THE NUCLEAR THREAT: A HOMELAND SECURITY PERSPECTIVE

by

Renae Katherine Harvey

Liberty University

A Dissertation Presented in Partial Fulfillment

Of the Requirements for the Degree

Doctor of Philosophy Criminal Justice: Homeland Security

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Abstract

On December 8, 1987, the United States and Russia signed the Intermediate-Range Nuclear Forces Treaty. Since then, it has been a common misconception that this solidified the end of the Cold War and the Nuclear Arms Race. To this day, nuclear installations are plaguing bordering countries within the European Union. As a result, severe transnational issues become evident as transnational crime groups grow and technological advancements of terrorist groups continue to gain ground within the nuclear power threshold. Furthermore, countries within the Asian Peninsula and the Middle East continue to demonstrate nuclear prowess via mass media attention as a sense of glorification and societal threat. Since the 1987 Intermediate-Range Nuclear Forces Treaty, four reviews of internal and external nuclear policies including the Nuclear Non-Proliferation Treaty and the Nuclear Posture Review have been completed by the United States. The purpose of each review is to assess nuclear threats and deploy policy initiatives to prevent adversary actions. The primary focus of this study was to establish a comprehensive qualitative analysis of the movement and illegal proliferation of nuclear material. The study highlights the dangers of the proliferation of both nuclear material and nuclear weapons by organized crime syndicates and terrorist groups and correlates their effect to important United States assets. This was completed through a comprehensive document analysis of missing nuclear material in conjunction with confiscated material found to be distributed by these groups. The results of this study provide the Department of Homeland Security resources in preventing nuclear proliferation by internal and external groups in an effort to assure the protection of United States critical infrastructure and key resources.

Keywords: Nuclear proliferation, nuclear material, terrorist organizations, organized crime syndicates, Homeland Security, critical infrastructure and key resources

Dedication

This dissertation is dedicated to my family who continue to push me to achieve beyond my own aspirations.

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Table of Contents

List of Tables

List of Figures

List of Abbreviations

AEA – Atomic Energy Act (1946)

AEA – Atomic Energy Agency

CBRN – Chemical, Biological, Radiological, Nuclear

CBRNE – Chemical, Biological, Radiological, Nuclear Event

Ci – Curies

CIA – Central Intelligence Agency

CIE – Conventional Armed Forces In Europe

CIKR – Critical Infrastructure and Key Resources

CNS – Center of Nuclear Security

CRP – Crisis Relocation Plan

CWMD – Countering Weapons of Mass Destruction

DCPA – Defense Civil Preparedness Program

DHS – Department of Homeland Security

DOD – Department of Defense

DOE – Department of Energy

DOJ – Department of Justice

EUROPOL – European Union Agency for Law Enforcement Cooperation

FBI – Federal Bureau of Investigation

FCPA – Foreign Corrupt Practices Act

FEMA – Federal Emergency Management Agency

GNDA – Global Nuclear Detection Architecture

HSAS – Homeland Security Advisory System

IAEA – International Atomic Energy Agency

IND – Improvised Nuclear Device

INFT – Interim Nuclear Forces Treaty

ISIS – Islamic State in Iraq and Syria

ITDB – Incident and Trafficking Database

kg – kilograms

km – kilometers

MAD – Mutually Assured Destruction

MI6 – Military Intelligence, Section 6

NATO – North Atlantic Treaty Organization

NEC – National Emergency Council

NPR – Nuclear Posture Review

NPT – Nuclear Non-Proliferation Treaty

NRC – Nuclear Regulatory Commission

NSHS – National Strategy For Homeland Security

OCD – Office of Civil Defense

OEP – Office of Emergency Planning

OPA – Office of Public Affairs

PPP – Public Private Partnership

Pu- - Plutonium

ROSATOM – Russian State Atomic Energy Corporation

SNM – Special Nuclear Material

TENEX – JSC Technabexport

TNT – Trinitrotoluene

U- - Uranium

UNODC – United Nations Office On Drugs and Crime

USC – United States Code

USNRC – United Nations Security Council Resolution

USNRC – United States Nuclear Regulatory Commission

USSR – Union of Soviet Socialist Republics

WMD – Weapon of Mass Destruction

WWII – World War II

CHAPTER ONE: INTRODUCTION

In Deuteronomy 20:16-18, God commands the Israelites to kill everyone in the cities of the Canaanites. His reason being, "Otherwise they will teach you to follow all the detestable things they do in worshipping their gods, and you will sin against the LORD your God." The religious purity of Israel described in Genesis 18:18 was not only crucial for their own sake but because of God's intention that they would function as a witness to His power and goodness to other nations. Therefore, it was vital to God that Israel start their life in the Land without the influence of false religions that would lead them away from Him. Sadly, because of the failure of the Israelites to obey God's command, they were indeed influenced to follow the false religions of the Canaanites. This involvement in Canaanite religions is evident in the Book of Judges but reaches its peak in the Period of the Kings. Although there were times when Israel was effective as a witness to God's power and goodness, such as Rahab in Joshua 2 and the Queen of Sheba in the time of Solomon in 1 Kings 10, the Canaanites ultimately failed in this responsibility for two reasons: lack of faithfulness to God and a developed nationalistic sense of their superiority and their right to have the ultimate power over the human race.

