for dealing with contamination at discrete sites or from smaller incidents, these methods can help mitigate the environmental harm from nuclear weapons.

Methods of Environmental Rehabilitation

The rehabilitation of a radioactive environment can take many forms. Methods include:

Chemical or Physical Separation: separating and removing radioactive contaminants from the soil through a chemical process or based on physical attributes, such as size.

Solidification: adding cement or chemicals to the contaminated material to bind it, thus preventing it from spreading.

Vitrification: heating contaminated material and then cooling it to create a solid mass that traps the radioactive material and prevents it from spreading.

Containment: forming an impermeable barrier between contaminated and uncontaminated material to prevent the spread of the radiation and human exposure.¹⁷

¹⁶ For an analysis of various remediation methods, see US Environmental Protection Agency (EPA), *Technology Reference Guide for Radioactively Contaminated Media*, October 2007, <https://www.epa.gov/sites/production/files/2015-05/documents/media.pdf> (accessed May 31, 2017), pp. 21-162.

¹⁷ See *ibid.* for a discussion and analysis of various remediation methods.

Remediation encompasses not only treatment of the environment, but also measures to reduce human exposure to radiation, even when it spreads. For example, evacuating contaminated areas and marking them with fencing and warning signs can help keep people away from the most dangerous zones. Monitoring radioactivity levels in local food and providing clean alternatives can prevent radiation exposure through ingestion.¹⁸ Dissemination of information regarding the location of contaminated areas and the dangers of exposure can ensure that people in the vicinity are aware of the risks and ways to protect themselves.¹⁹ Such information also helps affected people engage more effectively in decision making about remediation plans and thus exercise their human right to participation.²⁰ If undertaken as soon as possible and followed up with regular monitoring, this combination of rehabilitation and risk reduction measures can minimize harm to the environment and to humans following a nuclear explosion.

II. The Need for Comprehensive and Detailed Treatment of Environmental Remediation in Nuclear Weapon Ban Treaty

Given the devastation caused by nuclear weapons, environmental remediation should be a clear obligation in the nuclear weapon ban treaty. Requiring environmental remediation would also ensure the new treaty aligns with existing disarmament treaties. The 1993 Chemical Weapons Convention reflects a concern for the environmental damage associated with weapons; it requires states parties implementing the convention to “assign the highest priority in ensuring the safety of people and to protecting the environment.”²¹ Other disarmament treaties—including the Convention on Cluster Munitions,²² 2003 Protocol V to the 1980 Convention on Conventional

¹⁸ International Commission on Radiological Protection (ICRP), *Application of the Commission’s Recommendations to the Protection of People Living in Long-Term Contaminated Areas after a Nuclear Accident or a Radiation Emergency*, ICRP Publication 11, vol. 39, no. 3 (Elsevier, October 2008), <http://www.icrp.org/docs/p111%28special%20free%20release%29.pdf> (accessed May 31, 2017), p. 36.

¹⁹ *Ibid.*, p. 39.

²⁰ The right to participation has been invoked by human rights bodies in the context of environmental protection and human health. See, for example, UN Committee on Economic, Social and Cultural Rights (CESCR), General Comment No. 14, The Right to the Highest Attainable Standard of Health (Art. 12), U.N. Doc. E/C.12/2000/4 (2000), para. 54; CESCR, General Comment No. 15, The Right to Water (Arts. 11 and 12), U.N. Doc. E/C.12/2002/11 (2002), para. 48.

²¹ Convention on the Prohibition of the Development, Production, Stockpiling and Use of Chemical Weapons and on their Destruction (Chemical Weapons Convention), adopted January 13, 1993, 23 I.L.M. 800, entered into force April 29, 1997, art. VII(3).

²² Convention on Cluster Munitions, art. 4.

Weapons (CCW),²³ and 1997 Mine Ban Treaty²⁴—obligate states parties to clear remnants of war, a process that is analogous to remediating the environment after nuclear weapons use or testing.

Negotiating states should address environmental remediation in a comprehensive and detailed manner in the new nuclear weapon ban treaty. Doing so would further the treaty's humanitarian goals, help clarify states parties' obligations, set an international standard that may influence states not party to the treaty, and advance international law.

Furthering the Humanitarian Goal of the Nuclear Weapon Ban Treaty

Comprehensive and detailed treatment of environmental remediation would respect and advance the treaty's humanitarian goal—to eliminate or reduce human suffering from the use or testing of nuclear weapons. In its preamble, the draft text notes states parties' deep concern about “the catastrophic humanitarian consequences that would result from any use of nuclear weapons” and adds that those consequences “pose grave implications for human survival, the environment, socioeconomic development, the global economy, food security and for the health of future generations.” The United Nations General Assembly resolution initiating the nuclear weapon ban treaty negotiations likewise highlighted states' “[d]eep[] concern[] about the catastrophic humanitarian consequences of any use of nuclear weapons.”²⁵ Environmental remediation obligations would help achieve the goal of addressing the humanitarian harm of nuclear weapons by mitigating future harm.

