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sc_atlanta@srmun.org

Security Council Brief No. II: The Threat of Nuclear Terrorism

Introduction

There are at least seven terrorist organizations that have either demonstrated interest in or are thought to be capable of acquiring nuclear weapons.[1] Of those seven, Al-Qaeda and Aum Shinrikyo are known to have attempted to purchase nuclear arms or material for building such weapons on the black market.[2] This should be more than alarming, especially considering that these two groups have already committed attacks that either involved weapons of mass destruction, or resulted in unprecedented casualties. Despite the terrible danger these groups would pose should any of them succeed in acquiring or manufacturing a nuclear weapon, the measures to prevent and respond to a nuclear terror attack on Member States could be characterized as lackluster at best. Before it is possible to develop solutions to the issues facing international nuclear terror security policies, it is imperative that the threat of a nuclear terror attacks as well as the current security measures to prevent and respond to it are assessed.

Attempting to acquire nuclear weapons or material is not a novel idea for terrorist organizations. In 1998 during an interview with Time magazine, Osama bin Laden proclaimed that it was a religious duty to acquire nuclear weapons.[3] Religious duty and defense are two of varied reasons the seven aforementioned groups are seeking their own nuclear arms, but regardless of the reasoning, it is clear that these groups bear ill will towards several Member States. Thus far, the world has been spared the tragedy of a nuclear terror attack, however the poor security of nuclear weapons and material across globe, raises serious doubts that this trend will continue.

Vulnerable Nuclear Materials

The first source of nuclear material that must be addressed is the enormous amount of nuclear material stockpiled by the Union of Soviet Socialist Republics (USSR). By the time it collapsed in 1991, the USSR had created the world's largest stockpile of nuclear material and weapons.[4] Although the majority of the weapons were well secured, there was a concerning amount fissile material spread throughout the former USSR in facilities that were severely lacking in nuclear material security and control.[5] The most infamous of these facilities is located at Semipalatinsk, Kazakhstan. This facility was the USSR's primary testing facility and saw over 450 atmospheric and underground nuclear weapon detonations.[6] Some of these tests failed and scattered their plutonium across the area. After being abandoned by the collapsed USSR and handed over to Kazakhstan, the facility was left with virtually no security measures, save for some security personnel afforded to the former test reactors.[7] There was no information provided to the Kazakhstani government about the location of test tunnels or other facilities, leaving them helpless to guarantee the security of the site. The threat posed by such a vulnerable facility was made abundantly clear after evidence of illegal metal scavenging was discovered near test tunnels, known to contain plutonium that was believed to be easily recoverable.[8] This information was passed on to the United States' (US) Los Alamos National Laboratory, which sparked an initiative to begin a joint US-Kazakhstan-Russia clean-up operation. Between 2002 and 2012 an estimated total of "a dozen" bombs worth of weapons grade plutonium was extracted from the site.

1 Graham Allison, "Nuclear Terrorism Fact Sheet," *Belfer Center*, Harvard University, April 2010, https://www.belfercenter.org/publication/nuclear-terrorism-fact-sheet.
2 Allison, "Nucear Terrorism Fact Sheet".
3 Rolf Mowatt-Larssen, "Al Qaeda's Pursuit of Nuclear Weapons," Foreign Policy Magazine, January 25, 2010, https://foreignpolicy.com/2010/01/25/al-qaedas-pursuit-of-weapons-of-mass-destruction/.
4 David Albright & Kevin O'Neill, The Challenges of Fissile Material Control, Institute for Science and International Security, (1999), 70-72.
5 Albright & O'Neill, The Challenges of Fissile Material Control, 70-72.
6 "Semipalatinsk Test Site," Nuclear Threat Initiative, 2009, https://www.nti.org/learn/facilities/732/.
7 "Semipalatinsk Test Site."
8 "Semipalatinsk Test Site."

