

INSIDE | UN Security Council Holds Rare Disarmament Debate

# Arms Control TODAY

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THE SOURCE ON NONPROLIFERATION  
AND GLOBAL SECURITY

## The Inadmissibility of Nuclear Threats

By John Burroughs

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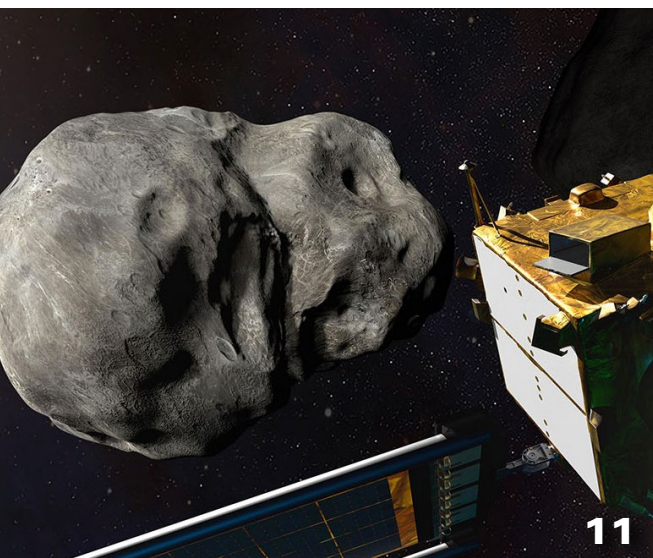
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# Breaking the Impasse on Disarmament, Part One

A special UN Security Council meeting on nuclear disarmament issues convened by Japan in March underscored agreement among all 15 members that the risk of nuclear war and arms racing is higher than at any point since the end of the Cold War. But it also highlighted chronic differences among the nuclear-armed states about how to reduce the danger. As the Japanese foreign minister warned ahead of the meeting, “The world now stands on the cusp of reversing decades of declines in nuclear stockpiles.”

To address such challenges, UN Secretary-General António Guterres outlined several commonsense, achievable steps that could begin to move the world away from the nuclear precipice if pursued by China, Russia, the United States, and others.

Noting that “states possessing nuclear weapons are absent from the table of dialogue,” Guterres said they “must reengage” to reduce nuclear stockpiles, prevent nuclear use, negotiate a joint no-first-use agreement, stop nuclear saber-rattling, and reaffirm support for the 1996 Comprehensive Test Ban Treaty.

He put specific emphasis on countries with the largest arsenals, Russia and the United States, and said that they “must find a way back to the negotiating table to fully implement the [New Strategic Arms Reduction] Treaty [New START] and agree on its successor.”

Last month, more than two dozen members of Congress introduced an important resolution calling for stronger U.S. efforts to engage Russia and China in arms control talks. Moving the nuclear-armed states in the right direction will, however, require much stronger and sustained pressure from civil society, legislators, and the international community.

At the Security Council meeting on March 18, U.S. Ambassador Linda Thomas-Greenfield criticized Russia’s nuclear rhetoric and reiterated the 2023 U.S. offer to engage in bilateral talks with Moscow on a post-New START nuclear arms control framework. Unsurprisingly, Russia’s delegate renewed the Kremlin’s rejection of the U.S. offer, claiming that there is no basis for such work if Western countries refuse to “respect [Russia’s] vital interests.”

In reality, maintaining limits on their strategic nuclear arsenals is in the vital interest of both countries. Yet, New START, the last remaining bilateral arms control treaty, is due to expire in fewer than 675 days. Moreover, Russia and the United States are obligated under Article VI of the nuclear Nonproliferation Treaty (NPT) to engage in negotiations to halt the arms race and move toward disarmament.

NPT member states should make it their highest priority at the NPT preparatory committee meeting in July to press Moscow and Washington to observe the New START limits on deployed warheads until a more permanent, comprehensive nuclear arms control arrangement is concluded.

Thomas-Greenfield also called out China’s nuclear buildup and said that, despite a round of bilateral talks in November, China “remained unwilling to engage in substantive talks on nuclear risk reduction and arms control.”

China’s delegate agreed that “the risk of a nuclear arms race and a nuclear conflict is rising,” but insisted that U.S. criticisms of China “don’t hold water.” He invited other nuclear-armed states to explore the possibility of a no-first-use agreement.

China’s proposal is designed, of course, to highlight its long-standing no-first-use posture and divert attention from its nuclear buildup. Nevertheless, such an agreement would help reduce nuclear risk. As U.S. President Joe Biden said in October 2022 about Russia’s threat of a potential first use of nuclear weapons

in Ukraine, “I don’t think there’s any such thing as the ability to easily [use] a tactical nuclear weapon and not end up with Armageddon.” The same logic applies to U.S. or Chinese first use.

If the United States wants more substantive dialogue with China, the

White House should agree to China’s proposal seriously and does not plan to threaten nuclear coercion against China. Such a shift could reduce tensions and lead to more concrete measures designed to prevent a Chinese-U.S. nuclear arms race.

Guterres also called for reforms at the Conference on Disarmament (CD) to open the way for long-delayed talks on a fissile material cutoff treaty (FMCT) and on legally binding negative security assurances against nuclear attack for non-nuclear-weapon states, a priority for most nations.

To advance progress at the CD, the United States indicated in February that it would drop its opposition to talks on legally binding assurances against nuclear attack for non-nuclear states in good standing with their NPT commitments if other states, including China and Pakistan, drop their objections to long-delayed talks on an FMCT. Such a quid pro quo, if accepted by Beijing, could jump-start CD activity and lead to tangible results that reduce nuclear risks and guard against unconstrained arms buildups.

The world has faced grave nuclear dangers before. Then as now, it will take strong domestic and international pressure, smart diplomacy, and some luck to prevent disaster. **ACT**

**[I]t will take strong domestic and international pressure, smart diplomacy, and some luck to prevent disaster.**

# InBRIEF



Patrick T. Fallon/AFP via Getty Images

## Notable Quotable

*“We made a film about the man who created the atomic bomb and, for better or for worse, we’re all living in Oppenheimer’s world. So, I would really like to dedicate this to the peacemakers everywhere.”*

—Cillian Murphy, in speech accepting the Oscar for best actor in the film, *Oppenheimer*, Los Angeles, March 10, 2024

## BY THE NUMBERS

### A Nuclear Power Plant in the War Zone

One of the uniquely challenging features of the Russian war on Ukraine is the presence of the Zaporizhzhia Nuclear Power Plant in the middle of the conflict zone. The plant produces no electricity but holds large amounts of nuclear fuel that must be kept safe. Russia illegally attacked the complex early in its full-scale invasion of Ukraine in 2022 and continues to occupy it. International Atomic Energy Agency (IAEA) Director-General Rafael Mariano Grossi repeatedly has expressed concern that the largest nuclear plant in Europe could be hit by military fire or lose its off-site power indefinitely. In a recent report, the IAEA said the plant lost the connection to its last remaining main power line for five hours on March 22 amid reports of widespread military action.

**6**

Reactors at Zaporizhzhia Nuclear Power Plant

**20**

Months that the reactors have been shut down

**4,500**

Current staff at the Zaporizhzhia complex employed by the Russian operating agency

**11,500**

Pre-war staff at the complex

**16**

Number of rotating International Atomic Energy Agency support teams that have monitored safety and security at the Zaporizhzhia plant since September 2022

**9**

Times the plant suffered complete losses of external power over the past 18 months

Source: International Atomic Energy Agency

<b>April 1-19</b>	UN Disarmament Commission, New York	<b>Aug. 6 and 9</b>	79th anniversaries of the atomic bombings of Hiroshima and Nagasaki
<b>April 24</b>	International Day of Multilateralism and Diplomacy for Peace	<b>Aug. 19-23</b>	10th Conference of States Parties to the Arms Trade Treaty, Geneva
<b>April 29</b>	Vienna Conference on Autonomous Weapons Systems, Vienna	<b>Aug. 29</b>	International Day Against Nuclear Tests
<b>May 13-June 28</b>	Part II of the Conference on Disarmament, Geneva	<b>Sept. 10-13</b>	12th Meeting of States Parties to the Convention on Cluster Munitions, Geneva
<b>June 13-15</b>	Summit of the Group of Seven industrialized countries, Puglia, Italy	<b>Sept. 24-Oct. 1</b>	UN General Assembly, New York
<b>June 20-28</b>	67th session of the Committee on the Peaceful Uses of Outer Space, Vienna	<b>Sept. 26</b>	International Day for the Total Elimination of Nuclear Weapons
<b>June 24-28</b>	65th session of the Preparatory Commission for the Comprehensive Nuclear-Test-Ban Treaty Organization, Vienna	<b>Oct. 7</b>	UN General Assembly First Committee on Disarmament and International Security, New York
<b>July 9-11</b>	NATO summit, Washington	<b>Oct. 16-18</b>	66th session of the Preparatory Commission for the Comprehensive Nuclear-Test-Ban Treaty Organization, Vienna
<b>July 22-Aug. 2</b>	Second meeting of the preparatory committee for the 11th review conference for the nuclear Nonproliferation Treaty, Geneva	<b>Nov. 25-29</b>	29th Conference of the States Parties to the Chemical Weapons Convention, The Hague
<b>July 29-Sept. 13</b>	Part III of the Conference on Disarmament, Geneva		

## Five Years Ago in ACT

### The Future of the Nuclear Order

“Both systems [the nuclear powers’ managed system of deterrence and the nuclear nonproliferation order], are faltering. Within the deterrent order, U.S. and Russian leaders are failing to maintain traditional arms control treaties and increasing the salience of nuclear weapons...The nuclear nonproliferation order is in no better shape...”

—Rebecca Gibbons Davis, April 2019

# The Inadmissibility of Nuclear Threats

**C**ontradicting the widespread and complacent post-Cold War belief that the risks of the nuclear age are declining, threats of the possible use of nuclear weapons are on the rise.

In the summer and autumn of 2017, the United States and North Korea exchanged incendiary warnings of nuclear destruction.<sup>1</sup> In September 2019, Pakistan referred to possible nuclear war in connection to its dispute with India over Kashmir.<sup>2</sup> In recent months, North Korean leader Kim Jong Un on several occasions reiterated his country's readiness to resort to nuclear arms to defend its fundamental interests.<sup>3</sup> Most alarmingly, the Russian government on numerous occasions, beginning with President Vladimir Putin's speech on February 24, 2022,<sup>4</sup> and up to the present, has raised the possibility of resorting to nuclear weapons should the United States and its NATO allies intervene to defend Ukraine against the full-scale Russian invasion.

Such threats are utterly unacceptable, above all because they greatly increase the

risks of a humanitarian and environmental catastrophe resulting from use of nuclear weapons. The position adopted by the Group of 20 (G-20) states, an intergovernmental forum that includes the world's major powers, in a declaration in Bali in November 2022 is striking in this regard. The declaration states in part, "It is essential to uphold international law and the multilateral system that safeguards peace and stability. This includes defending all the Purposes and Principles enshrined in the Charter of the United Nations and adhering to international humanitarian law, including the protection of civilians and infrastructure in armed conflicts. The use or threat of use of nuclear weapons is inadmissible."<sup>5</sup>

Although that position clearly was occasioned by Russian nuclear threats, by its terms, it is not limited to that

circumstance.<sup>6</sup> It was repeated in another G-20 declaration in New Delhi in September 2023.

## The Legal Dimension

Is a declaration of the "inadmissibility" of the threat and the use of nuclear arms an articulation of a political and moral norm, or does it also have a legal dimension? After all, the reference to inadmissibility does have a legal flavor; in a trial, evidence is found to be admissible or inadmissible. Further, there is a strong case to be made that threats of nuclear weapons use are not only unacceptable and illegitimate but contrary to international law. That is true under law governing when the resort to force is lawful (*jus ad bellum*) and under law governing the conduct of conflict (*jus in bello*), the law of armed conflict or international humanitarian law.

Article 2(4) of the UN Charter provides that "[a]ll Members shall refrain in their international relations from the threat or use of force against the territorial integrity or political independence of any state, or in any other manner inconsistent with the Purposes of the United Nations." If a use of force would violate Article 2(4), a threat to engage in such force violates that article. As the International Court

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**Homes and trees destroyed by Russian shelling in the Zaporizhzhia region of Ukraine create a haunting landscape in March as Moscow's full-scale invasion of the country grinds into its third year. On numerous occasions, Russian President Vladimir Putin has raised the possibility of using nuclear weapons if the United States and NATO intervene to defend Ukraine.**

(Photo by Andriy Andriyenko/SOPA Images/LightRocket via Getty Images)

of Justice (ICJ) stated broadly in its 1996 nuclear weapons advisory opinion, “The notions of ‘threat’ and ‘use’ of force under Article 2, paragraph 4, of the Charter stand together in the sense that if the use of force itself in a given case is illegal—for whatever reason—the threat to use such force will likewise be illegal.”<sup>7</sup>

It follows that a threat to use nuclear weapons as part of an aggressive attack is illegal. That certainly applies to the nuclear threats made in support of Russia’s invasion of Ukraine.

What is the law, though, when a state threatens to use nuclear arms not as part of an aggressive attack as in the Russian case? As the ICJ explained, the use or threat of force in self-defense pursuant to Article 51 of the Charter must be necessary and proportional.<sup>8</sup> A defensive threat to use nuclear weapons that does not meet those criteria would be illegal under *jus ad bellum*. In this context,<sup>9</sup> proportionality requires that the defensive use of force have a reasonable relationship

to the aggressive act responded to and a reasonable relationship to the lawful goals of the defensive use of force, for example, expelling troops from the attacked state’s territory. In many or all circumstances, a defensive first use of nuclear weapons would not be necessary or proportionate as a matter of *jus ad bellum*. Notably, the ICJ observed that the risk of escalation must be taken into account in assessing proportionality.<sup>10</sup> Recent North Korean nuclear threats fail to meet the requirement of proportionality.