Environmental remediation obligations would also complement obligations on victim assistance that similarly serve the treaty's humanitarian goal.²⁶ The draft text recognizes the link between damage to the environment and harm to people in its preamble. For example, it notes the

²³ Convention on Conventional Weapons (CCW) Protocol V on Explosive Remnants of War, adopted November 28, 2003, U.N. Doc. CCW/MSP/2003/2, entered into force November 12, 2006, art. 3.

²⁴ Convention on the Prohibition of the Use, Stockpiling, Production and Transfer of Anti-Personnel Mines and Their Destruction (Mine Ban Treaty), adopted September 18, 1997, entered into force March 1, 1999, art. 5.

²⁵ UN General Assembly, “Resolution adopted by the General Assembly on 23 December 2016: Taking Forward Multilateral Nuclear Disarmament Negotiations,” G.A. Res. 71/258, U.N. Doc. A/RES/71/258, January 11, 2017, http://www.un.org/ga/search/view_doc.asp?symbol=A/RES/71/258 (accessed May 30, 2017).

²⁶ See International Human Rights Clinic at Harvard Law School and Article 36, “Victim Assistance in the Nuclear Weapon Ban Treaty: A Comprehensive and Detailed Approach,” June 2017.

implications of nuclear weapons for “the health of future generations,” which can be threatened by long-term environmental contamination. It also notes the international humanitarian law prohibition on “use of methods or means of warfare which are intended or may be expected to cause [widespread, long term and severe] damage to the natural environment and *to thereby prejudice the health or survival of the population.*”²⁷ Requiring affected states parties to remediate the environment and provide victim assistance is necessary to effectively address and limit the humanitarian consequences of the use and testing of nuclear weapons.

Establishing a Clear Legal Standard for States Parties

Comprehensive and detailed treatment of environmental remediation would clarify the obligations of states parties involved in the complex and multifaceted process of remediation. As noted above, the process encompasses not only rehabilitation of the environment, but also protective measures that reduce the population’s exposure to contaminants. While the treaty should leave enough flexibility for states parties to implement a plan that best suits their situation, it should outline for states parties the key elements of remediation, which will be discussed in Part III.

Clarity regarding states parties’ obligations can facilitate stronger implementation at the national level. Vague treaty language can allow states parties to circumvent their obligations, either intentionally or inadvertently, through narrow interpretations of the law. A clear legal standard, by contrast, would set minimum requirements and serve as a basis for the development of best practices by offering a shared starting point. States parties to the Convention on Cluster Munitions, for example, have collectively produced action plans elaborating on how affected states parties can continue to improve implementation of the convention’s clearance obligations.²⁸ Comprehensive and detailed language would also provide criteria against which to judge the success of national measures to implement the treaty.

²⁷ Emphasis added.

²⁸ Dubrovnik Action Plan, adopted September 11, 2015, at First Review Conference of the Convention on Cluster Munitions, <http://www.stopclustermunitions.org/media/2333184/dubrovnik-action-plan.pdf> (accessed May 30, 2017), action 3; Vientiane Action Plan, adopted November 12, 2010, at First Meeting of States Parties of the Convention on Cluster Munitions, <http://www.clusterconvention.org/files/2011/01/VIENTIANE-ACTION-PLAN-Final2.pdf> (accessed May 30, 2017), actions 10-19.

Setting an International Standard and Influencing States Not Party to the Treaty

By addressing environmental remediation in a comprehensive and detailed manner, the nuclear weapon ban treaty could establish an international standard that carries normative value. While binding only on states party to the treaty, environmental remediation obligations would have the potential to influence the behavior of states not party, who could look to the new treaty's standards for guidance in addressing nuclear contamination. If the new treaty included strong environmental remediation standards, states not party might feel international pressure to carry out comparable environmental remediation activities.

Advancing International Law

Finally, comprehensive and detailed treatment of environmental remediation would reinforce and advance precedent set in international law. Humanitarian disarmament law, in particular, focuses on eliminating civilian suffering caused by prohibited weapons, including that which occurs after use.²⁹ The preamble of the Convention on Cluster Munitions, for example, expresses states parties' determination "to put an end for all time to the suffering and casualties caused by cluster munitions at the time of their use, when they fail to function or when they are abandoned."³⁰ Humanitarian disarmament treaties achieve this aim by requiring states parties to implement remedial as well as preventive measures, including clearance of remnants of war.³¹ The nuclear weapon ban treaty, which emerged from the humanitarian disarmament movement, also seeks to reduce the suffering of civilians, and requiring environmental remediation would serve that goal. Like the clearance obligations in other treaties, remediation obligations in the nuclear weapon ban treaty would underscore the importance of removing weapons-related contamination that lingers and can endanger the civilian population for years to come. The absence of such a provision in the nuclear weapon ban treaty would represent a step backwards for humanitarian disarmament.