Although there is still material present, it has been sealed within test tunnels, and would require extensive mining operations to reach.[9]

Although Semipalatinsk may be viewed as a successful cooperative effort to secure a large amount of weapons grade nuclear material, it must be noted that this was one of the largest and most utilized Soviet test site, and yet it took nearly 20 years not only to secure, but to also realize it was vulnerable to theft. This trend of loose Soviet material has unfortunately begun to manifest serious consequences by way of the Black Market. In former Soviet states, such as Georgia and Slovakia, law enforcement officials have been attempting to combat the flow of weapons grade materials like uranium and plutonium, as well as other radioactive material like cesium and iridium, which could be used in the production of a dirty bomb.[10] These areas have garnered much attention over the years to the alarming frequency that nuclear materials are found being offered up for sale on the Black Market. A more infamous case involved as much as a pound of weapons grade Highly Enriched Uranium-235 (HEU), which was believed to have originated in the former Soviet Union. Although this amount falls well short of the amount needed to produce a traditional nuclear weapon, the material would still be enough to create a dirty bomb.[11]

Experts at the Nuclear Threat Initiative (NTI) believe that much of the nuclear material being smuggled and seized in these areas can be traced back to two large scale thefts of Russian HEU and plutonium in the early 1990s. Fortunately, these same NTI experts say security measures in Russian facilities have improved since then, and thefts of such large quantities of nuclear material are no longer very probable.[12] The NTI also points to the difficulty of establishing trusted connections from these Black-Market sellers to terrorist organizations is likely a limiting factor when it comes to selling the material to those groups. However, the large quantity of material that is believed to be up for sale is enough that the possibility of a terror group acquiring enough to produce a crude nuclear device or dirty bomb cannot be ruled out.[13]

Another rising concern is the security of nuclear material used for medical and academic purposes, especially in developing Member States and areas in the midst of conflict. An example of the risk posed by these situations can be found in the revelation that The Islamic State of Iraq and the Levant (ISIL) acquired 88 pounds of low grade nuclear material from the University of Mosul in 2014.[14] Iraq's ambassador to the United Nations (UN), Mohamed Ali Alhakim provided this information to the UN, and then admitted that the material was not weapons grade, it could potentially be used or combined with other sources to create a weapon, or smuggled out of Iraq.[15] When this information was brought forth, some officials denied it would raise alarm authorities, as the material seized was not of a high enough grade to create an effective weapon.[16] Following several instances of ISIL deploying Mustard gas and other chemical weapons, this apparent lack of outward concern is not likely to persist.

Weapons of Terror

Should a worst-case scenario occur, and a terrorist group acquire enough nuclear material to construct a weapon, there are two types of weapons that will most likely be produced with the material. The first, and most likely is a Radiological Dispersion Device (RDD), or "dirty bomb."[17] A dirty bomb is considered the most likely weapon to be

[9] "Semipalatinsk Test Site."
[10] "Black Market for Nuclear Material Endures," USA Today, December 10, 2012, https://www.usatoday.com/story/news/world/2012/12/10/georgia-nuke-investigations/1757963/.
[11] "Slovak Uranium Arrests Reveal Shadowy Market," Associated Press, November 29 2007, http://www.nbcnews.com/id/22022256/ns/world_news-europe/t/slovak-uranium-arrests-reveal-shadowy-market/#.XY5uEC5KiUk
[12] "Illicit Trafficking in Weapons-Useable Nuclear Material: Still More Questions Than Answers," Nuclear Threat Initiative, December 11, 2011, https://www.nti.org/analysis/articles/illicit-trafficking-weapons-useable-nuclear-material-still-more-questions-answers/
[13] "Illicit Trafficking in Weapons-Useable Nuclear Material"
[14] Michelle Nichols, "Iraq Tells U.N. That 'Terrorist Groups' Seized Nuclear Materials," Reuters, July 9, 2014, https://www.reuters.com/article/us-iraq-security-nuclear/exclusive-iraq-tells-u-n-that-terrorist-groups-seized-nuclear-materials-idUSKBN0FE2KT20140709.
[15] Nichols, "Iraq Tells UN…"
[16] Nichols, "Iraq Tells UN…"
[17] "Fact Sheet on Dirty Bombs," United States Nuclear Regulatory Commission, May 2018, https://www.nrc.gov/docs/ML0510/ML051020528.pdf

utilized by a terror group, as it is less sophisticated than an actual nuclear weapon and requires considerably less nuclear material to produce. To produce a dirty bomb, a terror group would simply need to acquire nuclear material, and pair it with a conventional explosive. Once the RDD has reached its target, the detonation of the conventional explosive would disperse the radioactive material, but it would not cause an actual nuclear explosion.[18] This is the most important difference between a dirty bomb and an actual nuclear weapon. The result of a dirty bomb not producing a nuclear explosion is that it serves as a weapon of "mass disruption," as opposed to mass destruction.[19] This means that the weapon's primary purpose is not necessarily to produce casualties, but instead create panic, fear, and contamination.[20]

The potential of an RDD being used as a weapon of fear and disruption was confirmed by Dhiren Barot, a British national with ties to Al-Qaeda. Barot was arrested with other men for conspiring to produce and detonate a dirty bomb. British authorities revealed that Barot had authored a document called "The Final Presentation," which contained his research on the production and use of dirty bombs. In this document, Barot described the purpose of a dirty bomb was to "cause injury, fear, terror and chaos," as opposed to causing fatalities.[21] Barot's assessment seems to be agreed upon by government authorities, such as the US Department of Homeland Security (DHS), which states an RDD could potentially contaminate a few city blocks to over a mile, depending on the radiological material and conventional explosives used.