The concept of ultimate power over the human race has been the cause of war, peace, societal destruction, and the births of new civilizations. Even the Book of Hebrews claims God controls the fates of all humanity which usually ends with a bloody battle and the genocide of an entire civilization. Nevertheless, another society always prospers. In the New Testament, 2 Peter 3:10-13 warns that the heavens will dissolve, and all humanity will be lost. So how, in today's world, is ultimate power established? Karl Marx, in 1845 claimed that the maximum power of society is gained through the idealism of the effect of the material forces of production in direct relation to the means of production (Marx et al., 1995). In addition, it is quantified by the

measurement of the relations of production to the social and political arrangements that regulate production and distribution (Marx et al., 1995). In other words, the total of the forces of production that are considered accessible to the hands of men determines the condition in which society functions (Marx et al., 1995). In 1946, this power was developed by producing nuclear military-grade weaponry.

In 1996, Dr. Graham Turbiville found that the recent fall of the Soviet Union opened the doors to organized crime syndicates, allowing for unmonitored criminal exploits to flourish unquestioned. In addition, organized crime was estimated to control approximately 40,000 state and private organizations charged with the safety and security of weapon arsenals, including Cold War nuclear weapons and materials (Turbiville, 1996). Currently, organized crime in Russia is considered a highly functioning hierarchical association engaged in business, politics, and national security (Gilinsky & Siegal, 2019). Yakov Ginisky and Dina Siegal (2019) affirm that Russian organized crime is simply an international enterprise in illegal trade, especially between Russian and Chinese criminal groups, and at highly dysfunctional border regions that currently struggle with societal cohesion suffering from acts of war and terrorism.

Before September 11, 2001, few Americans seriously considered the possibility of a serious terrorist attack by foreign terrorists on American soil (Evans, 2002). In 2002, Jack Evans found a 1999 Federal Bureau of Investigation report that warned that acts of terrorism worldwide, though less frequent, have become more destructive. In addition, the report further warned political entities that terrorists have become increasingly more interested in weapons of mass destruction (Evans, 2002). This fear came to life on September 11, 2001, when members of the Al Qaeda terrorist organization were able to gain control and utilize a commercial airliner in a weapons of mass destruction fashion, killing over six thousand people. In 2016, Gary

Ackerman and Michelle Jacome reaffirmed the concern of Jack Evans (2002), concluding that terrorist organizations continue to maintain interests in weapons of mass destruction and the concern has yet to be legitimized by big government parties.

Background

In 1939, Albert Einstein and Leo Szilard warned United States officials of developments in Nazi Germany in the field of militarized nuclear fission projects (Krasznahorkai László et al., 2017). As a result, the United States government fortified the Manhattan Project in 1941, resulting in the development, production, and initial tests of the world's first atomic bombs four years later in Alamogordo, New Mexico (Krasznahorkai László et al. 2017). Within that same year, United States military aircraft dropped atomic bombs on Hiroshima and Nagasaki, Japan. Each bomb had an explosive power equivalent to about 20,000 tons of TNT causing the immediate deaths of approximately 200,000 people (Krasznahorkai László et al., 2017).

In 1951, despite opposition by Manhattan Project leaders, President Harry Truman ordered the continued development of nuclear bombs (Krasznahorkai László et al., 2017). In 1952, at Eniwetok Atoll in the Marshall Islands, the first Hydrogen bomb was tested. The blast had an explosive power equivalent to ten 400,000 tons of TNT, five hundred times greater than the power of each of the bombs dropped on Hiroshima and Nagasaki (Krasznahorkai László et al., 2017). In 1953, the Soviet Union detonated its first fusion bomb and, in 1961, detonated a fusion bomb equivalent to 50 megatons of TNT, over two thousand times greater than the Hiroshima and Nagasaki bombs (Krasznahorkai László et al., 2017).