The court also found that any threat to use nuclear weapons, whether aggressive or defensive, must be of a use that would comply with international humanitarian law or *jus in bello*. In general, the ICJ said that “[i]f an envisaged use of weapons would not meet the requirements of humanitarian law, a threat to engage in such use would also be contrary to that law.”<sup>11</sup> Under that principle, if a use of nuclear arms is illegal, the threat of their use is illegal.

Putting aside marginal cases, nuclear use in typical scenarios, even if defensive, would be illegal under international humanitarian law.<sup>12</sup> The ICJ went a long way toward accepting this conclusion, finding that “the threat or use of nuclear weapons would generally be contrary to the rules of international law applicable in armed conflict, and in particular the principles and rules of humanitarian law.”<sup>13</sup> The court did not reach a conclusion, one way or the other, however, regarding an extreme circumstance of self-defense in which the very survival of a state is at stake.<sup>14</sup> Nearly three decades after the court issued its opinion, the global community should move beyond the court’s uncertainty in that circumstance.

### **The ICJ Analysis of Threat**

The ICJ analysis of UN Charter requirements barring aggressive or disproportionate threats of force is unexceptionable; it flows from the

Charter and the well-established rule that a defensive use of force must be necessary and proportional. In contrast, the basis for the court's finding that a threat to use weapons in violation of international humanitarian law is illegal is not clear from the advisory opinion, nor is such a principle readily ascertainable in treaty law or ICJ case law.

Yet, the proposition that threats of illegal force are themselves illegal is rooted in the most important modern treaty, the UN Charter. Although the Charter does not address directly the issue of whether the illegality of threats of illegal force extends to violations of international humanitarian law, it does imply that the legality of threat of force and the legality of use of force should be analyzed together. The court's reference under Article 2(4) to the illegality of threats of uses of force when the latter are illegal "for whatever reason" is consistent with that implication.<sup>15</sup> Moreover, the Article 2(4) prohibition of the threat of force inconsistent with the purposes of the UN provides some support for an analysis going beyond the prohibitions of aggressive or disproportionate threats. Purposes set out in Article 1 include the maintenance of peace and security and cooperation in solving problems of a humanitarian character and in promoting respect for human rights.

Beyond those Charter considerations, it appears that the court enunciated the principle that a threat to use weapons in violation of international humanitarian law is illegal on its own authority. The ICJ is the highest court in the world on general questions of international law, and its judges include eminent international lawyers. It is not unusual for the highest court in a judicial system to develop the law or, put another way, to make visible already existing principles.

Sometimes, there is a distinction made in international law between conduct preparatory to a wrongful act and the wrongful act itself, which is illegal or criminal. This tendency is visible in the crime of aggression included in the Rome Statute of the International Criminal Court, which provides that an individual may be convicted of "planning" or "prepar[ing]" for aggression, but only if a state "act of aggression" is actually committed. If this approach were taken

## **[T]he proposition that threats of illegal force are themselves illegal is rooted in the most important modern treaty, the UN Charter.**

in the realm of state responsibility, a threat would be illegal only if contrary to a treaty, as it is in the case of threats of aggression under the Charter.<sup>16</sup>

A threat to use weapons in violation of international humanitarian law, certainly a specific and credible threat, is different from preparatory conduct such as acquiring military capabilities enabling an aggressive attack. A thought exercise regarding biological and chemical weapons illustrates the soundness of the court's finding. The use of biological weapons and the use of chemical weapons would be violations of international humanitarian law prohibitions of attacks with indiscriminate and uncontrollable effects.<sup>17</sup> Further, a nearly universal convention, the Chemical Weapons Convention, prohibits the possession and use of chemical arms; another one, the Biological Weapons Convention, prohibits possession of biological arms, reinforcing an existing ban on their use. Should a specific and credible threat to use such arms be considered lawful? Going beyond the sphere of weapons, under the Genocide Convention, incitement, conspiracy, and attempt to commit genocide are prohibited but not threats. Yet, it seems highly doubtful that a specific and credible threat to commit genocide should be considered lawful.

There are partial international prohibitions of threat under international humanitarian law.<sup>18</sup> A key instrument, Additional Protocol I to the 1949 Geneva Conventions, includes a provision prohibiting "acts or threats of violence the primary purpose of which is to spread terror among the civilian population."<sup>19</sup> Another provision prohibits threatening that there shall be no survivors.<sup>20</sup>

Such prohibitions can be viewed in two ways. One is that their partial character demonstrates the lack of a comprehensive

prohibition of threats to use weapons in violation of international humanitarian law. The second is that they are expressions of an underlying principle, namely, that it is prohibited to threaten to carry out a prohibited act.<sup>21</sup>

### **The Evolution of International Law**

The latter view is more consonant with the evolution of international law, recently illustrated by the 2017 negotiation of the Treaty on the Prohibition of Nuclear Weapons (TPNW) and the UN Human Rights Committee's 2018 General Comment on the right to life. In that comment, the committee found that "[t]he threat or use of weapons of mass destruction, in particular nuclear weapons...is incompatible with respect for the right to life and may amount to a crime under international law."<sup>22</sup>

The TPNW is the latest manifestation of the view of a majority of the world's states that the threat or use of nuclear arms is illegal. Previously, such views were expressed in arguments to the ICJ and, regarding use, in numerous UN General Assembly resolutions going back to 1961.<sup>23</sup> Moreover, beginning with the 1967 Treaty of Tlatelolco, non-nuclear-weapon states have negotiated regional nuclear-weapon-free-zone treaties with protocols that, when ratified, obligate the five nuclear-weapon states acknowledged by the nuclear Nonproliferation Treaty not to use or threaten to use nuclear arms against members of the regional zones.<sup>24</sup>

In June 2022, five months prior to the adoption of the G-20 declaration in Bali, the first meeting of TPNW states-parties adopted the Vienna Declaration. In it, states-parties "stress that any use or threat of use of nuclear weapons is a violation of international law"; and they "condemn unequivocally any and all nuclear threats, whether they be explicit or implicit and

irrespective of the circumstances.” The second meeting of states-parties, in New York City in late 2023, reiterated those points. The TPNW itself obligates states-parties “never under any circumstances” to “use or threaten to use nuclear weapons.” TPNW states-parties do not include any nuclear-armed states.

These developments further support the soundness of the court’s findings: threats to use weapons that violate international humanitarian law and therefore, at least as a general matter, threats to use nuclear weapons are illegal. It bears repeating as well that threats to use disproportionate force in self-defense are illegal, and the risk of escalation, obviously an acute concern when it comes to nuclear arms, must be taken into account in assessing proportionality.

Without attempting a definition of “threat” as a matter of international law, it can safely be stated that a specific and credible governmental statement making demands qualifies. Take a concrete context where the stakes are high, such as an armed conflict involving a nuclear-armed state; and the message is, if you

do not refrain from doing X or if you do Y, we will resort to nuclear arms. That undoubtedly is a legally cognizable threat. It certainly describes Putin’s threat at the outset of the invasion of Ukraine, in which he expressed a readiness to resort to nuclear force should NATO states “interfere” in Russian military operations in Ukraine.

What about standing policies declaring a state’s readiness to resort to nuclear weapons when subjected to a nuclear attack and more generally when vital interests are stake? One could argue that specific threats are not involved in those policies and therefore they are not illegal. It is true that references to vital interests and similar formulations are vague. Yet, doctrinal signals that a nuclear attack may or will be met with a responsive or preemptive nuclear attack are focused and credible, even if not issued in an actual circumstance of potential use.

More broadly, if specific threats are illegal, that points toward the illegality and certainly the illegitimacy of the machinery and doctrines of nuclear deterrence. In its advisory opinion, the

ICJ stated that it “does not intend to pronounce here upon the practice known as the ‘policy of deterrence.’”<sup>25</sup> Yet, as the United States observed in its oral argument to the court, “it is impossible to separate the policy of deterrence from the legality of the use of the means of deterrence.”<sup>26</sup>

It is highly disturbing that nuclear threats are on the rise, in the Russian-Ukrainian conflict and elsewhere. Even so, there are positive trends, although their importance should not be overstated. It is encouraging that there has been a counterassertion of a norm against nuclear threats in G-20 summits, as well as in the TPNW meetings. It is also encouraging that the United States and other NATO states for the most part have refrained from any public nuclear threats in response to those made by Russia.

The norm against threatening the use of nuclear weapons has a firm legal foundation. It is imperative that governments and civil society strive to entrench it even more deeply in international and national understanding and practice.



Despite nuclear saber-rattling in recent years by Russia, North Korea, and others, the entry-into-force of the Treaty on the Prohibition of Nuclear Weapons (TPNW) shows that a majority of the world’s states view the threat or use of nuclear weapons as illegal. As TPNW states-parties held their second meeting in November in New York, Juan Ramon de la Fuente of Mexico (C, R), the meeting president, spoke with Céline Nahory, advocacy coordinator for the International Campaign to Abolish Nuclear Weapons (ICAN). (Photo by ICAN/Darren Orntiz)

## ENDNOTES

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17. In addition to general rules of international humanitarian law, an amendment to the Rome Statute, so far ratified by only a small number of states, specifically makes use of biological weapons a war crime. Article 8(2)(b)(xxvii). Use of chemical weapons arguably is specifically criminal under a provision of the Rome Statute setting forth the Geneva Gas Protocol prohibition of use of "asphyxiating, poisonous or other gases, and all analogous liquids, materials or devices." Article 8(2)(b)(xviii).
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# Planetary Defense: The Nuclear Option Against Asteroids

**W**hat should be done if it is discovered some day that a large asteroid is on an imminent collision course with Earth? In particular, should a nuclear weapon be employed to divert or destroy such a threat if no other remedies seem sufficient?

This nightmare scenario is not now on the horizon; no one has detected any imminent massive inbound celestial body. Yet, humanity cannot take too much comfort because even the best astronomy is unable to detect all significant asteroids in adequate time to prevent their impact and because the world currently possesses only a very limited capacity for doing anything effective about these dangers.

Any potential deployment of a nuclear device in orbit or beyond and the prospect a nuclear explosion in space would face enormous political, legal, and technical obstacles. Even if the unprecedented

activity were undertaken entirely for the peaceful purpose of saving humanity from a sudden extraterrestrial threat, it would be deservedly controversial and complicated. Long-standing international legal restrictions, established to preserve nuclear stability and restraint on Earth, would be severely challenged by any nuclear anti-asteroid program.

There are four main components of this scientific, political, and legal dilemma: the scope of the potential asteroid problem, the currently inadequate array of technically feasible responses, the legal and policy

impediments that would apply against any possible use of a nuclear explosive device for anti-asteroid protection, and a proposed reconciliation via adaptations in existing international law.

## Dodging Asteroids

There are many millions of asteroids in the solar system, of widely varying size, composition, location, and trajectory. Most of them stay safely in the main asteroid belt between the orbits of Mars and Jupiter, but as gravity, random collisions, and space weather exert chaotic influences, some asteroids adopt more widely erratic orbits, several of which could bring them uncomfortably close to Earth. An asteroid that approaches within 45 million kilometers of our planet's orbit is categorized as a "near Earth object"; if it flies closer than 7.5 million kilometers and is larger than 140 meters in size, it is labeled a "potentially hazardous object."<sup>1</sup>

Distressingly, a great many of these fast-flying, portentous objects remain totally undetected. NASA and its companion space agencies in other countries are engaged assiduously in the search for

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**This asteroid, roughly 18 meters wide, whizzed through the sky above Chelyabinsk, Russia, on Feb. 15, 2013 before exploding in the atmosphere and causing considerable damage on the ground. The photograph was taken by a local Chelyabinsk resident, M. Ahmetvaleev.** (Photo by M. Ahmetvaleev via NASA)

these celestial bodies, and hundreds of new specimens are identified each year. Additional resources, including telescopes on the ground and in space, are being deployed to enhance “space situational awareness.” Yet, asteroids are relatively small and dark on the cosmic scale, and they can be especially difficult to detect if they approach from the general direction of the sun, which obscures the efforts of Earth-based astronomers. NASA’s Jet Propulsion Laboratory maintains a vivid Asteroid Watch Dashboard, which displays tracking information about upcoming near approaches, usually several per month, identifying each asteroid’s approximate diameter and date of closest Earth proximity.<sup>2</sup>

Generally, an asteroid larger than approximately 140 meters in diameter would be regarded as capable of inflicting regional damage, afflicting thousands of square kilometers, in a collision on Earth. There are an estimated 25,000 objects of this magnitude that could come near this planet, and only about 43 percent of them have been detected and tracked. A larger asteroid, measuring a kilometer or more across, would generate catastrophic global effects, comparable perhaps to those envisioned as the abrupt “nuclear winter” climatic alterations that could

be triggered by a nuclear war. Some 854 of those giants have been detected, and dozens more are suspected.<sup>3</sup>

Throughout history, substantial asteroid impacts have been a recurrent phenomenon for this planet. Most famously, during the Chicxulub event some 66 million years ago, an asteroid 10-15 kilometers in diameter crashed into what is now the Gulf of Mexico, off the Yucatan Peninsula. The catastrophic geophysical effects led to the extinction of the non-avian dinosaurs and perhaps 75 percent of all other animal and plant species living then.<sup>4</sup>

More recent episodes, involving much smaller asteroids, also have proven momentous. For example, in 1908, an asteroid perhaps 50 meters in diameter exploded above the Russian region of Tunguska. There were no documented human witnesses in that remote Siberian locale, but the force of the detonation has been estimated as equivalent to 10-50 megatons of TNT. It flattened 80 million trees over a 2,000-square-kilometer area.<sup>5</sup>

In 2013, near the Russian city of Chelyabinsk, a roughly 18-meter-wide asteroid exploded at an altitude of 30 kilometers with a yield estimated at 400-500 kilotons, damaging 7,200 buildings and injuring 1,500 people.<sup>6</sup> No one

had seen this asteroid coming, and as it streaked across the morning sky, it could have been misinterpreted as a U.S. missile.