²⁹ Bonnie Docherty, "Ending Civilian Suffering: The Purpose, Provisions, and Promise of Humanitarian Disarmament Law," *Austrian Review of International and European Law*, vol. 15 (2010), http://hrp.law.harvard.edu/wp-content/uploads/2013/08/04_docherty_neu-FINAL.pdf (accessed June 1, 2017), p. 7.

³⁰ Convention on Cluster Munitions, pmbl. para 2.

³¹ See Docherty, "Ending Civilian Suffering: The Purpose, Provision, and Promise of Humanitarian Disarmament Law," *Austrian Review of International and European Law*, p. 8.

Including environmental remediation obligations in this treaty would also have the effect of furthering the progression of humanitarian disarmament law. Clearance provisions have grown increasingly strong over the past two decades. While the Mine Ban Treaty requires marking mined areas and clearance, the Convention on Cluster Munitions mandates additional and more specific measures and makes clear that the obligations apply to remnants from use pre-dating the convention. The nuclear weapon ban treaty has the opportunity to take the next step by moving clearance obligations beyond explosive remnants of war, such as cluster munition remnants, to toxic remnants of war.³² Toxic remnants of war are defined as toxic or radiological substances used in or resulting from military activities that form a hazard to humans or ecosystems.³³ Like explosive remnants of war, they present a lingering danger for civilians and therefore should be dealt with in a similar way. Requiring environmental remediation in the nuclear weapon ban treaty would also mark the first time that states have been required to address the remnants of a weapon of mass destruction; biological and chemical weapons produce toxic, not explosive, remnants of war.

III. Environmental Remediation Elements in the Nuclear Weapon Ban Treaty

To address environmental remediation in a comprehensive and detailed manner, negotiating states should start with but strengthen the language in the draft text.³⁴ The preambular paragraphs come out strongly against the environmental harm caused by nuclear weapons. They recognize that “the catastrophic consequences of nuclear weapons . . . pose grave implications” for the environment. They also highlight international law related to the protection of the environment in armed conflict, stating that states parties “*bas[e] themselves* on the principles and rules of

³² See Doug Weir, “The Nuclear Ban Treaty Needs Work if It’s to Deliver on the Environment,” post to Toxic Remnants of War Project (blog), May 25, 2017, <http://www.toxicremnantsofwar.info/the-nuclear-ban-treaty-needs-work-if-its-to-deliver-on-the-environment/> (accessed May 29, 2017) (arguing that inclusion of strong environmental remediation obligations in the nuclear weapon ban treaty would advance efforts to protect the environment from the effects of armed conflict).

³³ See Doug Weir, “Report: Pollution Politics: Power, Accountability and Toxic Remnants of War,” post to Toxic Remnants of War Project (blog), July 3, 2014, <http://www.toxicremnantsofwar.info/report-pollution-politics/> (accessed May 31, 2017).

³⁴ The Toxic Remnants of War Project has also published a detailed analysis of the draft text’s environmental provisions and argued for strengthening them. Weir, “The Nuclear Ban Treaty Needs Work if It’s to Deliver on the Environment,” post to Toxic Remnants of War Project (blog).

international humanitarian law, in particular . . . the rule that care shall be taken in warfare to protect the natural environment against widespread, long term and severe damage.”³⁵

While the inclusion of draft Article 6(2) addresses environmental remediation, it should be significantly stronger. Draft Article 6(2) declares that affected states parties have a “right to seek and to receive assistance toward the environmental remediation of areas . . . contaminated [by use or testing].” The treaty should take the next step, however, and establish explicit remediation obligations for affected states parties, whether in a stand-alone article or as part of what is now Article 6. The treaty should also bolster the complementary and critical international assistance and cooperation obligations that appear in draft Article 8. This package could build on analogous clearance provisions in other humanitarian disarmament treaties, especially the Convention on Cluster Munitions, because clearance activities, like environmental remediation, are intended to eliminate harm from remnants of war.

Environmental Remediation Obligations

The nuclear weapon ban treaty should contain a general obligation on environmental remediation that establishes primary responsibility on affected states parties and addresses temporal matters as well as enumerate specific obligations to guide implementation.