Within the last thirty years, societal awareness has dwindled regarding nuclear arms control. Overall, the disarmament of nuclear weapons has been of great success. According to a study completed by Gotz Neuneck (2019), approximately 40,000 warheads have been

deactivated since 1991, most belonging to the United States and Russia. However, the increase of proliferation of nuclear weapons via China, North Korea, and the Middle East stimulating a continuation of nuclear arms competition is evolving, placing the arms control framework into a crisis that may essentially lead to a total collapse of the arms control architecture and inadvertent nuclear war phenomenon (Neuneck, 2019).

Since 2017, approximately 14,465 nuclear weapons are within the possession of at least nine countries, with approximately 3,750 of these deployed to military installations and 1,800 declared operational (Neuneck, 2019). As Neuneck (2019) found, 95% of all existing nuclear weapons are in possession of the United States and Russia. Although both nuclear superpowers are modernizing their nuclear forces and all facets of the nuclear triad, China, India, Pakistan, and North Korea are currently undergoing fast advances in nuclear weapons technology and armament (Iverson, 2018). According to the Nuclear Threat Initiative (2018), North Korea commenced testing several nuclear-armed missiles as a world demonstration of global power beginning in 2017. One missile, the Hwasong-12, has been determined to reach approximately 4500 kilometers (km), a direct threat to United States Pacific Island military bases. The following missile, the Hwasong-14, was developed to complete a maximum trajectory of 10,000 km, the distance of New York City. Lastly, the Hwasong-15 was developed to reach an altitude of approximately 4,500 km. If fired upon a flat trajectory, the ability for North Korea to conduct a continental nuclear attack is inevitable (Nuclear Threat Initiative, 2018).

Since the 1987 Intermediate-Range Nuclear Forces Treaty, the United States has conducted four internal and external nuclear policy reviews. These reviews were conducted in 1994, 2001, 2010, and 2017 to assess nuclear threats and deploy policy initiatives to prevent possible adversary actions (Payne, 2017). Under policies established by the Nuclear Non-

Proliferation Treaty (NPT), it was decided that the monitoring of nuclear power would be conducted by the nations that were already considered nuclear superpowers: the United States, China, Russia, France, and the United Kingdom (Morgan & Williams, 2018). This, however, became a drastic misguidance in the procedure as the policy allowed each nation to make its' own determinant on what nuclear power is. In addition, each country had an economic stake in regions, such as Iran, that allotted for the trade of nuclear power and commodities, such as oil, to become prevalent (Morgan & Williams, 2018).

Throughout history, organized crime syndicates have had a strong foothold in the aspects of black-market commodities, with a high-end sale being that of special nuclear material (Zartner, 2010). With innovative technologies and the institution of the "dark web," these organizations have continued to grow, and the risk for high-end nuclear material trades with terrorist cells continues to rise (Zartner, 2010). On January 31, 2004, Abdul Qadeer Kahn, the "father" of Pakistan's nuclear weapons program, was arrested by a joint task force consisting of the United Kingdom and the United States Government Officials. According to MacCalman (2016), Kahn had developed a prospering network of nuclear technology and equipment, smuggling to over twenty countries, including Korea and the Middle East. To this day, very few of Kahn's network members have been apprehended, and the black-market nuclear arms dealings are still on the rise (MacCalman, 2016).

Problem Statement

The Intermediate-Range Nuclear Forces Treaty was signed on December 8, 1987, spreading a sense of security worldwide as many believed the threat of nuclear war had come to an end (Martin, 2016). More recently, however, Benjamin Martin (2016) and Michael Wesley (2018) have found that the world is closer to a possible nuclear exchange than ever since the

Cold War Missile Crisis. This ideology came forth in 2017 when the United Nations General Assembly voted for a Nuclear Weapons Prohibition Treaty that stimulated North Korea to sprint through technological development and nuclear demonstrations to become a world "superpower" (Wesley, 2018).

Current research within the nuclear arms crisis has strictly focused on nuclear weapons' arming and disarmament (Martin, 2016; Webber & Parthemore, 2019). However, many researchers believe that these arguments are a simple cover-up to the real problem surrounding nuclear arms (Martin 2016; Webber & Parthemore, 2019). The realization of innovation and modernization has not gone unnoticed, stimulating an international response that invigorated more efforts in deploying policies to limit and eliminate the creation and role of nuclear arms in big government capacity (Webber & Parthemore, 2019). However, Martin (2016), Andy Weber and Christine Parthemore (2019), and Agus Demirovski (2018) agree that these policies fail to understand the effects of such limitations that place countries at risk to transnational crime exploits involving sensitive nuclear material. Therefore, a better understanding of the threat to homeland security and public safety through the movement of nuclear material and nuclear weapons through the criminal enterprise and terrorist nexus is of great importance.