The DHS points to several difficulties posed by an RDD detonation. The first being a lack of obvious signs that an RDD was indeed detonated, as it will appear to be a conventional explosion, except for the presence of radioactive material, which is unlikely to be detected until specialized equipment and personnel can arrive on scene.[22] Once it is confirmed that an RDD was detonated, the next challenge is determining what type of material was used, and how dangerous it is. For example, should an RDD made with the material ISIL stolen from Mosul, the danger posed to the public would be minimal, but should an RDD use weapons grade material like what was seized from the Black Market, the risks would be much greater. Regardless of the quality of the material used, the DHS believes panic would be widespread, just as Barot outlined in his work.[23] Finally, the most costly and long-term effect of an RDD attack would be the decontamination efforts of the area. Depending on a variety of factors including the material used, the size of the explosion, and the weather conditions of the area, decontamination could take months and cost millions.[24]

The next weapon a terror group could plausibly produce is a crude nuclear device, similar to the bombs that were dropped on Japan by the end of World War II. These are the most likely type of nuclear weapon besides an RDD, due largely in part to the devices relative simplicity, and the fact that designs and schematics for early versions of such devices are widely available via open sources.[25] One type of such design is known as a gun type.[26] This design earns its namesake by firing a projectile of fissile material at a target composed of more fissile material. The resulting high-speed impact results in the material entering a supercritical state. This entire process could take place within a repurposed large caliber gun.[27] Despite this information, producing even a crude weapon would require a small team of three to four people familiar with various fields such as chemistry and physics. Should such a team be assembled, the most difficult part of the process would be acquiring material suitable for creating a weapon.[28] This is especially true for crude nuclear devices, as the amount of material required to successfully produce such a device is more than a dozen kilograms for the most ideal types of fissile material, and more than two or three dozen

[18] "Fact Sheet on Dirty Bombs," United States Nuclear Regulatory Commission, May 2018, https://www.nrc.gov/docs/ML0510/ML051020528.pdf
[19] "Fact Sheet on Dirty Bombs."
[20] "Fact Sheet on Dirty Bombs."
[21] "Fact Sheet on Dirty Bombs."
[22] "Radiological Dispersion Device," U.S. Department of Homeland Security, https://www.ready.gov/radiological-dispersion-device
[23] "Radiological Dispersion Device."
[24] "Fact Sheet on Dirty Bombs."
[25] J. Carson Mark, et al., "Can Terrorists Build a Nuclear Weapon?," Nuclear Control Institute, https://www.nci.org/k-m/makeab.htm
[26] Mark, "Can Terrorists Build a Nuclear Weapon?"
[27] Mark, "Can Terrorists Build a Nuclear Weapon?"
[28] Mark, "Can Terrorists Build a Nuclear Weapon?"

kilograms for other types of material.[29] Beyond issues inherent to the acquisition of the material, the next biggest issue facing a group attempting to utilize a crude nuclear device would be the sheer size of the weapon. It is estimated that such a device would weigh upwards of a ton, similar to the size of the weapons used on Japan.[30]

The damage that would be wrought by such a device would be unparalleled to any other attack in US history. Most estimates for the explosive yield of a crude nuclear device sit around the ten-kiloton range, which is very similar to the power of the bombs dropped on Hiroshima and Nagasaki. Were a device like the one described above detonated in Lower Manhattan, New York City, estimated casualties reach upwards of 300,000 with more than 100,000 dead immediately.[31] Several city blocks would be instantly demolished in the blast. Radiation levels that would require medical attention would be spread approximately over a kilometer away from the initial blast site. Without medical attention, it is estimated that 50-90 percent of those exposed to these levels of radiation would die anywhere within several hours, to several weeks.[32] There would also be widespread burn injuries of various degrees which would further add to the total number of casualties. Lower Manhattan would also be subjected to an extremely strong air blast which could potentially cause the collapse of buildings and inflict widespread casualties. Radioactive fallout would have the potential to stretch for miles outside of ground zero, potentially contaminating thousands more, albeit likely with less than fatal doses.[33]