Primary Responsibility on Affected States Parties

The nuclear weapon ban treaty should assign primary responsibility to affected states parties to remediate their territory. Although the draft text references such states in its Article 6(2), it does not impose any obligations on them. Humanitarian disarmament treaties typically contain a paragraph that outlines a general obligation to clear and destroy remnants of the prohibited weapons. The clearance provision of the Convention on Cluster Munitions begins by obligating “[e]ach State Party [] to clear and destroy, or ensure the clearance and destruction of, cluster

³⁵ This language comes from Articles 35(3) and 55 of Additional Protocol I to the Geneva Conventions. Protocol Additional to the Geneva Conventions of 12 August 1949, and Relating to the Protection of Victims of International Armed Conflicts (Protocol I), adopted June 8, 1977, 1125 U.N.T.S. 3, entered into force December 7, 1978, arts. 35(3) and 55. While its inclusion in the draft text is important, it is worth noting that many people have argued that the environment should be protected against widespread, long-term *or* severe damage. See, for example, Weir, “The Nuclear Ban Treaty Needs Work if It’s to Deliver on the Environment,” post to Toxic Remnants of War Project (blog).

munition remnants located in cluster munition contaminated areas under its jurisdiction or control.”³⁶ The Mine Ban Treaty³⁷ and CCW Protocol V³⁸ include similar clauses. Placing primary responsibility for remediation on affected states parties would thus follow the precedent of disarmament law. It would also be consistent with human rights law because that framework requires states to protect people in their territory and reducing environmental harm contributes to that end. This approach would have practical benefits because affected states are better positioned to coordinate clearance efforts in their territory and can view outside interference as an infringement on their sovereignty.

Assigning primary responsibility to affected states parties would not create insurmountable obstacles even for those facing the most catastrophic environmental damage. Remediation encompasses many steps, which vary in cost and difficulty, and heavily affected states parties would have the capacity to implement at least some of them, through a combination of their own available resources and significant international assistance. In addition, following the model of existing disarmament treaties, the nuclear weapon ban treaty could create certain accommodations for the heavily affected states parties, without shifting primary responsibility to others. The Convention on Cluster Munitions and Mine Ban Treaty allow heavily affected states parties to apply for extensions to the clearance deadlines set in those treaties. Even if the nuclear weapon ban treaty does not impose a specific deadline for remediation, there may be other types of accommodations it could make for the most onerous remediation measures. The treaty could require remediation “to the extent possible” in recognition of the fact that complete remediation may not be realistic. Finally, as will be discussed in depth below, inclusion of robust international cooperation and assistance obligations would entitle affected states parties to foreign aid that would help them meet their responsibilities. States parties might be more forthcoming with such assistance if the treaty prioritized environmental remediation by making it a direct obligation, not just an area for international assistance.

³⁶ Convention on Cluster Munitions, art. 4.

³⁷ The Mine Ban Treaty states: “Each State Party undertakes to destroy or ensure the destruction of all anti-personnel mines in mined areas under its jurisdiction or control, as soon as possible but not later than ten years after the entry into force of this Convention for that State Party.” Mine Ban Treaty, art. 5(1).

³⁸ Protocol V requires each contracting party and party to an armed conflict to “after the cessation of active hostilities and as soon as feasible . . . mark and clear, remove or destroy explosive remnants of war in affected territories under its control.” CCW Protocol V, art. 3.

Affected state responsibility has not deterred highly contaminated countries from becoming parties to other weapons ban treaties. For example, Lao PDR, on which 270 million submunitions were dropped in the 1960s and 1970s, joined the Convention on Cluster Munitions despite being the country with the “world’s highest level of contamination by unexploded submunitions.”³⁹ Other severely affected countries, including Lebanon, Iraq, and Afghanistan, have also joined that convention.⁴⁰ Judging by this experience, the importance of delegitimizing nuclear weapons and the prospect of international cooperation and assistance would likely attract states affected by nuclear weapons use and testing to the new treaty, even with a positive obligation to remediate the environment.

Temporal Elements

The treaty could also address two temporal issues not referred to in draft Article 6. First, the Convention on Cluster Munitions and the Mine Ban Treaty both establish ten-year time deadlines for completing clearance.⁴¹ This paper does not propose a specific timeline for remediation measures dealing with nuclear contamination; the qualifier “as soon as possible” may be sufficient. Negotiating states could add a deadline, however, in consultation with technical experts. If they decided that was the best course, they should take into account the scale of nuclear weapons contamination and consider the criteria for determining when remediation efforts or, more realistically, specific remediation activities are “complete.” Second, the new treaty, like the Convention on Cluster Munitions, should explicitly clarify that the obligation applies to environmental contamination attributable to use and testing pre-dating the entry into force of the treaty as well as future environmental harm.⁴²

Specific Obligations Relating to Environmental Remediation

To deal with environmental remediation in a comprehensive and detailed way, the nuclear weapon ban treaty should go beyond articulating general responsibilities. It should also establish specific obligations regarding the steps of the remediation process, none of which are addressed

³⁹ “Lao PDR: Mine Action,” Landmine & Cluster Muniton Monitor, November 25, 2016, <http://www.the-monitor.org/en-gb/reports/2017/lao-pdr/mine-action.aspx> (accessed May 31, 2017).