Of course, smaller particles penetrate Earth’s atmosphere all the time, including the spectacular meteor showers that regularly illuminate the night sky. The passage of larger objects, a meter or more in size, dazzles observers somewhere on the planet three or four times per month. More ominous are the very close approaches by still-larger bodies that observatories continuously track. Although none are projected to impact Earth in the foreseeable future, these calculations remain largely a cosmic game of uncertainties and probabilities, given the difficulty of accurately projecting the future course of a distant asteroid or comet. Even if a potential threat is discerned sufficiently early, it may take many months and carefully repeated observations to determine how likely an Earth impact really is, where on the planet it might occur, and how large and solid and therefore how consequential the asteroid would be.

As one vivid example, the asteroid denominated as 99942 Apophis has a diameter of approximately 340 meters. Initial observations in 2004 indicated a 2.7 percent probability that it would

collide with Earth in 2029, which would be extraordinarily damaging. Subsequent observations eliminated that possibility, but also assessed that if the 2029 flyby happened to pass within a narrow region in space characterized as a precise “keyhole,” then gravitational effects would imply that the asteroid’s next close approach to Earth, projected in 2036, would create such an impact. Subsequent additional observations have eliminated the likelihood of a collision; the 2029 conjunction will pass very near Earth, but the 2036 rendezvous will miss our planet by millions of miles, and there is now no prospect of a collision for at least the next 100 years.<sup>7</sup>

Nonetheless, other significant asteroids have replaced Apophis atop the International Astronomical Union’s Torino Scale, which categorizes asteroid impact dangers.<sup>8</sup> In fact, between 2027 and 2029, five other, even larger asteroids will approach Earth to within only four times the distance to the moon. Ominously, astronomers warn that a doomsday collision is statistically a question of when, not whether, because large asteroids will surely collide with Earth at some point as they have in the past. They just do not know whether the next Chicxulub-scale impactor will arrive within a few decades or not for another 60 million years.

### Planetary Defense

In 2016, NASA established a Planetary Defense Coordination Office, charged with leading the development of capabilities to anticipate and respond to potential asteroid perils. Several candidate technologies have been pursued, and one, the kinetic interceptor, has been operationally tested. This concept entails launching a physical mass to ram into the targeted asteroid at high speed, nudging it off its trajectory or shattering the asteroid as a last resort, much as a missile defense interceptor might attempt to do to a hostile attacker much closer to Earth.

In 2021-2022, NASA undertook the Double Asteroid Redirection Test mission, propelling a small spacecraft 11 million kilometers into the 160-meter-wide asteroid Dimorphos, which poses no threat to Earth. The program was a marvelous success, validating the ability of the craft’s autonomous guidance system to

## **There has never been anything like a test nuclear explosion against a celestial body, but scientists have begun to contemplate some plausible methodologies.**

direct it unerringly to the impact point at 22,000 kilometers per hour. The asteroid’s original trajectory was indeed altered appreciably, even more than most prior calculations had anticipated.<sup>9</sup>

Nevertheless, the kinetic impactor concept has important limitations. It could succeed only against a relatively small target, a few hundred meters in size at most, and only if there was plenty of advance warning so that the small variance in the asteroid’s path could accumulate over time, causing the asteroid to miss Earth. Moreover, the scenario requires that the asteroid be a relatively solid, intact body rather than a mass of space rubble loosely held together by gravity, as some asteroids are. Additionally, the target asteroid could not be too fragile lest the impact shatter it rather than displace its course through space.

Other potential planetary defense concepts have been hypothesized and sketched out, but none has proceeded into testable hardware. One notion, the gravity tractor, would send a spacecraft to intercept an asteroid, but instead of crashing into it, the spacecraft would adopt a closely parallel flight path. As the microgravity between the two objects pulled them closer together, the spacecraft would incrementally power away, and the continuing gravity would bend the asteroid to follow, bit by bit departing from its original trajectory.<sup>10</sup>

Other even less-developed concepts would seek to install some type of engine on the asteroid or to paint it to alter the natural color and light reflectivity of one surface on the asteroid so it would differentially absorb solar energy as it spins, which could translate into slowly changing its course.

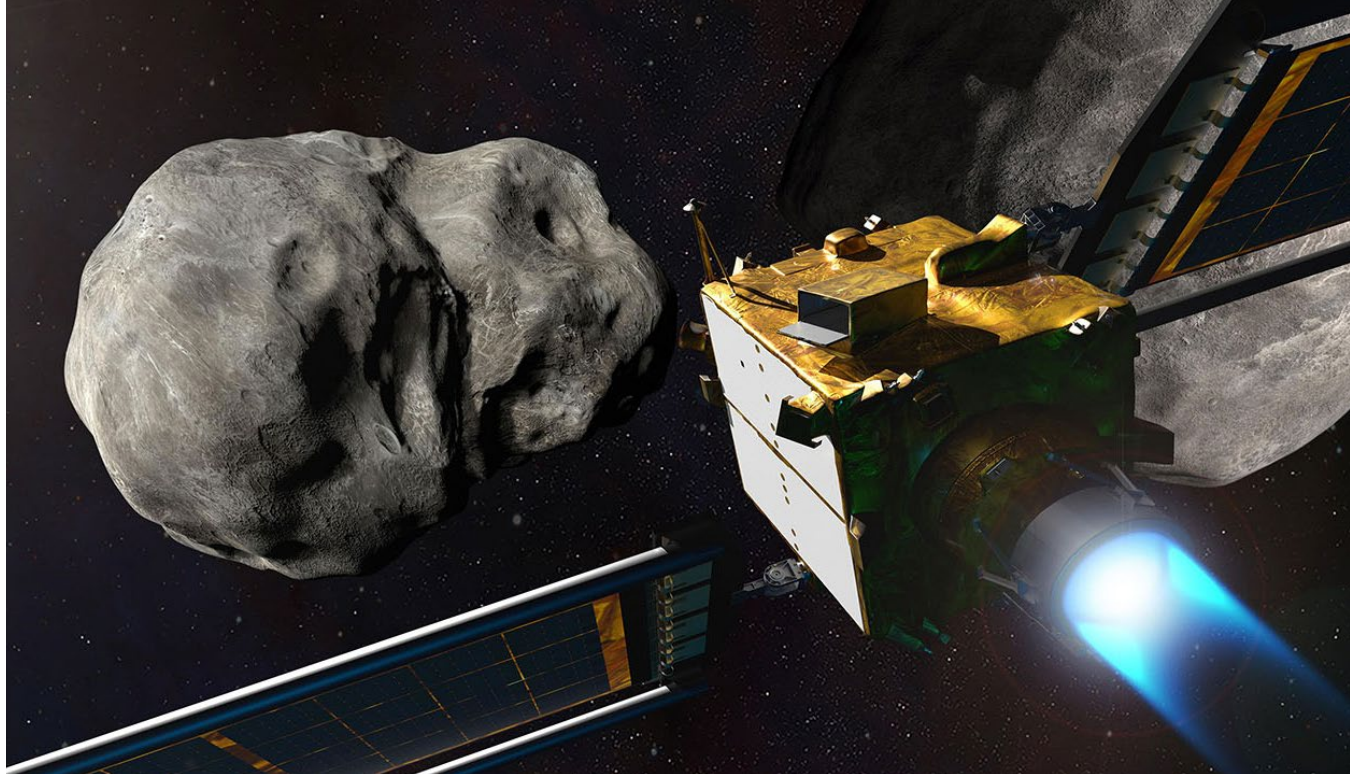
If the threatening asteroid was large, however, and if the available time

frame was compressed, a more powerful response could be necessary. The attention of scientists and other experts therefore inevitably has been drawn to nuclear explosions, which offer the most efficient mechanism for transferring a large amount of energy to a distant target and represent a relatively mature technology, having been operationally tested 2,056 times, including several times in space.<sup>11</sup>

There has never been anything like a test nuclear explosion against a celestial body, but scientists have begun to contemplate some plausible methodologies. The current leading concept would not undertake to fracture the asteroid, despite several Hollywood movies luridly featuring that scenario. Doing that would probably leave most of the asteroid’s mass, which after the explosion would be highly radioactive, on a trajectory to collide with Earth. Moreover, fracturing the asteroid could create several distinct impact points on Earth, which would be comparable to a nuclear weapon with multiple independently targetable reentry vehicles and might expand the area of damage on the planet, inflicting even more harm than a single, larger crash.

Instead, a nuclear planetary defense mission likely would rely on a detonation at some short standoff distance from the asteroid and would employ the nuclear energy to vaporize volatile material on the surface of the asteroid. As those molecules rapidly evaporate or sublime away, the resulting vapor would exert a tiny equal and opposite force, nudging the asteroid off track. Again, nothing of this sort has ever been tested, and there are no plans to undertake such an experiment.

Two relatively new international entities have emerged to study and respond to the asteroid threat. The Space Mission



This illustration depicts NASA's Double Asteroid Redirection Test (DART) spacecraft prior to impact at the Didymos asteroid system. NASA undertook the DART mission in 2021-2022 to test whether the spacecraft could be directed to strike the smaller asteroid Dimorphos, which orbits Didymos, and alter its trajectory. The test was considered a success, offering a potential solution if an asteroid ever threatens Earth. (Illustration by NASA)

Planning Advisory Group is a collection of leading national space agencies, with an ambitious collective agenda to share information about asteroid exploratory missions and to collaborate to evaluate and recommend possible responses to asteroid scenarios.<sup>12</sup> The companion International Asteroid Warning Network is an affinity group for dozens of astronomers and observatories to identify and characterize the population of potential asteroid and comet impact dangers and to serve as a clearinghouse for sharing their findings with the broader community.<sup>13</sup>

### Legal Impediments

Any consideration of using nuclear detonations in space immediately inspires profound political and legal opposition.<sup>14</sup> Three treaties or groups of treaties are implicated, each of which was created long ago for reasons having nothing to do with potential asteroid impacts. The treaties have enjoyed wide adherence and are recognized as foundational to terrestrial peace and security, but they nonetheless pose significant challenges for any nuclear planetary defense scheme.

First, under the 1963 Limited Test Ban Treaty, each party legally undertakes “to prohibit, to prevent, and not to carry out any nuclear weapon test explosion,

or any other nuclear explosion, at any place under its jurisdiction or control... in the atmosphere [and] beyond its limits, including outer space.” This constitutes a direct, categorical prohibition against the contemplated nuclear planetary defense mission.

The 1996 Comprehensive Test Ban Treaty would reinforce the 1963 treaty and extend a comparable proscription to any environment, including underground, as well as in space. Although this treaty has been signed and ratified by 178 countries, it is not in force because several required countries, including the United States, have not ratified it. Its signatories are nonetheless obligated by customary international law, as reflected in Article 18 of the Vienna Convention on the Law of Treaties, “to refrain from acts which would defeat the object and purpose” of the treaty. In 2016 the UN Security Council authoritatively proclaimed that any nuclear explosion by any state would constitute such a defeat and therefore is already prohibited.<sup>15</sup>

Notably, these test ban treaties apply to nuclear weapons tests and to “any other nuclear explosion.” This explicit language ensures that even if a nuclear planetary defense operation might be characterized as a so-called peaceful nuclear explosion

or “nuclear explosion for peaceful purposes,” there is no escape hatch from the legal prohibition.

Second, the 1967 Outer Space Treaty, the foundational instrument regulating human space activities, imposes the obligation “not to place in orbit around the Earth any objects carrying nuclear weapons or any other kinds of weapons of mass destruction, install such weapons on celestial bodies, or station such weapons in outer space in any other manner.”

Although this treaty is sometimes cited as a comprehensive “no nukes in space” commitment, its actual coverage is narrower. It proscribes only three specified activities regarding nuclear weapons: their placement in Earth orbit, installation on a celestial body, and stationing in space. Notably, the treaty does not bar the transit of a nuclear weapon through space. Although the key terms are not defined in the treaty or in the subsequent practice by states interpreting the language, it might be possible for a nuclear planetary defense mission to adopt an operational profile that dodged these constraints. For example, the nuclear explosive device might not have to orbit the Earth even once before being directed toward its target; it might not have to be installed on the asteroid if it were detonated at a



distance; and its flight plan might not be regarded as having it stationed in space.

In addition, the Outer Space Treaty language applies to nuclear weapons, and some might seek to characterize a nuclear explosive device being employed for a peaceful, planet-saving operation as not constituting a weapon. That term might be reserved most appropriately for instruments used for a hostile, warlike, or criminal purpose. Of course, many items are dual use; a knife would be regarded as a weapon if it is wielded to threaten or stab someone but not when it is used to slice an apple. The literature on this point reflects an unresolved international debate regarding the treaty's applicability to a nuclear planetary defense mission.

Finally, the several treaties dealing with nuclear nonproliferation also could be implicated, especially if the nuclear planetary defense mission were undertaken by a coalition of countries that included some legally authorized to possess nuclear weapons and some not. The 1968 nuclear Nonproliferation Treaty (NPT), for example, prohibits parties that possess nuclear weapons from transferring to others a nuclear weapon or other nuclear explosive device or control over such a weapon, and it reciprocally prohibits non-nuclear-weapon states from receiving such a weapon or device or control over it. So, the respective roles of the various states collectively participating in a nuclear planetary defense mission would have to be precisely defined, to prohibit control passing to an unauthorized state.

Many regional treaties establishing nuclear-weapon-free zones go a significant step further in pursuit of nonproliferation, requiring their parties, in the language of the treaty applicable to Latin America, to “refrain from engaging in, encouraging or authorizing, directly or indirectly, or in any way participating in the testing, use, manufacture, production, possession, or control of any nuclear weapon.” This broad mandate would seem not only to bar a non-nuclear-weapon state from actively joining in a nuclear planetary defense mission, but also from requesting that other states undertake such a rescue or expressing political support for it. Although a nuclear planetary defense mission would have to be led by one or a handful of

technologically advanced countries, it surely would be beneficial to develop a broad global consensus endorsing such an operation even if that required circumventing this legal restriction.