The damage caused by a crude nuclear device would also extend to the target city's economy, as the entire area would undoubtedly be shut down and evacuated for the length of the decontamination process. The recovery process and lost economic production would reach a cost exceeding billions of dollars.[34] Even after decontamination was complete, it is unlikely that target city's population would be quick to return, as the psychological impact of a nuclear device would cause a lasting fear of contamination amongst the population. This fear would also hinder the rebuilding process, as it is unlikely that there would be much of a willingness to enter the areas affected by the blast to begin construction. The prospects of a city such as New York being able to fully recover from a nuclear blast, even after the years of decontamination efforts, are very dim.[35] Although the cost of human lives would be unlike anything the US has ever endured, the impacts on the economy and way of life in the target city would last far longer than the decontamination and rebuilding process.[36]

Security Council Actions

The United Nations Security Council (UNSC) has taken measures to prevent or at least mitigate the chances of terrorist organizations acquiring the material needed for such attacks through various resolutions. Chief among these resolutions is S/RES/1540, which was unanimously adopted by the body on April 28, 2004.[37] This resolution required all Member States to create legislation that would prevent the proliferation of all biological, chemical, and nuclear weapons to any non-state actors, as well as prohibit Member States from aiding any non-state actor's attempts to develop or acquire the materials or components required to produce such weapons.[38] Along with these new obligations, S/RES/1540 created a new subsidiary body of the UNSC, known as the 1540 Committee. The 1540 Committee is comprised of representatives of all UNSC Member States, which are supported by a group of up to nine experts, who are appointed by the UN Secretary General. The mission of the 1540 Committee is to monitor and aid Member States in the implementation of the obligations agreed to in S/RES/1540, and explicitly does not include the ability or mandate to establish sanctions, conduct investigations, or prosecute alleged violations of non-

[29] Mark, "Can Terrorists Build a Nuclear Weapon?"
[30] Michael Crowley, "Can Terrorists Build the Bomb?," Popular Science, February 1, 2005, https://www.popsci.com/scitech/article/2005-02/can-terrorists-build-bomb/.
[31] Alex Wellerstein, "Nuke Map," Stevens Institute of Technology, 2016, https://nuclearsecrecy.com/nukemap/
[32] Wellerstein, "Nuke Map."
[33] Wellerstein, "Nuke Map."
[34] "Homeland Security Planning Scenarios- Scenario 1: Nuclear Detonation - 10-Kiloton Improvised Nuclear Device," Global Security, 2004, https://www.globalsecurity.org/security/library/report/2004/hsc-planning-scenarios-jul04_01.htm
[35] "Homeland Security Planning Scenarios."
[36] "Homeland Security Planning Scenarios."
[37] "1540 Committee: General Information," United Nations, Accessed October 13, 2019, https://www.un.org/en/sc/1540/about-1540-committee/general-information.shtml
[38] "1540 Committee: General Information."

proliferation obligations.[39] Since 2004, the mandate of the 1540 Committee has been reaffirmed, extended, and focused into strengthening technical assistance to Member States in several resolutions. After a unanimous vote, the committee's mandate was extended until 2021 with S/RES/2325, which also called upon Member States to strengthen efforts to comply with S/RES/1540.[40]

Conclusion

Although acquiring nuclear material is generally considered quite difficult for terrorist organizations, the sheer volume of potentially unsecured and vulnerable material, along with the unsophisticated methods with which it could be weaponized and used against Member States should be cause of great concern for policy makers. From unsecured Soviet era sites, to Black Market sales, the chance of enough nuclear material falling into the wrong hands stands far too high for the world to feel even remotely comfortable with the security status quo. Any remaining amount of comfort should be far removed after reviewing the weapons with which terror organizations could strike. Both the unsophisticated and relatively simple radiological dispersion device and the dangerous but difficult to produce crude nuclear device would be formidable weapons in terrorists' hands and would wreak havoc that would almost certainly be unparalleled in recent history. Whatever policies Member States choose to pursue; they must bear in mind the horrific consequences that would arise from failure to secure nuclear material against terror groups.

[39] "Frequently Asked Questions About Resolution 1540," United Nations, Accessed October 13, 2019, https://www.un.org/en/sc/1540/faq.shtml#6

[40] "1540 Committee: General Information."