⁴⁰ “Who’s Joined the Convention on Cluster Munitions?” Cluster Muniton Coalition, May 23, 2017, <http://www.stopclustermunitions.org/media/2260731/who-has-joined-the-convention-on-cluster-munitions-english-23-may-2017.pdf> (accessed May 31, 2017).

⁴¹ See Mine Ban Treaty, art. 5(1); Convention on Cluster Munitions, art. 4(1)(a).

⁴² Convention on Cluster Munitions, art. 4(4).

in draft Article 6. These specific obligations should cover the following areas: assessment, risk reduction measures, rehabilitation, national plan, and reporting.

Assessment

Remediation efforts generally begin with an assessment. A mandated assessment should determine levels of radiation and risk and identify which areas should be prioritized for remediation. It should also address which methods of remediation would work best, calculate the potential costs involved, and identify areas for which affected states parties need outside assistance.

Other disarmament treaties mandate comparable assessments. The Convention on Cluster Munitions obliges states parties to “[s]urvey, assess and record the threat posed by cluster munition remnants” and to “[a]ssess and prioritise needs in terms of marking, protection of civilians, clearance and destruction.”⁴³ CCW Protocol V requires assessment of both the threat of explosive remnants of war and the priorities for clearance.⁴⁴ The Mine Ban Treaty establishes an obligation to assess risk by requiring states parties to identify areas suspected to have antipersonnel landmines.⁴⁵

Risk Reduction Measures

After assessing the situation, affected states parties should be obliged to reduce the risks that radiation from the use or testing of nuclear weapons poses to civilians. As a starting point, states parties should ensure that the most contaminated areas are clearly marked and fenced off. Due to the widespread nature of nuclear contamination, marking and fencing all contaminated areas may not be feasible, but states parties should at least set aside the most dangerous zones.

States parties should further reduce the threat to their population through risk reduction education.⁴⁶ Risk education involves informing people living nearby about the dangers presented

⁴³ Ibid., art. 4(2)(a, b).

⁴⁴ CCW Protocol V requires parties to “(a) survey and assess the threat posed by explosive remnants of war; (b) assess and prioritise needs and practicability in terms of marking and clearance, removal or destruction.” CCW Protocol V, art. 3(3).

⁴⁵ Mine Ban Treaty, art. 5(2).

⁴⁶ For more information on risk reduction education, also known as mine risk education, see United Nations Mine Action Service (UNMAS), “Mine/ERW Risk Education,” International Mine Action Standard (IMAS) 12.10,

by exposure to the contaminated area or consumption of potentially contaminated food as well as measures they can take to protect themselves.

Existing disarmament treaties commonly mandate these types of risk reduction measures. The Convention on Cluster Munitions provides, for example, that each state party must mark, monitor, and fence affected areas “to ensure the effective exclusion of civilians,” post warnings, and educate local civilians about the risks posed by cluster munition remnants.⁴⁷ (For full language, see Article 4(2) in Annex.) CCW Protocol V and the Mine Ban Treaty contain comparable obligations.⁴⁸

Rehabilitation

Affected states parties should be required to rehabilitate areas contaminated by nuclear weapons use and testing. As discussed above, rehabilitating the environment can entail removing contaminants and/or preventing them from spreading.⁴⁹ The treaty will likely want to let states parties determine the most appropriate remediation method for their situation.

The obligation to rehabilitate is analogous to the obligations to clear and destroy remnants of war in other disarmament treaties, notably the Convention on Cluster Munitions, CCW Protocol V, and Mine Ban Treaty. The requirement to address environmental damage from armed conflict can also be found in some international environmental treaties. The 1968 African Convention on the Conservation of Nature and Natural Resources, for example, obliges states parties to rehabilitate different parts of the environment, including land, soil, and vegetation,⁵⁰ and also imposes a specific obligation on states parties to “rehabilitate areas damaged in the course of armed conflicts.”⁵¹

Amendment 2, Second Edition, June 2013, <http://www.mineactionstandards.org/fileadmin/MAS/documents/imas-international-standards/english/series-12/IMAS-12-10-Ed2-Am2.pdf> (accessed May 29, 2017); “Mine Risk Education,” UNMAS, <http://www.mineaction.org/issues/education> (accessed May 29, 2017).

⁴⁷ Convention on Cluster Munitions, art. 4(2).

⁴⁸ Protocol V requires states parties to take all feasible measures to protect civilians, including “warnings, risk education to the civilian population, marking, fencing and monitoring.” CCW Protocol V, art. 5. The Mine Ban Treaty requires states parties to ensure that areas containing or suspected to contain antipersonnel mines must be “perimeter-marked, monitored and protected by fencing or other means.” Mine Ban Treaty, art. 5(2).

⁴⁹ US EPA, *Technology Reference Guide for Radioactively Contaminated Media*, p. 5.

⁵⁰ African Convention on the Conservation of Nature and Natural Resources, adopted on September 15, 1968, 1001 U.N.T.S. 3, entered into force June 16, 1969, arts. VI and VIII.