A similar effect could result from the ambitious scope of the 2021 Treaty on the Prohibition of Nuclear Weapons, which comprehensively bars its states-parties from possessing, testing, using, or conducting other operations regarding nuclear weapons and includes an undertaking never to “assist, encourage or induce, in any way, anyone to engage in any activity prohibited to a State Party under this Treaty.” That mandate also could inhibit any effort to generate international support for or participation in a multinational nuclear planetary defense operation.

Additionally, any future international agreement that comprehensively sought a global, permanent abolition of nuclear weapons would be challenged by the asteroid scenario. Already, opponents of the concept of creating a world free of nuclear weapons cite the possible planetary defense application as a rationale against progress toward zero.

### The Search for a Solution

What should be done if a threatening asteroid appears on the horizon and the potential array of non-nuclear planetary defense options seems inadequate to the task? Is there any way to maintain international fidelity to the treaties and collective adherence to the rule of law while acting efficaciously to protect the planet?

One potential recourse would be to alter relevant treaty obligations. Each of these agreements can be amended; each is also subject to withdrawal if a party's “supreme interests” are jeopardized. These mechanisms are somewhat cumbersome, however, and can be time-consuming; in some instances, effective amendment requires a supermajority or even unanimity among the parties. Such changes also would constitute a permanent alteration in the treaty legal obligations rather than just a temporary exception. There are also valid excuses for nonperformance of international legal obligations, known as “circumstances that preclude the wrongfulness” of the state's action, such as duress, necessity, and fundamentally changed circumstances. Again, none of these recognized rationales seems quite applicable to the situation under consideration here.<sup>16</sup>

Another alternative, favored by an ad hoc international lawyers working group established in 2017 by NASA and the space agencies of other cooperating countries, would turn to the UN Security Council.<sup>17</sup> Under Chapter VII of the UN Charter, the Security Council possesses an extraordinary power in the event of a declared “threat to the peace” to create new law, including the even more extraordinary power effectively to supersede the obligations of prior treaties. The council could exercise that power to authorize a particular state or combination of states to undertake a nuclear planetary defense mission, notwithstanding the



**President Lyndon B. Johnson (R) watches the signing of Outer Space Treaty, which bans weapons in outer space, on January 27, 1967.** (Photo by © CORBIS/Corbis via Getty Images)

preexisting obligations of the Limited Test Ban Treaty, the Outer Space Treaty, the NPT, and other instruments noted above.

In so doing, the Security Council could immunize the acting states from any adverse legal consequences that would otherwise flow from their intentional, material departure from the implicated treaties. Once sufficient facts were known, the council could tightly restrict the authority it was delegating to certain states, limiting the number and type of nuclear weapons to be used and the way in which they would be applied, the identities of the states that could be involved in the most delicate parts of the operation, the time frame, the transparency of the operation, and other parameters.

Of course, the Security Council could adopt such a resolution only pursuant to unanimity or abstention among its five veto-wielding permanent members (China, France, Russia, the United Kingdom, and the United States). If those powers cannot see eye to eye regarding this peril, then the planet truly would be jeopardized.

Other international institutions could play a supporting role in legitimizing a nuclear planetary defense mission. The UN General Assembly and its subordinate Committee on the Peaceful Uses of Outer Space, as well as the Conference on Disarmament, do not possess the inherent lawmaking powers of the Security Council. Even so, a robust debate and endorsement by those bodies could manifest a high degree of global consensus on the appropriate course of action, helping politically to excuse what could otherwise constitute material breaches of legal obligations.

The danger of a catastrophic asteroid impact has only begun to attract the type and scale of attention and resources it demands. The problem requires technical finesse and large, sustained expenditures; it is grounded in a probabilistic assessment of potential hazards rather than a finite certainty; and it exposes a time frame that stretches far beyond any politician's term of office—all factors that create a sure formula for shoving the issue to a back burner.

The use of a nuclear weapon would not be anyone's first choice for a planetary defense mission. The financial costs and environmental consequences would be severe, the international politics

could be corrosive, the legal jeopardy to important arms control treaties would be substantial, and the breaching of a decades-long taboo against nuclear weapons use would be dreadful.

Still, this option belongs on the list of possible responses, should the worst imaginable scenario emerge. Even the most substantial international legal commitments should never pose an obstacle to action that would be truly necessary to protect the planet from Armageddon, especially when there are mechanisms that could allow the world to stave off an incoming asteroid while demonstrating fidelity to the law.

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## Oppenheimer's Bypassed Solution to the Nuclear Danger

Christopher Nolan's film *Oppenheimer* has educated a vast audience about a critical moment in world history. It also takes its viewers to a dark place, in which J. Robert Oppenheimer is punished for his effort to avert a nuclear arms race when he is stripped of his security clearance. As the movie expresses his thoughts, he had started then failed to stop "a chain reaction that might destroy the entire world."

That might leave some viewers wondering how Oppenheimer hoped to prevent what he accurately foresaw as an unwinnable superpower nuclear arms race. Despite the personal struggles portrayed in the movie, he worked ceaselessly toward identifying a practical path toward that goal. Unfortunately, the answer he ultimately found has been all but forgotten.

His initial hope was for comprehensive international control of everything from uranium mining to deployed weapons. As reflected in his work on the 1946 Acheson-Lilienthal report, that approach was overtaken by the deepening Cold War and the 1949 Soviet atomic bomb test.<sup>1</sup>

In that new context, Oppenheimer turned to a search for a nuclear policy that could contain the Soviet threat while avoiding capabilities for "exterminating civilian populations." That phrase is from a majority report in 1949, which he authored, of the General Advisory Committee of the U.S. Atomic Energy Commission.<sup>2</sup> In it, he distinguished between atomic weapons sufficient for



**In 1963, President Lyndon Johnson (R) presented J. Robert Oppenheimer, the father of the atomic bomb, with the Enrico Fermi award, the highest honor of the Atomic Energy Commission, which years earlier declared the physicist a security risk.**

(Photo by Eric Brissaud/Gamma-Rapho via Getty Images)

detering attack and the development of a hydrogen bomb, whose almost limitless explosive power and "the global effects of its radioactivity," would vastly magnify the nuclear danger. The committee's call to suspend hydrogen bomb development while supporting work on low-yield tactical nuclear weapons reflected

Oppenheimer's emerging vision of minimally sufficient nuclear deterrence. Consistent with that approach and further antagonizing supporters of a nuclear airpower buildup, Oppenheimer participated in the military's 1951 Project Vista, which argued that Europe could be defended with short-range tactical

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nuclear weapons rather than long-range strategic bombers.<sup>3</sup>

He next moved to consider whether efforts at population defense could contribute to the combined goals of deterring attack while avoiding civilian “extermination.” From the perspective of the U.S. Air Force leadership, his answer provided final proof of Oppenheimer’s treacherous “pattern of activities.”<sup>4</sup> For those who shared his view that a nuclear arms race risked world destruction, however, his emerging policy approach represented a radical advance in how to reduce the nuclear danger. The “father of the atom bomb” was about to create the first coherent vision of superpower nuclear arms control.

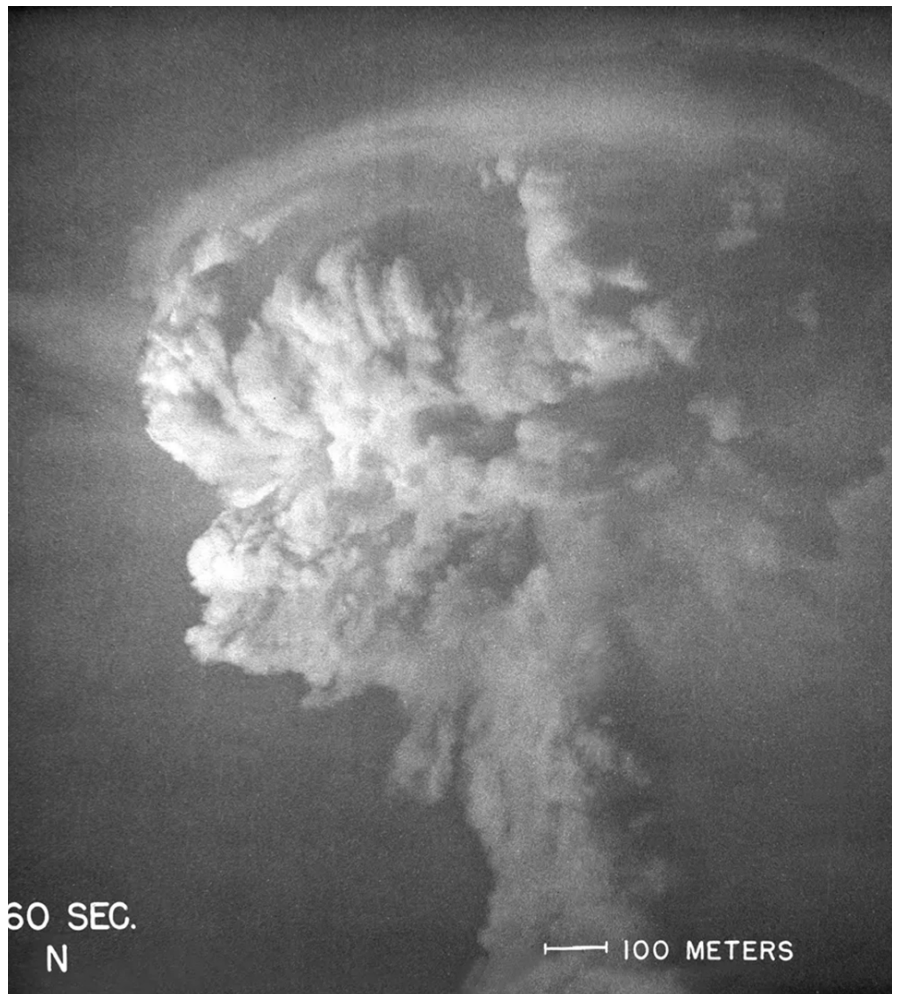
### A New Proposal

Oppenheimer’s new proposal, to put it simply, was for a superpower agreement that would avoid a buildup of bombs and bombers and instead direct Soviet and U.S. efforts toward defending their populations against nuclear attack. One might describe this approach as “mutual defense emphasis.”

It is understandable that his call for this arms control concept was left out of the film as peripheral to the high drama of its protagonist’s life and times. Yet, it also was ignored in the biography by Kai Bird and Martin J. Sherwin, on which the movie largely was based, and has received scant attention in most other histories of the nuclear age.

Because all scholars now agree that Oppenheimer’s banishment as an adviser on nuclear policy was unjust, it is worth examining whether the arms control concept that contributed to his downfall warrants reconsideration. That requires a look back at 1952, when Oppenheimer followed his work on Project Vista by joining a 1952 summer study at the MIT Lincoln Laboratory, which assessed prospects for defending the U.S. homeland against nuclear-armed bombers.<sup>5</sup>

The study concluded that a full-scale continental defense could intercept 60 to 80 percent of enemy bombers and that technological advances promised far greater effectiveness. Based on those findings, Oppenheimer concluded that although defense against a Soviet “knockout blow” technically was achievable, it would require that



Owing to the work of J. Robert Oppenheimer and other scientists, the world’s first atomic bomb, code named Trinity, was detonated on July 16, 1945, over Alamogordo, New Mexico. (Photo courtesy of Los Alamos National Laboratory)

the Soviets decide to limit their own buildup of nuclear-capable long-range bombers. Although formal agreements were unlikely in that Cold War climate, Oppenheimer envisioned a tacit understanding in which the superpowers would couple low levels of bombers with large-scale efforts at detection and interception. In that case, he concluded, deterrence could be based on mutual fears that few if any bombers would reach their targets.

At the time, the Soviet Union was focused on constructing a multitiered radar network and thousands of jet interceptors, while deploying no nuclear-capable intercontinental-range bombers, essentially the reverse of the initial U.S. reliance on a purely offensive strategy. Oppenheimer expressed the hope that, in return for being spared a buildup of U.S. nuclear airpower that was

certain to overwhelm even the massive Russian defensive effort, Moscow might be prepared to make deep cuts in its conventional forces threatening Western Europe. Only such bilateral concessions could avert the threats that each side feared most.

Oppenheimer then took this logic a step further. Should the day arrive when improved superpower relations revived interest in nuclear disarmament, he proposed that nationwide defenses would be a vital supplement to a verification regime. Although verification alone could not eliminate fears of hidden nuclear weapons and bombers, extensive defensive deployments could resolve that formidable obstacle to comprehensive offensive disarmament. As he explained in a 1953 article, a combination of robust verification measures and large-scale defenses could make “steps of evasion

far too vast to conceal or far too small to have, in view of existing measures of defense, a decisive strategic effect.”<sup>6</sup>

That article became famous for its appeal to the American people for candor regarding the impending Soviet capability to destroy the nation’s “heart and life” even if the United States attacked first. In a nonpublic forum, Oppenheimer expressed hope that such candor would galvanize public support for a major effort to build a continental defense and negotiate a bilateral limit on offenses. Informed U.S. citizens, as a later advocate of this approach put it, would “prefer live Americans to dead Russians.”<sup>7</sup>

These ideas had been developed in meetings of the Oppenheimer-led Panel of Consultants on Disarmament during the waning months of the Truman administration. Its work included a stillborn “no first test” proposal for the hydrogen bomb, based on the argument that stopping at the brink of testing would prevent both sides from developing deliverable weapons while enabling a rapid response if one side broke the agreement.<sup>8</sup> The first U.S. nuclear test occurred while the panel was still deliberating.

The panel’s report was delivered to newly elected President Dwight Eisenhower, who then heard direct appeals from panel members Oppenheimer, CIA Director Allen Dulles, and leading U.S. science adviser Vannevar Bush.<sup>9</sup> Discussions within the administration embraced their call for a continental defense system while rejecting their accurate prediction that homeland defense would prove futile without an agreement to limit offensive forces. A year later, Dulles’ older brother, Secretary of State John Foster Dulles, would announce the U.S. doctrine of “massive retaliation,” justifying the unfolding buildup to around 3,000 nuclear-armed bombers by the end of the 1950s.

### **A Bitter Attack**

Oppenheimer’s case for mutual defense emphasis came under bitter attack by Air Force leadership, which regarded support for U.S. nuclear superiority as a litmus test of patriotism. A sample of the prevalent conspiratorial thinking was the testimony of the chief Air Force scientist, David Griggs, during the hearings that led to

## **Oppenheimer’s case for mutual defense emphasis came under bitter attack by Air Force leadership...**

the revocation of Oppenheimer’s security clearance. “It was...told me by people who were approached to join the summer study that in order to achieve world peace... it was necessary not only to strengthen the air defense of the continental United States, but also to give up something, and the thing that was recommended that we give up was the...strategic part of our total air power,” Griggs said.<sup>10</sup>

It is largely forgotten that the original vision of nuclear arms control was based on restricting the offense to make strategic defense possible. In 1957 the arrival of the intercontinental ballistic missile (ICBM), demonstrated by the Soviet launch of Sputnik, would make that arms control approach appear foredoomed, and U.S. arms control supporters soon seized on a moment when shooting down ballistic missiles was literally impossible. In a radical shift from Oppenheimer’s arms control vision, these arms control supporters reasoned that the best outcome would be a superpower agreement to deploy ICBMs in large but equal numbers and protect them from nuclear attack by placing them underground in hardened concrete silos. Because neither side could hope to eliminate the other’s nuclear-armed missiles by striking first, the prospect of devastating retaliation against the aggressor’s population would freeze both sides in a state of stable mutual deterrence. The goal of arms control had shifted from the pursuit of offensive nuclear disarmament to the preservation of peace through an enduring “balance of terror.”

By the time the two sides developed plausibly effective defenses against missiles during the 1960s, this logic called for banning their deployment, and

the United States proposed such a plan for “offense only” mutual deterrence to the Soviet Union in 1967. When Soviet leaders objected, arguing that it would be better to ban offenses and allow population defenses, the United States responded that it would simply overwhelm any Soviet anti-ballistic missile defensive system by expanding its ICBM force.

In 1972 the Anti-Ballistic Missile (ABM) Treaty enshrined the principle of assured vulnerability to a nuclear holocaust, which has guided U.S.-Russian strategic arms control from then through the New Strategic Arms Reduction Treaty (New START). This approach soon became known as mutual assured destruction, a label created by Donald G. Brennan, who was also a supporter of mutual defense emphasis. He believed that the acronym MAD captured the insanity of entrusting safety to an arrangement based on forever avoiding accidental launches, miscalculation during a crisis, or a leader’s descent into insanity.

Oppenheimer’s defensive alternative to MAD had a remarkable if brief resurrection three decades later. President Ronald Reagan, facing widespread opposition to his 1983 call for a massive U.S. population defense known as the Strategic Defense Initiative, recast it from a nuclear victory strategy to a disarmament concept. Paul Nitze, Reagan’s senior arms control adviser, attended meetings of Oppenheimer’s 1952 disarmament panel as head of the Department of State’s policy planning staff. Now, as the Cold War waned, he embraced its call for a defense-protected disarmament regime, and Reagan approved his updated version of Oppenheimer’s arms control concept.

Presented to the Soviet arms control delegation in Geneva in January 1985, Nitze's proposal called for a 10-year negotiated transition combining non-nuclear population defenses with complete offensive disarmament. His explanation of the need for nationwide defenses as a hedge against cheating verged on a verbatim repetition of Oppenheimer's logic years earlier.

Nitze's proposal initially was rejected by Soviet President Mikhail Gorbachev, who scoffed at Reagan's vague promise to share U.S. missile defense technology. Yet, the Cold War had reached a turning point, and Gorbachev soon called for "a change in the entire pattern of armed forces" toward "imparting an exclusively defensive character to them." In October 1991, weeks before his fall from power, Gorbachev announced that the Soviets were ready "to consider proposals... on non-nuclear anti-ballistic missile defenses." The chain from Oppenheimer to Nitze to Gorbachev would extend to the first two leaders of the Russian successor state.

### Back to the Past

On February 1, 1992, Russian President Boris Yeltsin called for a global missile defense system that would enable countries to slash or eliminate their nuclear arsenals.<sup>11</sup> If that proposal reflected the giddy idealism of a new era, including reliance on a non-existent space-based missile shield, the United States by then had lost any interest in exploring cooperative defenses with the weak Soviet successor state. Eight years later, in May 2001, U.S. President George W. Bush would stun new Russian President Vladimir Putin by withdrawing from the ABM Treaty, signaling a prospective U.S. ballistic missile defense buildup that a still floundering Russia would be unable to match.

Looking back at that moment in 2019, Putin's views on that U.S. decision are worth quoting:

[I]f the US side...wanted to withdraw from the [t]reaty...I suggested working jointly on missile-defence projects that should have involved the United States, Russia and Europe. ... Those were absolutely specific proposals. I am convinced that the world would

be a different place today, had our US partners accepted this proposal. Unfortunately, this did not happen. We can see that the situation is developing in another direction; new weapons and cutting-edge military technology are coming to the fore. Well, this is not our choice.<sup>12</sup>

The world now finds itself confronted with the same basic problem that confronted Oppenheimer in the early 1950s, in which hopes for comprehensive arms control have yielded to major-power confrontation, including a race to incorporate destabilizing new weapons technologies. The United States, Russia, and China are pursuing improved offensive systems and defenses against aircraft and missiles of all types and ranges. Distinctions between offensive and defensive weapons and forces, crucial to all forms of arms control, are subordinated to whatever cost-effective blend of capabilities best advances war-fighting strategies. New START, already suspended in part over the full-scale Russian invasion of Ukraine, will expire in 2026; and as China approaches nuclear parity with the original superpowers, MAD offers no formula for three-way assured-destruction force levels.

The world continues to live with Oppenheimer's forecast that harnessing the destructive power of nuclear weapons will enable powerful nuclear states to overwhelm any adversary's unilateral efforts to limit wartime damage. It also lives with his realistic fear that human survival cannot be entrusted permanently to what he called the "strange stability" of the resulting balance of terror.

Oppenheimer's original arms control concept proved too idealistic for his time and place and may well be equally so today. From the perspective of all that has happened since, however, directing diplomacy toward achieving mutual defense emphasis may be less quixotic than current hopes to sustain the view that mutual assured vulnerability to annihilation is the best of all possible nuclear worlds. If the world manages to outlast the new cold war as it somehow survived the first, the door should not be closed to reconsidering, as Oppenheimer was the first to propose, that population defenses and offensive disarmament may be "necessary complements."

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“Your source on developments related to the world’s most dangerous weapons.”



Japanese Foreign Minister Yoko Kamikawa (C) chairs a UN Security Council meeting on nuclear disarmament in New York on March 18. She has warned that “the world now stands on the cusp of reversing decades of declines in nuclear stockpiles.”

(Photo by Japanese Foreign Ministry)

## UN Security Council Holds Rare Disarmament Debate

Japan chaired a rare, high-level UN Security Council meeting on nuclear disarmament and nonproliferation on March 18. Although the meeting underscored the urgency of addressing the growing threats posed by nuclear weapons, it also highlighted the chronic divisions among key states on disarmament and nonproliferation issues.

Japanese Foreign Minister Yoko Kamikawa described the meeting as “an opportunity for UN member states to share concrete ideas and proposals to accelerate the realization of a world without nuclear weapons” in an op-ed published by PassBlue on March 17.

“The world now stands on the cusp of reversing decades of declines in nuclear stockpiles. We will not stop moving ahead to promote realistic and practical efforts to create a world without nuclear weapons. Japan cannot accept Russia’s threats to break the world’s 78-year record of the nonuse of nuclear weapons,” she added.

UN Secretary-General António Guterres; Robert Floyd, executive secretary of the Preparatory Commission of the Comprehensive Nuclear-Test-Ban Treaty Organization; and Gaukhar Mukhatzhanova, director of the nonproliferation program at the Vienna Center for Disarmament and Non-Proliferation, were invited to brief the meeting.

All Security Council members were represented, including the five permanent members (China, France, Russia, the United Kingdom, and the United States). Many stressed the urgency of addressing growing nuclear weapons threats. But the exchange also underscored the extent to which rising geopolitical tensions and long-standing divisions among leading states impede tangible progress on disarmament and nonproliferation issues.

In his opening remarks, Guterres warned that “[h]umanity cannot survive a sequel to [the movie] *Oppenheimer*. Voice after voice, alarm after alarm, survivor after survivor are calling the world back from the brink.”

“And what is the response?” he asked. “States possessing nuclear weapons are absent from the table of dialogue. Investments in the tools of war are outstripping investments in the tools of peace. Arms budgets are growing, while diplomacy and development budgets are shrinking.”

Guterres said the nuclear-armed states in particular “must reengage” to prevent any use of a nuclear weapon, including by securing a no-first-use agreement, stopping nuclear saber-rattling, and reaffirming moratoriums on nuclear testing.

He urged them to take action on prior disarmament commitments under the nuclear Nonproliferation Treaty (NPT), including reductions in the number of nuclear weapons “led by the holders of the largest nuclear arsenals, the United States and the Russian Federation, who must find a way back to the negotiating table to fully implement the [New Strategic Arms Reduction Treaty] and agree on its successor.”

To catalyze action, he reiterated his call for “reforms to disarmament bodies, including the Conference on Disarmament [CD]...that could lead to a long-overdue fourth special session of the General Assembly devoted to disarmament.”

U.S. Ambassador Linda Thomas-Greenfield criticized Russia’s “irresponsible...nuclear rhetoric” and said that “China has rapidly and opaquely built up and diversified” its nuclear arsenal.

In addition, “Russia and China have remained unwilling to engage in substantive discussions around arms control and risk reduction,” she said.

Thomas-Greenfield reiterated the U.S. offer to “engage in bilateral arms control discussions with Russia and China, right now, without preconditions.”

Dmitry Polyanskiy, Russia’s deputy UN ambassador, said that his country shares “the noble goal” of a nuclear-weapon-free world. Nevertheless, he described the possession of nuclear weapons as “an important factor in maintaining the strategic balance.”

Polyanskiy countered criticism of Russian nuclear threats by charging that it is the “clearly Russophobic line of the United States and its allies [that] creates risks of escalation that threaten to trigger a direct military confrontation among nuclear powers.” He said the current situation is largely the result of the “years-long policy of the United States and its allies aimed at undermining the international architecture of arms control, disarmament, and [weapons of mass destruction] nonproliferation.”

Polyanskiy added, “As for the issues of strategic dialogue between Russia and the United States with a view to new agreements on nuclear arms control, they cannot be isolated from the general military-political context. We see no basis for such work in the context of Western countries’ attempts to inflict a ‘strategic defeat’ on Russia and their refusal to respect our vital interests.”

Maltese Ambassador Vanessa Frazier called on the nuclear-weapon states to fulfill their disarmament obligations under the NPT. “Current tensions cannot be an excuse for the delay.... Rather they should be a reason to accelerate the implementation,” she said.

Chinese Ambassador Zhang Jun acknowledged that “the risk of a nuclear arms race and a nuclear conflict is rising” and “[t]he road to nuclear disarmament remains long and arduous.”

He reiterated Beijing’s long-standing position that “nuclear weapons states should explore feasible measures to reduce strategic risks, negotiate and conclude a treaty on no first use of nuclear

weapons against each other” and “provide legally binding negative security assurances to non-nuclear-weapon states.”

Apparently in response to U.S. criticism of a Chinese nuclear buildup and refusal to engage in substantive arms control and risk reduction talks, Zhang said these “allegations against China do not hold any water.”

“Demanding that countries with vastly different nuclear policies and number of nuclear weapons should assume the same level of nuclear disarmament and nuclear transparency obligations is not consistent with the logic of history and reality, nor is it in line with international consensus, and as such will only lead international nuclear disarmament to a dead end,” the Chinese envoy said.

Some states proposed new initiatives. In response to U.S. concerns that Russia may be pursuing an orbiting anti-satellite system involving a nuclear explosive device, Japan and the United States announced they will “put forward a Security Council resolution, reaffirming the fundamental obligations that parties have under this [Outer Space] Treaty,” which prohibits the deployment of weapons in space. (See *ACT*, March 2024.)

Japan also announced the establishment of a cross-regional group called Friends of FMCT “with the aim to maintain and enhance political attention” and to expand support for negotiating a fissile material cutoff treaty (FMCT) banning the production of fissile materials for nuclear weapons.

For decades, the 65-nation CD has failed to agree on a path to begin FMCT talks. Australia, Brazil, Canada, France, Germany, Italy, the Netherlands, Nigeria, the Philippines, the UK, and the United States will join the FMCT group, according to the Japanese Foreign Ministry.

High-level Security Council debates focused on nuclear disarmament and nonproliferation have been infrequent in the post-Cold War era, and few of them result in consensus statements or resolutions.

In 2009, the council held a summit-level meeting chaired by U.S. President Barack Obama on nuclear nonproliferation and disarmament.

It adopted Resolution 1887, which reaffirmed a “commitment to the goal of a world free of nuclear weapons” and outlined a framework of measures for reducing global nuclear dangers.

In September 2016, the council adopted Resolution 2310, which reaffirmed support for the 1996 Comprehensive Test Ban Treaty. It called on states to refrain from resuming nuclear testing and called on states that have not signed or ratified the treaty to do so without further delay.

More recently, the council has held briefings on nuclear disarmament issues but without tangible outcomes.