⁵¹ *Ibid.*, art. XV.

National Plan

The treaty should require states parties to develop a national plan for environmental remediation. Such a plan would help coordinate activities among government agencies and ensure funds are earmarked for the implementation of this obligation. The Convention on Cluster Munitions mandates states parties to “take steps to mobilise resources and develop a national plan to carry out these activities, building, where appropriate, upon existing structures, experiences and methodologies.”⁵² CCW Protocol V requires that “[i]n order to reduce the risks of explosive remnants of war, the contracting party and parties to the armed conflict should take the following measures: ... (d) take steps to mobilise resources to carry out these activities.”⁵³

Reporting

To address environmental remediation in a comprehensive and detailed way, the treaty should also require states parties to report on their progress in implementing their remediation obligations. The treaty should mandate states parties submit reports within a certain amount of time after the treaty comes into force and update that information annually.

Regular reporting on a range of matters serves at least three roles. First, it illuminates challenges that a state party is facing in implementing a treaty and helps other states parties adapt their international assistance in response. Second, it gives states parties an opportunity to learn lessons about the effects of implementation methods from other states parties. Third, reporting allows civil society groups, international organizations, and other states parties to monitor a state party’s progress in meeting its treaty obligations, which can help hold it to account.⁵⁴ Transparency through reporting is a common element in disarmament treaties.⁵⁵ Article 7 of the Convention on Cluster Munitions, which contains an extensive list of elements states parties must report on, could serve as a model for a transparency obligation in the nuclear weapon ban treaty. That article requires regular reports on the size and location of contaminated areas and the status and

⁵² Convention on Cluster Munitions, art. 4(2)(b). See also CCW Protocol V, art. 3(3) (requiring that “[i]n order to reduce the risks of explosive remnants of war, the contracting party and parties to the armed conflict should take the following measures: ... (d) take steps to mobilise resources to carry out these activities.”).

⁵³ CCW Protocol V, art. 3(3).

⁵⁴ Bonnie Docherty, “Article 7,” in Gro Nystuen and Stuart Casey-Maslen, eds., *The Convention on Cluster Munitions: A Commentary* (Oxford: Oxford University Press, 2010), paras. 7.2 and 7.3.

⁵⁵ See, for example, Chemical Weapons Convention, art. 3; Mine Ban Treaty, art. 7; Convention on Cluster Munitions, art. 7.

progress of clearance, destruction, risk reduction education, and warnings, all topics that are equally relevant to environmental remediation in the nuclear weapons context.⁵⁶

International Cooperation and Assistance Obligations

To complement the obligations that should be imposed on affected states parties, the nuclear weapon ban treaty should obligate *all* states parties to provide international cooperation and assistance for environmental remediation. Outside assistance is essential to ensuring affected states parties can meet their remediation responsibilities. Knowing other states parties are required to provide such help would encourage affected states to join the treaty. Because international cooperation and assistance can come in a variety of forms, including technical, material, financial, and human resources, arguably all states parties would be able to contribute some type of assistance. The obligation could appear in the environmental remediation provision itself, or more likely in a separate article that lays out international cooperation and assistance requirements for other areas, such as victim assistance.

Draft Articles 6(2) and 8 include provisions related to international cooperation and assistance, but the treaty's provisions on this topic are insufficient as written and should be strengthened. First, the treaty should require states parties to provide assistance as well as cooperation. Although draft Articles 6(2) and 8(2) give states parties the right to seek and receive *assistance*, according to draft Article 8(1), other states parties are only obligated to *cooperate*.⁵⁷ Second, the treaty should elaborate on the types of assistance states parties should provide, such as technical, material, and financial, and how they should be provided. Third, the treaty should enumerate areas, including environmental remediation, for which international cooperation and assistance is required. Such specificity will help ensure affected states parties receive the outside assistance they need.

⁵⁶ Convention on Cluster Munitions, art. 7(1)(h-j).

⁵⁷ Furthermore, a loophole exists with regard to environmental remediation. While states parties are obliged under draft Article 8(1) to cooperate "to facilitate the implementation of the obligations of this Convention," the draft text does not establish an obligation to remediate, which means that there is no clear requirement to cooperate with remediation activities.