The last such meetings were in March 2023, when Mozambique chaired a discussion on threats to international peace and security, including nuclear dangers, and in August 2022, when China organized a meeting on promoting common security through dialogue in the context of escalating tensions among major nuclear powers.

Following the March 18 meeting, the Japanese Foreign Ministry said the session “provided an opportunity to accelerate substantive discussion between nuclear-weapon states and non-nuclear-weapon states” ahead of the NPT review conference in 2026.—*SHIZUKA KURAMITSU and DARYL G. KIMBALL*



# Europeans, U.S. Threaten Iran With IAEA Censure

European and U.S. officials threatened to pursue action against Iran at the next International Atomic Energy Agency (IAEA) Board of Governors meeting if Tehran does not meet its legally binding safeguards obligations.

The agency has been pressing Iran for years to account for the presence of nuclear materials at two sites that were never declared to the IAEA as part of Iran's nuclear program. The agency assesses that one of the locations, Turquazabad, was used to store nuclear materials and equipment, and the other, Varamin, included a pilot plant for uranium milling and conversion.

In a Feb. 26 report, the IAEA said Iran did not provide the agency with "any information on the outstanding safeguards issues relevant to either of the two undeclared locations." It added that the IAEA "will not be able to confirm the completeness and correctness" of Iran's nuclear declaration until Tehran provides technically credible explanations for the presence of the uranium at the two locations and accounts for the current location of the nuclear materials.

France, Germany, and the United Kingdom, known as the E3, said in a March 7 statement to the IAEA board that action to "hold Iran accountable to its legal obligations is long overdue." They made clear that they will pursue a resolution at the board's quarterly meeting in June if there is no "decisive and substantive progress" on the safeguards investigation.

An official from one of the E3 countries told *Arms Control Today* in a March 12 email that several European countries favored pursuing a resolution censuring Iran for its failure to cooperate with the agency during the March board meeting, but the United States opposed the proposal.

The board last passed a resolution regarding the investigation in November 2022. That resolution said it is "essential and urgent" for Iran to clarify all outstanding safeguards issues. Following the passage of that resolution, Iran agreed in a March 2023 joint statement with the agency to "provide further information and access to address the outstanding safeguards issues."



**The Board of Governors of the International Atomic Energy Agency holds its quarterly meeting at the agency headquarters in Vienna March 4. European and U.S. officials threatened to pursue action against Iran at the next board meeting if Tehran fails to meet its legally binding nuclear safeguards obligations. (Photo by Dean Calma / IAEA)**

The E3 statement also said the board may need to consider "making a finding under Article 19 of Iran's Safeguards Agreement," which includes the option of reporting Iran to the UN Security Council if the agency cannot verify that all of Iran's nuclear materials are being used for peaceful purposes.

The board reported Iran to the Security Council in 2006, a move that led to a series of council resolutions requiring Iran to halt certain nuclear activities and the imposition of sanctions when Tehran failed to implement those provisions.

Iran defended its cooperation with the IAEA in a March 5 note to the agency. The note said that Tehran has "done its utmost" to enable the IAEA to "effectively carry out verification activities." It said that Iran has fulfilled all of its legal commitments, including under its safeguards agreement. The note repeated allegations that the IAEA assessment of the undeclared locations is "based on unreliable information and unauthentic documents."

In a March 7 statement to the board, Laura Holgate, U.S. ambassador to the IAEA, also condemned Iran's failure to cooperate with the IAEA investigation, but suggested that the board ask the

agency to prepare a "comprehensive summary report" on Iran's nuclear program and the "degree to which the agency is in position to verify that Iran's program is exclusively peaceful."

She said that if Iran continues to "delay and deflect" the agency's inquiries, the board must consider "further action for the sake of demonstrating that no state can indefinitely thwart implementation of its...safeguards obligations [under the nuclear Nonproliferation Treaty] by obstructing" the IAEA.

If the board pursues a resolution censuring Iran for failing to cooperate with the agency, Tehran is likely to retaliate. The U.S. intelligence community, in its 2024 Worldwide Threat Assessment, released March 11, assessed that Iran "probably will consider installing more advanced centrifuges, further increasing its enriched uranium stockpile, or enriching uranium to 90 percent" uranium-235 in response to a censure, further sanctions, or an attack against the nuclear program.

The intelligence community also assessed that Iran "is not currently undertaking key nuclear weapons-development activities" but that the

expansion of the country's program "better position[s] it to produce a nuclear device, if it chooses to do so."

According to the most recent IAEA report on Iran's nuclear program, Iran's overall stockpile of enriched uranium grew over the last quarter. But Tehran down-blended 32 kilograms of uranium enriched to 60 percent U-235 by mixing the material with low-enriched uranium. As a result, Iran's stockpile of 60 percent U-235 material decreased slightly from 128 kilograms to 121 kilograms.

Although a slight decrease in the stockpile of 60 percent U-235 is positive because that material can be quickly enriched to weapons-grade levels, or 90 percent U-235, the down-blending has little impact on the immediate proliferation risk posed by Iran's nuclear program.

If Iran made the decision to produce weapons-grade uranium, it could still enrich enough material for one bomb in about a week and enough for about six bombs in a month. After that, it would

take Iran an estimated six months to one year to build a bomb. But those activities would take place at covert facilities, making the weaponization process more difficult to detect and disrupt.

Holgate told the IAEA board that the United States has "serious concerns" about the 60 percent U-235 stockpile. "Iran should down-blend all, not just some, of its 60 percent stockpile, and stop all production of uranium enriched to 60 percent entirely," she said.

—KELSEY DAVENPORT

## Ukraine War Colors U.S. Concerns on Russia, North Korea

The U.S. intelligence community remains concerned that Russian President Vladimir Putin could resort to the use of nuclear weapons in Ukraine in response to Russia's failure to achieve decisive battlefield successes, Director of National Intelligence Avril Haines told the Senate Select Committee on Intelligence on March 11.

After Putin made several veiled nuclear threats in the spring and fall of 2022, U.S. intelligence officials made public an assessment that senior Russian officials had discussed the use of tactical nuclear weapons in Ukraine that year. (See *ACT*, December 2022.)

Haines, presenting the 2024 edition of the worldwide threat assessment report, also said that the intelligence community worries that Russia will put at risk long-standing norms against the use of "asymmetric or strategically destabilizing weapons, including in space and the cyber domain."

In February, U.S. officials accused Russia of developing a new anti-satellite (ASAT) weapons system that would violate the Outer Space Treaty. (See *ACT*, March 2024.) The accusation of a treaty violation strongly implies that the new ASAT system would carry a nuclear warhead in orbit.

The report said that Russian capabilities in space would remain competitive with those of the United States despite the imposition of sanctions on the Russian space industry in response to the invasion of Ukraine. In contrast, last year's report speculated that sanctions, in concert with resource constraints and sectoral difficulties, might imperil Russia's long-term space goals.

The intelligence community assesses that North Korea, having supplied Russia beginning last year with conventional arms and munitions to bolster the war effort in Ukraine (see *ACT*, November 2023), is probably seeking to leverage this assistance to secure acceptance as a nuclear power. Speaking to this concern, Haines said that Russia's reliance on its few allies may lead to weakening of "long-held nonproliferation norms." North Korea's shipment of military goods to Russia constitutes a violation of UN Security Council sanctions prohibiting exports of arms from North Korea.

Although the threat assessment did not include new information on Chinese strategic systems, it did eliminate a



North Korean leader Kim Jong Un (L) visits Russian President Vladimir Putin in Tsiolkovsky, Russia, in September. The two countries are growing closer as North Korea supplies Russia with weapons for its war in Ukraine. (Photo by Getty Images)

finding present in last year's report that China was not interested in agreements that could restrict its strategic forces. This comes after a November summit between U.S. President Joe Biden and Chinese President Xi Jinping, two subsequent military-to-military meetings over the winter, and a January meeting in Bangkok between U.S. National Security Advisor Jake Sullivan and Chinese Foreign Minister Wang Yi. (See *ACT*, March 2024.)

In its assessment of Iran's nuclear program, the report said the intelligence community found that the country is not currently performing key weapons-related activities.

In a shift from last year's threat assessment, the report placed special emphasis on chemical and biological threats.

It highlighted the growing risk of states using chemical weapons against their own general population and individual critics. In addition to outlining the threat posed by actors employing dual-use biotechnologies to design new pathogens and toxins, the report noted the success that China and Russia have had in undermining public trust in countermeasures.

—XIAODON LIANG



South Korean and U.S. soldiers pose for photos in March after their joint live fire exercise at a military training field in Pocheon, part of an annual event. (Photo by JungYeon-Je/POOL/AFP via Getty Images)

## U.S. to Focus on Deterring North Korea

In the absence of dialogue with North Korea, the United States will redouble its efforts alongside allies to deter Pyongyang, a top U.S. official said.

Washington still views negotiations with Pyongyang as the only viable pathway to peace on the Korean peninsula and remains focused on denuclearizing North Korea, Jung Pak, the U.S. senior official for North Korea, said March 5 at the Carnegie Endowment for International Peace.

But the United States assesses that North Korea is undergoing a long-term strategic shift, Pak said. North Korean leader Kim Jong Un no longer believes that he can achieve his primary goal, preservation of the regime, through negotiations with the United States or South Korea, she said. Kim is viewing the world through a “new Cold War lens” where he believes that North Korea will benefit from aligning more closely with Russia and China, she said.

Pak said that North Korea currently is not interested in engagement, but the United States continues to reiterate its willingness to engage in talks “at any level” and on “any topic” without preconditions. If there is an opening for diplomacy, denuclearization will not happen “overnight” given the “scope

of [North Korea’s] weapons activities and its proliferation,” she said, adding that denuclearization will require “interim steps.”

In the absence of dialogue, Pak said the United States will “redouble” its efforts to deter North Korean aggression.

Pak’s comments came as the United States and South Korea commenced a military exercise, called Freedom Shield, that North Korea described as an “undisguised” military threat that “can never be called defensive.”

During the exercises, the South Korean military conducted drills simulating a strike on North Korean ballistic missile launches and practiced intercepting cruise missiles. North Korea accelerated testing of what it claims are nuclear-capable cruise missiles in recent months. Cruise missiles, which are maneuverable during flight, are more difficult to intercept than ballistic missiles.

The drills also included simulating a response to a North Korean invasion. South Korean Defense Minister Shin Won-sik said that the exercises included field training for special operations forces, which must be “capable of swiftly eliminating the enemy leadership should Kim Jong Un wage war.”

Gen. Paul J. La Camera, head of U.S. forces stationed in South Korea, told *The Wall Street Journal* in a March 11 interview that the exercises are designed to respond to an array of threats posed by North Korea. Kim must be assured that “positive [actions] will be met with positive actions, and negative will be met with negative,” he said.

As the Freedom Shield exercises wrapped up, North Korea conducted military exercises that included paratroopers simulating an infiltration into South Korea and attacking a South Korean guard post. Kim observed parts of the exercise.

In addition to expanding its missile capabilities, North Korea appears to be working to meet Kim’s goal of expanding the country’s nuclear arsenal.

In a March 4 statement, International Atomic Energy Agency (IAEA) Director-General Rafael Mariano Grossi said the agency is continuing to observe activities indicative of the commissioning of the light-water reactor (LWR) at the Yongbyon nuclear complex.

He said that the “continuation and further development” of North Korea’s nuclear program, including the commissioning of the LWR, “are clear

violations of relevant UN Security Council resolutions and deeply regrettable.”

Grossi called on North Korea to “cooperate promptly” with the IAEA and effectively implement its safeguards agreement.

Laura Holgate, U.S. ambassador to the IAEA, told the agency’s Board of Governors in a March 6 statement that North Korea’s “dangerous, irresponsible, and escalatory nuclear rhetoric, and its unprecedented number of ballistic missile launches...threaten international peace

and security and undermine the global nonproliferation regime.”

Holgate said that North Korea’s “rejection of diplomacy and dialogue underscores” that Pyongyang alone is responsible for “continued provocations.”

North Korea has not responded to U.S. offers for dialogue, but Kim’s sister, Kim Yo Jong, suggested that the country might be open to engagement with Japan.

She said that if Japan “makes a political decision to open up a new way of mending the relations,” the two countries “can

open up a new future together.” In addition, if Tokyo “drops its bad habit” of criticizing Pyongyang “over its legitimate right to self-defense” and the issue of Japanese citizens abducted by North Korea, there “will be no reason for the two countries not to become close,” she said.

She appeared to be responding to a statement by Japanese Prime Minister Kishida Fumio that called for “boldly” changing the country’s relationship with North Korea. —KELSEY DAVENPORT

## U.S. Nuclear Costs, Projections Continue to Rise

**T**he Biden administration’s \$850 billion defense budget request for fiscal year 2025 would increase spending for Defense Department nuclear weapons programs by 31 percent over the current year and projects sharply rising future costs for some key nuclear modernization programs.

The request for National Nuclear Security Administration (NNSA) weapons-related activities is 4 percent higher than appropriated by Congress for fiscal year 2024. In all, the budget request, unveiled on March 11, calls for \$69 billion for nuclear weapons operations, sustainment, and modernization, including \$49 billion for Pentagon programs and the rest for the NNSA. The combined budgets would be 22 percent higher than last year.

Three key nuclear rearmament programs are driving increasing costs. The funding request for the new Sentinel intercontinental ballistic missile (ICBM) system foresees lifetime research and

development (R&D) and procurement costs that are 44 percent higher than anticipated in the 2024 budget request. The Columbia-class nuclear-powered ballistic missile submarine program will consume 30 percent of the Navy’s \$32 billion shipbuilding budget under the administration’s spending plan for 2025, up from 17 percent in the budget authorized by Congress for 2024.

Meanwhile, the cost of producing plutonium pits at the 80-unit-per-year rate mandated by Congress is projected to rise to more than \$4 billion per year from fiscal years 2027 to 2029.

The administration released the new budget request before Congress completed work on the appropriations bills that actually fund the government for the current fiscal year. Congressional negotiators finalized the fiscal 2024 appropriation figures for the Defense Department in late March.



An artist’s rendering of a future U.S. Navy Columbia-class ballistic missile submarine, which will replace the Ohio-class submarines that are nearing the end of their service life. The new ships are part of a major U.S. nuclear weapons modernization program.

(Photo courtesy of the U.S. Navy)

In line with the Air Force's disclosure in January that the Sentinel ICBM program likely would exceed baseline unit costs by 37 percent and its entry into service would be delayed by two years, the president's request substantially raised projected R&D spending associated with the program. (See *ACT*, March 2024.) Last year, the R&D costs for fiscal years 2025 to 2028 were estimated at \$11 billion, and now that projection is \$14 billion.

Speaking at an industry conference March 7, Air Force Secretary Frank Kendall acknowledged the budgetary squeeze created by the cost overruns. "We see very big problems dealing with [fiscal] '26. We're looking at a number of things which are increasing. Sentinel is one of them," he said.

The Air Force requested \$539 million in advance-year procurement money on the Sentinel program in 2024, but later asked congressional appropriators to shift that money to R&D. There is no further procurement request in the 2025 budget. In 2020 the Pentagon estimated that the total cost of the next-generation Sentinel program, including decades of operations and support, could be as high as \$264 billion. (See *ACT*, March 2021.) Taking the new increases into account, the total cost of the program over its planned 50-year life cycle could be as high as \$300 billion, plus another \$15 billion to produce the new W87-1 warhead for the missiles. (See *ACT*, March 2024.)

The cost overruns put the Sentinel program in "critical" breach of the Nunn-McCurdy Act, triggering a mandatory investigation into the root causes of the unanticipated cost increases. By mid-April, the Defense Department is required to give Congress an explanation of the cost increase, changes in the projected cost, changes in performance or schedule, and action taken or proposed to control growth.

The Sentinel program is in "deep trouble," Rep. John Garamendi (D-Calif.) of the House Armed Services Committee and Sen. Elizabeth Warren (D-Mass.) of the Senate Armed Services Committee wrote in a March 14 letter to Kristyn Jones, the acting undersecretary of the Air Force. The lawmakers called for a thorough assessment of alternatives to the Sentinel program, including possibly extending the life of the Minuteman III ICBM to 2030, 2040, or 2050.

Funding for the W87-1 warhead associated with the Sentinel ICBM would stay flat at \$1.1 billion in 2025 under the administration's budget proposal.

The request calls for \$8 billion for R&D and procurement of the new long-range B-21 strategic bomber, slightly less than the 2024 appropriation. The Air Force would receive less for the Long-Range Standoff (LRSO) weapons system, a new nuclear-armed, air-launched cruise missile, with funding falling from the \$950 million appropriated in 2024 to \$833 million for 2025. Spending on the W80-4 warhead for the LRSO system would increase from \$1 billion to \$1.2 billion.

Spending on the Columbia-class submarine would increase sharply from \$6.1 billion in 2024 to \$9.8 billion in 2025. Several media outlets, citing unnamed sources, reported March 11 that the first ship would not launch until 2028, a year later than planned.

To address production challenges and delays affecting the Columbia-class submarine and the Virginia-class attack submarine programs, the administration asked for \$3.3 billion in 2024 supplemental funding to invest in the submarine industrial base.

Speaking in support of the supplementary request March 11, Senate Armed Services Committee Chairman Jack Reed (D-R.I.) called on contractors to "do better" and "get their personnel situation straightened out," according to *National Defense*.

The budget also seeks \$743 million for development of a new W93 submarine-launched ballistic missile warhead and its aeroshell, an increase above the \$516 million that was appropriated by Congress in fiscal 2024.

The administration's request did not include funding for the nuclear-capable sea-launched cruise missile despite the mandate in the 2024 National Defense Authorization Act that the administration establish a program of record for the system. Congress appropriated \$90 million for the missile and \$70 million for its warhead in the 2024 budget. (See *ACT*, January/February 2024.)

In the NNSA request, funding for plutonium-pit modernization and production at the Savannah River Site would increase from the \$1.1 billion enacted by Congress in 2024 to \$1.3 billion, while funding for the same activities at Los Alamos National Laboratory would decline from \$1.8 billion to \$1.5 billion. The NNSA significantly raised its projections for plutonium production and modernization costs for the 2025-2028 time period from \$12.3 billion to \$14.8 billion.

In a January 2023 report, the Government Accountability Office (GAO) assessed that the NNSA had not developed a comprehensive schedule or cost estimate for the plutonium modernization program that met GAO best practices. The GAO found activities and milestones missing from the NNSA schedule and flagged a likelihood of disruption and delay.

Meanwhile, spending on NNSA arms control and nonproliferation programs would increase from \$212 million appropriated by Congress for 2024 to \$225 million. The administration request for the Defense Department Cooperative Threat Reduction program would remain unchanged at \$350 million.

Following testing setbacks and delays, the administration has eliminated funding for procuring the Navy's hypersonic Conventional Prompt Strike system while requesting R&D spending of roughly \$900 million. The Army variant of the system, the Long-Range Hypersonic Weapon, would receive \$538 million in R&D funding and an additional \$744 million for procurement under the proposed budget.

Two months after Congress eliminated funding for the Air Force's Air-Launched Rapid Response Weapon (see *ACT*, January/February 2024), the Biden administration increased its R&D request for the service's other hypersonic program, the Hypersonic Attack Cruise Missile. That program would receive \$517 million in 2025, according to the budget proposal, up from \$343 million appropriated by Congress for 2024.

Spending on missile defense programs would decline under the administration request, with total costs for the Aegis ballistic missile defense system and purchases of Standard Missile-3 Block IB and IIA interceptor missiles declining from the \$1.7 billion appropriated last year to \$1.3 billion.

Likewise, spending on design and development of the Missile Defense Agency's Next Generation Interceptor, a new component of the Ground-Based Midcourse Defense system, would be reduced from the \$2.1 billion appropriated in 2024 to \$1.7 billion. —XIAODON LIANG

# Indian Missile Capable of Firing Multiple Warheads

India announced what it called a successful test of the country's first domestically produced missile carrying multiple warheads with independent targeting capability, thus signaling progress in advancing a nuclear deterrent against China.

In a social media post on March 11, Indian Prime Minister Narendra Modi commended efforts by the national Defence Research and Development Organisation (DRDO). "Proud of our DRDO scientists for Mission Divyastra the first flight test of indigenously developed Agni-5 missile with Multiple Independently Targetable Re-entry Vehicle (MIRV) technology," Modi wrote.

The organization released a press release on the same day stating that the test was carried out from Dr. APJ Abdul Kalam Island in Odisha and that "[v]arious [t]elemetry radar stations tracked and monitored multiple re-entry vehicles." The agency added that "[t]he mission accomplished the designed parameters."

With the test on March 11, months before Modi faces a national election that could give him a rare consecutive third term in office, India joined a short list of states that are confirmed to possess operational missiles with MIRV capability: China, France, Russia, the United Kingdom, and the United States.

"While the Indian government may rejoice in its technical achievement, the proliferation of MIRV capability is a sign of a larger worrisome trend in worldwide nuclear arsenals that is already showing signs of an emerging nuclear arms race with more destabilizing MIRVed missiles," Hans Kristensen and Matt Korda of the Federation of American Scientists wrote on their organization's website on March 12.

"The capability to deploy multiple warheads on each missile is one of the most dangerous developments of the nuclear era because it is one of the quickest ways for nuclear-armed states to significantly increase their number of deployed warheads and develop the capability to rapidly destroy large numbers of targets," they said.

One day later, in an interview with *Fortune India*, Kristensen added that



**India's first test of the Agni-5 missile capable of carrying multiple warheads with independent targeting capability has fanned further fears of an emerging nuclear arms race.** (Photo by Government of India)

"[a]lthough there are still technical challenges before MIRV [capability] becomes fully operational in India, Pakistan, and North Korea, the trend is that the MIRV club has doubled in the past decade."

Developed in the early 1960s and operationalized in the 1970s by the United States and the Soviet Union, MIRV technology impacted the strategic calculus of deterrence by enabling a single missile to carry multiple warheads that each can hit separate targets.

This capability increases the effectiveness of an attack, making it more difficult for adversaries to defend against multiple warheads or decoys. From an adversary's perspective, land-based missiles equipped with MIRV technology would be a prime target before their launch because they offer a chance to destroy multiple warheads at once.

Although the development and deployment of MIRV technology increases the proficiency of a first strike, it also can destabilize deterrence calculations and raise concerns about an

accelerating arms race and the potential for rapid nuclear escalation.

Because Indian missiles already can reach all of Pakistan, analysts generally agree that India's focus on expanding its MIRV capability, developing longer-range missiles and hypersonic weapons, launching an integrated rocket force, and advancing missile defense systems on land and sea is intended to deter China. (See *ACT*, December 2021.)

The Agni-5 missile has an expected delivery range of more than 5,000 kilometers and can strike most of China, according to the Center for Strategic and International Studies Missile Defense Project. In recent years, a significant weight reduction enabled the missile to travel distances beyond 7,000 kilometers, Indian defense officials told India Today TV on Dec. 17, 2022.

India has invested in MIRV capability for more than a decade. (See *ACT*, October 2018.)

Pakistan also has been developing MIRV technology "to increase stability and deterrence by increasing the chances

of penetrating of India's emergent ballistic missile defenses," according to an article published by the International Institute for Strategic Studies in November, but the result of its latest missile test, in October, was described as unclear.

Reflecting on the latest Indian test, the U.S. State Department on March 12 told the Indian news outlet ANI that "[t]he

United States and India share a vision for an Indo-Pacific region that is free, open, secure, and prosperous. We continue to work as partners with India and with other countries in the region to achieve this vision."

Meanwhile, in a statement delivered at the Conference on Disarmament on March 14, Anupam Ray, the Indian ambassador to the conference, reaffirmed

India's doctrine of minimum credible deterrence and, as part of it, no first use of nuclear weapons. "India has espoused the policy of no first use against nuclear-weapon states and nonuse against non-nuclear-weapon states. We are prepared to convert these undertakings into multilateral legal arrangements," he said. —SHIZUKA KURAMITSU

## Diplomatic Debate Over Autonomous Weapons Heats Up

**D**iplomatic activity concerning the regulation of autonomous weapons systems is accelerating. The United States convened a conference on the subject in March, Austria has scheduled one for April, and the UN General Assembly plans a debate on the topic at its fall meeting.

The quickening diplomacy reflects growing worldwide concern over the faulty or unsupervised use of artificial intelligence (AI) and autonomous weapons in combat, possibly resulting in unintended atrocities or conflict escalation, and differing opinions over how best to prevent such perils.

The intensifying concern over the deployment of autonomous weapons is perhaps best exemplified by the lopsided Dec. 22 vote on UN General Assembly Resolution 78/241, calling for a rigorous study of the topic. Some 152 states voted in favor of the resolution, with only Belarus, India, Mali, and Russia voting no. Another 12 states abstained.

Acknowledging unease over "the possible negative consequences and impact of autonomous weapon systems on global security and regional and international stability," the resolution calls for a comprehensive review of the subject at the next UN General Assembly, scheduled to begin Sept. 10. To ensure that such an assessment is conducted in a thoroughly informed manner, the resolution directs the secretary-general to prepare a comprehensive report on the issue, incorporating the views of all key stakeholders.

Although there is widespread agreement about the potential risks posed by autonomous weapons systems, especially when they are deployed without adequate human oversight, there is considerable international debate over the best way to regulate them. Some nations, led by the United States, advocate the adoption of voluntary constraints. Another group, led by Austria, favors a legally binding prohibition on the deployment of fully autonomous weapons systems. To promote their contending perspectives, these key actors decided to organize separate international meetings.

The first of these dueling assemblies was convened by the U.S. State Department on March 19-20 at the University of Maryland. Without much fanfare, the plenary brought together some 150 participants from nearly all of the 52 countries that have signed the "Political Declaration on Responsible Military Use of Artificial Intelligence and Autonomy." The declaration is a set of voluntary constraints on the use of autonomous weapons systems first released by the State Department in February 2023 and then rereleased, with slightly altered language, last November. (See *ACT*, April 2023.)



**Alexander Kmentt, Austria's director of disarmament, arms control, and nonproliferation, briefs Vienna-based diplomats in March about his government's plan for a conference on autonomous weapons systems, in April.**

(Photo courtesy of Alexander Kmentt)

The declaration affirms that autonomous weapons systems can play positive as well as negative roles in warfare. It also asserts that states must adopt strict guidelines on their use in order to prevent negative outcomes. For example, the declaration posits that states "should take appropriate steps, such as legal reviews, to ensure that their military AI capabilities will be used consistent with their respective obligations under international law." But this measure and others enunciated in the declaration are purely voluntary steps, entailing no legal obligation by signatory states to abide by them and carrying no penalties if they fail to do so.

Nevertheless, organizers of the U.S. event insisted that by convening representatives of signatory states and sharing experiences, they are helping to bolster international norms against the misuse of autonomous weapons systems. "We look forward to continuing to share lessons learned and best practices to build our collective capacities to implement these responsible measures," Assistant Secretary of State Mallory Stewart told *Arms Control Today*. She said that participating states agreed to form working groups to discuss implementation of specific measures in the political declaration and that the entire group will meet again in annual plenaries such as the one held in Maryland.

By contrast, the assembly being organized by Austria, officially called the Vienna Conference on Autonomous Weapons Systems

and the Challenge of Regulation, will consider legally binding measures along with voluntary ones.

To be held April 29-30, it will include representation from governmental and nongovernmental entities. Its aim, according to the official announcement, is “to increase international awareness of the topic of [autonomous weapons systems] and their legal, moral, ethical, and security policy challenges,” as well as to “build momentum...for the creation of an international legal and normative framework.”