In drafting these elements, negotiating states can take inspiration from other disarmament treaties that require international cooperation and assistance for clearance. Article 6 of the Convention on Cluster Munitions, for example, contains detailed international cooperation and assistance obligations, requiring states parties to assist with both risk reduction measures and clearance itself. (For more details, see Article 6(4)-(5) in Annex.) Article 7 of CCW Protocol V requires each state “in a position to do so” to “provide assistance in dealing with the problems posed by existing explosive remnants of war, as necessary and feasible,”⁵⁸ and Article 8 elaborates on additional related obligations. The Mine Ban Treaty contains similar provisions on international assistance and cooperation.⁵⁹

Precedent also exists in the nuclear weapons context for requiring assistance with environmental remediation. For example, the Treaty on a Nuclear-Weapon-Free Zone in Central Asia states: “Each Party undertakes to assist any efforts toward the environmental rehabilitation of territories contaminated as a result of past activities related to the development, production or storage of nuclear weapons or other nuclear explosive devices, in particular uranium tailings storage sites and nuclear test sites.”⁶⁰

The nuclear weapon ban treaty could require or encourage states parties that have used or tested nuclear weapons (“user states”) to assume particular responsibility for providing remediation assistance to affected states parties. For example, in its clearance article, the Convention on Cluster Munitions “strongly encourage[s]” user states parties to provide assistance to affected states parties to facilitate the clearance and destruction of cluster munition remnants. This article also requires user states parties to provide information on the weapons used and location of strikes, information that can prove invaluable for clearance but which only user states possess.⁶¹ CCW Protocol V requires the user state party to provide “where feasible, *inter alia* technical, financial, material or human resources assistance” for clearance of explosive remnants of war.⁶²

⁵⁸ CCW Protocol V, art. 7(2).

⁵⁹ The Mine Ban Treaty contains provisions similar to that in the Convention on Cluster Munitions on international cooperation and assistance with mine clearance. Mine Ban Treaty, art. 6.

⁶⁰ Treaty on a Nuclear-Weapon-Free Zone in Central Asia, adopted on September 8, 2006, entered into force on March 21, 2009, art. 6.

⁶¹ Convention on Cluster Munitions, art. 4(4).

⁶² CCW Protocol V, art. 3(1).

The Chemical Weapons Convention requires a state party that has abandoned chemical weapons to “provide all necessary financial, technical, expert, facility as well as other resources.”⁶³

Finally, the treaty should also explicitly require international cooperation and assistance for emergency measures necessary in the immediate aftermath of a new nuclear weapons explosion. In such a situation, the affected state party would likely lack the capacity to deal with the catastrophic impacts in a timely fashion and thus other states parties should play a leading role. The Convention on Cluster Munitions and Chemical Weapons Convention contain comparable articles on the international assistance required for an emergency response.⁶⁴

Conclusion

Negotiating states should build on and strengthen the language of the draft treaty text to address, in a comprehensive and detailed manner, the environmental harm recognized in the preamble. They should impose both explicit obligations on affected states parties to remediate the environment and clear obligations on all states parties to provide international cooperation and assistance. Existing disarmament treaties offer guidance on what types of provisions should be included in the new nuclear weapon ban treaty in order to create stronger protections for civilians and the environment. By strengthening the draft text, negotiating states can promote the values that underlie the new treaty and humanitarian disarmament law more broadly.

⁶³ The Chemical Weapons Convention also requires the state in whose territory the chemical weapons are found to “provide appropriate cooperation.” Chemical Weapons Convention, Verification Annex, Part IV(B), para. 15.

⁶⁴ Convention on Cluster Munitions, art. 6(6); Chemical Weapons Convention, art. X(8)-(11).

ANNEX

Clearance Provisions in the 2008 Convention on Cluster Munitions**Preamble**

...

Determined to put an end for all time to the suffering and casualties caused by cluster munitions at the time of their use, when they fail to function as intended or when they are abandoned, . . .

...

Believing it necessary to contribute effectively in an efficient, coordinated manner to resolving the challenge of removing cluster munition remnants located throughout the world, and to ensure their destruction, . . .

Article 4

Clearance and destruction of cluster munition remnants and risk reduction education

1. Each State Party undertakes to clear and destroy, or ensure the clearance and destruction of, cluster munition remnants located in cluster munition contaminated areas under its jurisdiction or control, as follows:

(a) Where cluster munition remnants are located in areas under its jurisdiction or control at the date of entry into force of this Convention for that State Party, such clearance and destruction shall be completed as soon as possible but not later than ten years from that date;

(b) Where, after entry into force of this Convention for that State Party, cluster munitions have become cluster munition remnants located in areas under its jurisdiction or control, such clearance and destruction must be completed as soon as possible but not later than ten years after the end of the active hostilities during which such cluster munitions became cluster munition remnants; and

(c) Upon fulfilling either of its obligations set out in sub-paragraphs (a) and (b) of this paragraph, that State Party shall make a declaration of compliance to the next Meeting of States Parties.