Alexander Kmentt, director of disarmament, arms control, and nonproliferation at the Austrian Foreign Ministry, said the Vienna meeting is aimed particularly at stimulating international interest in UN General Assembly deliberations on autonomous weapons systems.

In addition to awareness-raising and momentum-building for the future regulation of autonomous weapons systems, the conference is linked to the report that UN Secretary-General António Guterres has been mandated to produce, Kmentt told *Arms Control Today*. The conference agenda is designed to achieve this outcome by soliciting “relevant substantive input by experts” and “by stimulating states to submit their views to the [secretary-general] as input for this report,” he added.

The groups assembled by the United States and Austria have many similar concerns about the battlefield deployment of autonomous weapons systems, but also have differences about the best approach to regulating these systems. These are sure to become more pronounced as states prepare for the General Assembly’s review. —MICHAEL T. KLARE

## Islamic State Group Blamed for Chemical Attack in Syria

**T**he Islamic State group likely carried out an attack in Syria using chemical weapons nine years ago, according to international experts responsible for investigating the use of these banned weapons.

In a report on Feb. 22, the Investigation and Identification Team (IIT) of the Organisation for the Prohibition of Chemical Weapons (OPCW) said that there are “reasonable grounds” to find the Islamic State group culpable for the attack in Marea on Sept. 1, 2015, in which 11 individuals showed symptoms consistent with exposure to sulfur mustard.

“The Secretariat of the OPCW has once again delivered on the mandate it has received to identify perpetrators of chemical weapons use in Syria,” OPCW Director-General Fernando Arias said when the report was released. “This is a stark reminder to the international community that nonstate actors like [the Islamic State group] have developed the capacity and the will to use chemical weapons.”

The report concludes a comprehensive year-long OPCW investigation into the attack in Marea.

Investigators found that the Islamic State group deployed sulfur mustard using one or more artillery guns, asserting that “no other entity possessed the means, motives, and capabilities to deploy sulfur mustard as part of an attack in Marea” on that date.

According to the report, 11 individuals who “came into contact with the liquid



**Wounded people receive treatment after a mustard gas attack in the Marea district of Aleppo, Syria, on Sept. 1, 2015. An investigation by experts with the Organisation for the Prohibition of Chemical Weapons recently pinned responsibility on the Islamic State group.** (Photo by Mamun Ebu Omer/Anadolu Agency/Getty Images)

substance experienced symptoms consistent with exposure to sulfur mustard.”

The IIT was able to reconstruct the organizational chain of command that led to the attack and identify four individuals as perpetrators and two additional Islamic State members as primary drivers of the group’s chemical weapons program.

Using a finding of “reasonable grounds” to assign the responsibility to the Islamic State group is a “standard of proof consistently adopted by

international fact-finding bodies and commissions of inquiry,” the report said.

The IIT relied on interviews, information from the OPCW Fact-Finding Mission, states-parties to the Chemical Weapons Convention (CWC), and various forensic evidence and data to reach its conclusions.

The Syrian Network for Human Rights, a primary nongovernmental organization providing the IIT with on-the-ground information, has documented five chemical weapons attacks by the Islamic



State group and 132 casualties since the group emerged in Syria in 2013.

This case marks the first time that the IIT has established that a nonstate actor perpetrated a chemical weapons attack in Syria. Mozambique's UN ambassador, speaking at a UN Security Council meeting on behalf of Algeria, Guyana, and Sierra Leone, declared that the findings "suggest that, henceforward, the Syrian chemical weapons program will be seen in a different perspective."

The findings document the latest in a series of confirmed chemical attacks in Syria and underscore growing frustration that CWC states-parties are becoming less

compliant with the treaty. "The absence of accountability for the use of chemical weapons continues to be a threat to international peace and security," said Adedeji Ebo, director and deputy to the UN high representative for disarmament affairs, at a Security Council meeting on March 4.

The findings provoked a mixed reaction at the meeting. Some states, such as the United States, criticized Syria for failing to comply with the OPCW and pointed to the latest IIT report as proof that the OPCW remains impartial. France, Japan, and Slovenia also praised the OPCW's impartiality and called on Syria to comply with the IIT.

Syria insisted that it destroyed its chemical weapons stockpile and is cooperating with the OPCW. Russia and Iran defended Syria and said the OPCW is being exploited by Western countries.

The IIT report was released before the OPCW Executive Council met in The Hague on March 5-8 where its findings were discussed. Arias reported that Syria's chemical stockpile declaration continues to have "gaps, inconsistencies, and discrepancies that remain unresolved [and] the Secretariat assess[es] that the declaration submitted by [Syria] still cannot be considered accurate and complete." —*MINA ROZEI*

## NEWS In Brief

### Grossi, Putin Discuss Zaporizhzhia Nuclear Power Plant

The head of the International Atomic Energy Agency (IAEA) met Russian President Vladimir Putin last month to discuss the safety and security of the Russian-occupied Zaporizhzhia Nuclear Power Plant in Ukraine.

After the meeting in Sochi on March 6, IAEA Director-General Rafael Mariano Grossi described his conversation with Putin as "professional and frank" and said the situation regarding Zaporizhzhia remains "enormously fluid and precarious."

Russia illegally attacked the nuclear power plant in the early days of its full-scale invasion of Ukraine and continues to occupy the facility.

According to a press release from the Kremlin, Putin told Grossi that Moscow is willing to "do everything to ensure security anywhere [that Russia is] involved with nuclear energy."

In early February, Russia's state-run nuclear energy company Rosatom barred employees of Energoatom, the Ukrainian nuclear power company, from working at Zaporizhzhia. (See *ACT*, March 2024.) Grossi visited the nuclear power plant after that announcement to assess safety and security conditions there.

In a March 7 letter to the IAEA, Russia said the number of employees at Zaporizhzhia is enough "to carry out its safe operation" and scheduled maintenance. Russia said it is recruiting additional personnel and making "efforts aimed at improving the quality of life" for employees at the nuclear complex.

In a March 12 interview with Reuters, Grossi said the plant's current staff "can do the job" but the "situation is not sustainable in the long term."

The day after Grossi met with Putin, the IAEA Board of Governors passed a resolution demanding the "urgent withdrawal" of all unauthorized personnel from the facility and calling for the nuclear power plant "to be immediately returned to the full control of the competent Ukrainian authorities."

This resolution is the fourth that the board has passed condemning Russia's illegal occupation of Zaporizhzhia.

—*KELSEY DAVENPORT*

### Sweden Joins NATO

Two years after Russia's full-scale invasion of Ukraine, Sweden officially joined NATO amid rising concerns that the war might spill into other European countries.

On March 7, Swedish Prime Minister Ulf Kristersson handed over accession documents to the United States during a ceremony in Washington, culminating a process in which the allies unanimously approved the addition of the new member.

"Sweden is a safer country today than we were yesterday.... We have taken out an insurance in the Western defense alliance," he said.

The move is seen as a major blow to Russia, which long has opposed NATO expansion.

As a member, Sweden has pledged to adhere to NATO's doctrine of common defense, by which allies agree to defend any other NATO ally that comes under military attack by another country.

Now that it has joined NATO, Sweden is considering reinforcing Gotland, a strategic island in the Baltic Sea that is close to Russia and key to the defense of the Baltic states.

In an interview with the *Financial Times* on March 14, Kristersson confirmed that ways to protect Gotland are on the list of issues being discussed with the allies. He acknowledged that Sweden only has a "small" military presence on the island.

Sweden is the 32nd country to join NATO, following Finland, which formally became a member in April 2023. Both countries applied for membership in May 2022, abandoning their long-held neutrality, the hallmark of their Cold War foreign policy. Polls showed that public opinion on nonalignment shifted drastically after Russia invaded Ukraine. —*CHRIS ROSTAMPOUR*

## U.S. Approves Funding for Pacific Island Nations

The U.S. House of Representatives on March 6 approved a \$7 billion spending package that included funding to support updated versions of the Compact of Free Association with the Republic of Palau, the Republic of the Marshall Islands, and the Federated States of Micronesia that will govern relations with these island nations for the next 20 years. President Joe Biden signed the bill into law on March 8.

The extension of the compact with the Marshall Islands, and earlier compacts with the Federated States of Micronesia and the Republic of Palau, guarantees the United States exclusive military rights over large areas in the Pacific region, including a missile

test facility in the Marshall Islands and a high-frequency radar system being built in Palau. It also guarantees a continuation of federal services and rights for citizens of the island nations. The Compact of Free Association packages will provide economic assistance of \$3.3 billion to the Federated States of Micronesia, \$2.3 billion to the Republic of the Marshall Islands, and \$889 million to Palau through 2043.

The agreement with the Marshall Islands also will update and expand U.S. financial and technical assistance to the island nation, including for the ongoing health and environmental damage caused by the 67 atmospheric nuclear test explosions conducted between 1946 and 1958. (See *ACT*, March 2023.)

—DARYL G. KIMBALL

# REPORTS OF NOTE

## Missile Defense and the Strategic Relationship Among the United States, Russia, and China

Tong Zhao and Dimitry Stefanovich  
American Academy of Arts & Sciences  
April 2023

In this report, policy experts Tong Zhao and Dimitry Stefanovich discuss the challenges posed by new missile defense technologies and recommend ways to mitigate and stabilize conflicts between the United States and its two near-peer competitors, China and Russia.

Tong, of the Carnegie Endowment for International Peace, examines the Chinese view of the security dilemma between Beijing and Washington while Stefanovich, of the Primakov Institute of World Economy and International Relations, explores the Russian view of missile defense developments and the stalled strategic dialogue between Moscow and Washington.

Tong explains how developments in the U.S. missile defense program have raised Chinese concerns regarding strategic calculations, creating growing suspicions on both sides. He stresses the necessity of addressing crisis instability by overcoming the current communication deficit between the two countries. He sees an opportunity for compromise given Chinese concern about U.S. missile defense and the U.S. concern about Chinese anti-satellite technologies.

Stefanovich discusses Moscow's concerns regarding U.S. missile defense and space capabilities and explains Russia's ongoing attempts to address them. The author also examines the strategic partnership between Russia and China, which developed in reaction to common perceptions about missile defense threats from the United States.

The report offers a unique analysis of how the development of new missile technologies has added complexity to the strategic debate. Despite heightened tensions between China and the United States and Russia

and the United States, the authors make recommendations to establish two-way conversations in order to mitigate the potential for conflict. —SHIZUKA KURAMITSU

## Escalation in the War in Ukraine: Lessons Learned and Risks for the Future

Bryan Frederick, Mark Cozad, and Alexandra Stark  
Rand Corp.  
September 2023

This report explores escalation pathways within the context of the full-scale Russian war on Ukraine. Bryan Frederick, Mark Cozad, and Alexandra Stark argue that there are limits on past predictions of Russia's escalation decisions since the 2022 invasion and that Russian President Vladimir Putin has adopted "a more centralized, and apparently personalized, decision-making process."

The report examines when and how Russia has pursued escalatory options and when it has exercised restraint. To date, Russia's attempts at escalation have focused on Ukraine and ignored NATO members. As it pertains to nuclear threats or escalation, the report makes the case that as the war continues and Russia experiences higher losses of personnel, conventional military escalation options will become less effective or appealing to Russian decision-makers.

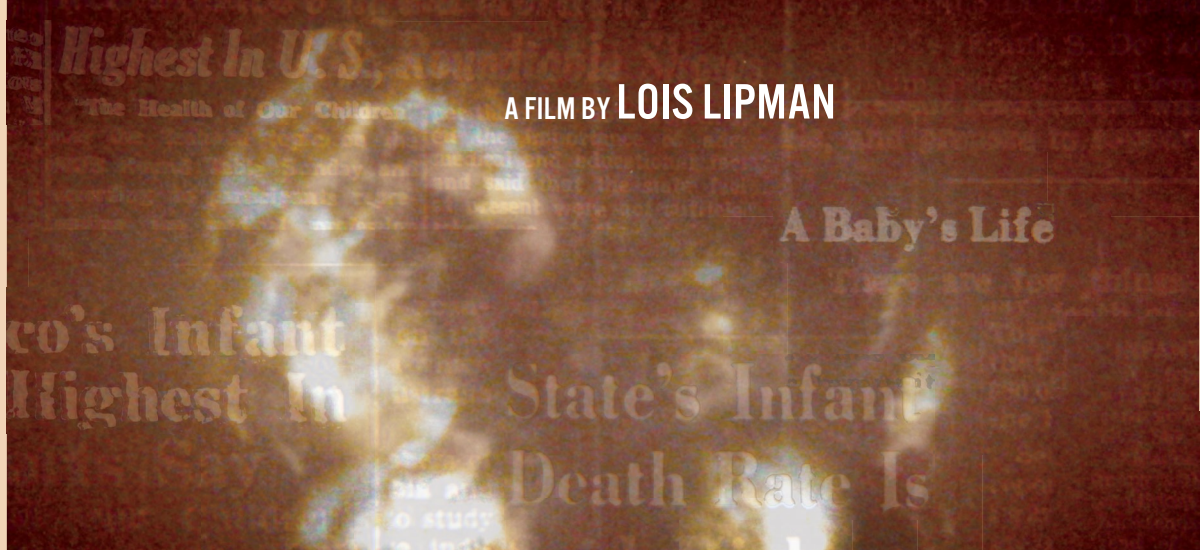
The report draws on discussions held among 15 experts from governmental and nongovernmental organizations who were convened for two workshops in April and May 2023. The workshops aimed to better understand escalation options, motivations, and restraints between Russia and Ukraine. The analysis of these workshops is divided into four chapters covering background, escalation decision lessons, risks of escalation, and future implications for key policymakers.

The authors make it clear that Russia believes that it still has a path to achieving its goals in Ukraine and does not see direct NATO intervention as inevitable. —LIBBY FLATOFF



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