2. In fulfilling its obligations under paragraph 1 of this Article, each State Party shall take the following measures as soon as possible, taking into consideration the provisions of Article 6 of this Convention regarding international cooperation and assistance:

(a) Survey, assess and record the threat posed by cluster munition remnants, making every effort to identify all cluster munition contaminated areas under its jurisdiction or control;

(b) Assess and prioritise needs in terms of marking, protection of civilians, clearance and destruction, and take steps to mobilise resources and develop a national plan to carry out these activities, building, where appropriate, upon existing structures, experiences and methodologies;

- (c) Take all feasible steps to ensure that all cluster munition contaminated areas under its jurisdiction or control are perimeter-marked, monitored and protected by fencing or other means to ensure the effective exclusion of civilians. Warning signs based on methods of marking readily recognisable by the affected community should be utilised in the marking of suspected hazardous areas. Signs and other hazardous area boundary markers should, as far as possible, be visible, legible, durable and resistant to environmental effects and should clearly identify which side of the marked boundary is considered to be within the cluster munition contaminated areas and which side is considered to be safe;
- (d) Clear and destroy all cluster munition remnants located in areas under its jurisdiction or control; and
- (e) Conduct risk reduction education to ensure awareness among civilians living in or around cluster munition contaminated areas of the risks posed by such remnants.

3. In conducting the activities referred to in paragraph 2 of this Article, each State Party shall take into account international standards, including the International Mine Action Standards (IMAS).

4. This paragraph shall apply in cases in which cluster munitions have been used or abandoned by one State Party prior to entry into force of this Convention for that State Party and have become cluster munition remnants that are located in areas under the jurisdiction or control of another State Party at the time of entry into force of this Convention for the latter.

(a) In such cases, upon entry into force of this Convention for both States Parties, the former State Party is strongly encouraged to provide, *inter alia*, technical, financial, material or human resources assistance to the latter State Party, either bilaterally or through a mutually agreed third party, including through the United Nations system or other relevant organisations, to facilitate the marking, clearance and destruction of such cluster munition remnants.

(b) Such assistance shall include, where available, information on types and quantities of the cluster munitions used, precise locations of cluster munition strikes and areas in which cluster munition remnants are known to be located. . . .

Article 6

International cooperation and assistance

1. In fulfilling its obligations under this Convention each State Party has the right to seek and receive assistance.

2. Each State Party in a position to do so shall provide technical, material and financial assistance to States Parties affected by cluster munitions, aimed at the implementation of the obligations of this Convention. Such assistance may be provided, *inter alia*, through the United Nations system, international, regional or national organisations or institutions, non-governmental organisations or institutions, or on a bilateral basis.

...

4. In addition to any obligations it may have pursuant to paragraph 4 of Article 4 of this Convention, each State Party in a position to do so shall provide assistance for clearance and destruction of cluster munition remnants and information concerning various means and technologies related to clearance of cluster munitions, as well as lists of experts, expert agencies or national points of contact on clearance and destruction of cluster munition remnants and related activities.

5. Each State Party in a position to do so shall provide assistance for the destruction of stockpiled cluster munitions, and shall also provide assistance to identify, assess and prioritise needs and practical measures in terms of marking, risk reduction education, protection of civilians and clearance and destruction as provided in Article 4 of this Convention.

6. Where, after entry into force of this Convention, cluster munitions have become cluster munition remnants located in areas under the jurisdiction or control of a State Party, each State Party in a position to do so shall urgently provide emergency assistance to the affected State Party.

...

11. Each State Party may, with the purpose of developing a national action plan, request the United Nations system, regional organisations, other States Parties or other competent intergovernmental or non-governmental institutions to assist its authorities to determine, *inter alia*:

- (a) The nature and extent of cluster munition remnants located in areas under its jurisdiction or control;
- (b) The financial, technological and human resources required for the implementation of the plan;
- (c) The time estimated as necessary to clear and destroy all cluster munition remnants located in areas under its jurisdiction or control;
- (d) Risk reduction education programmes and awareness activities to reduce the incidence of injuries or deaths caused by cluster munition remnants; . . .

Article 7

Transparency measures

1. Each State Party shall report to the Secretary-General of the United Nations as soon as practicable, and in any event not later than 180 days after the entry into force of this Convention for that State Party, on:

...

- (h) To the extent possible, the size and location of all cluster munition contaminated areas under its jurisdiction or control, to include as much detail as possible regarding the type and quantity of each type of cluster munition remnant in each such area and when they were used;
- (i) The status and progress of programmes for the clearance and destruction of all types and quantities of cluster munition remnants cleared and destroyed in accordance with Article 4 of this Convention, to include the size and location of the cluster munition

contaminated area cleared and a breakdown of the quantity of each type of cluster munition remnant cleared and destroyed;

(j) The measures taken to provide risk reduction education and, in particular, an immediate and effective warning to civilians living in cluster munition contaminated areas under its jurisdiction or control;

...

(m) The amount of national resources, including financial, material or in kind, allocated to the implementation of Articles 3, 4 and 5 of this Convention; and

2. The information provided in accordance with paragraph 1 of this Article shall be updated by the States Parties annually, covering the previous calendar year, and reported to the Secretary-General of the United Nations not later than 30 April of each year.

3. The Secretary-General of the United Nations shall transmit all such reports received to the States Parties.