Purpose Statement

Though the current Nuclear Non-Proliferation Treaty (NPT) is considered a vital policy to support the destruction of nuclear weapons, the treaty, unfortunately, incorporates several gaps that allow for the proliferation of nuclear material, especially by illegal entities (Martin, 2016). The most prime example here is that of the India-Pakistan nuclear rise. Within their rise to nuclear power, India and Pakistan have failed to incorporate security measures to properly store nuclear material (Sudirman, 2018). As a result, the risk of nuclear material landing into

illegitimate hands has become of great concern to both national and transnational security entities (Sudirman, 2018).

The purpose of this study will be to establish a comprehensive qualitative analysis of the proliferation capabilities of organized crime groups and terrorist organizations explicit to that of nuclear material and establish an impact threat assessment to United States critical infrastructures. Using a qualitative exploratory design model, the study will attempt to combine this information and provide a strategic analysis on the relationship between organized crime groups and terrorist organizations and the nuclear threat they pose to the United States in an attempt to open discussion to a legitimate Homeland Security initiative that will be able to address such threats strategically and effectively.

Significance of the Study

Since 1970, nuclear installations have plagued several bordering countries within the European Union that have caused severe transnational issues both politically and civilly (Kaijser & Meyer, 2018). Furthermore, the production of such material stimulates further transnational crime with the growth of terrorist groups and their attempt to gain ground within the nuclear power threshold. As a result, transnational policies regarding treatment, civil rights, and fair justice policies have been a battle that continues to rock the justice systems and societal expectations (Demirovski, 2018; Webber & Parthemore, 2019). In addition, countries within the Asian Peninsula and the Middle East are demonstrating their nuclear power via mass media attention as a sense of glorification and societal threat (Sudirman, 2018). As a result, understanding the implications of nuclear arms and the movement of nuclear material to create those arms to the criminal world and its effect on homeland security is of great importance (Kaijser & Meyer, 2018).

The scope of this study will be to show the relationship between the black market, terrorist groups, and organized crime syndicates regarding the illegal movement of nuclear material. In addition, the scope of the study will attempt to associate this movement of material through illegal distribution to show the negative impacts upon United States assets and open discussion into a more feasible and strategic Homeland Security initiative to supervise and challenge current nuclear policies that lack to protect such assets from this particular criminal enterprise.

Research Questions

The resurfacing of nuclear arms and the continuation of technological advances has played a significant role in increasing the effectiveness of high violent terrorist organizations and organized criminal groups, becoming a considerable threat to national and homeland security as well as public safety (Demorovski, 2018). As terrorist organizations look to become more dominant and recognized through the nuclear atmosphere, illegal imports and exports and illegal buying and selling of nuclear goods via criminal actions become of great concern (Anderson et al., 2018). Currently, the concepts behind all things nuclear surround basic policy debate focused primarily on the armament versus disarmament of such weapons (Drame et al., 2016). Many of these policy initiatives, however, lack to educate and reverberate the risk associated with not only the illegal acquisition and distribution of nuclear arms to criminal organizations, but also the material by which they are created (Anderson, 2018; Demorovski, 2018; Drame et al., 2016).

Despite agreements to decommission nuclear arsenals, the world has continued to struggle with a vast increase in nuclear arms proliferation by China, North Korea, and the Middle East (Neuneck, 2019). Neuneck (2019) and Adam Demorovski (2018) agree that this dangerous combination of societal unawareness paired with growing nuclear arsenals throughout these

areas has placed the framework of nuclear arms control into a recognizable crisis that may lead to a total collapse of the nuclear arms control infrastructure and an accidental nuclear war phenomenon.

RQ 1: What are the relationships, if any, between the black market, terrorist groups, organized crime syndicates, and the illegal distribution of nuclear material?

RQ 2: What impact, if any, does the distribution of nuclear material from these illegal organizations have on United States Critical Infrastructure and Key Resources?

Operational Definitions

Critical Infrastructure and Key Resources (CIKR)

CIKR stands for Critical Infrastructure and Key Resource and is used to develop an inventory of the assets, systems, and networks, including those located outside the United States, that make up the Nation's critical infrastructure network (Knight et al, 2018). In addition, Knight et al (2018) assures that this tool contributes to the critical functionality and collects information pertinent to risk management that considers the fundamental characteristics of each sector. This method uses metrics and other evaluation procedures at the national, State, local, regional, and sector levels to measure progress and assess the effectiveness of critical infrastructure protection programs (Knight et al, 2018).

Horizontal Proliferation

Horizontal proliferation is understood as the ambition of a particular party to possess a nuclear arsenal through indigenous efforts (Schofield, 2014). This occurs in three phases: exploration, pursuit, and acquisition (Larres & Wittlinger, 2020).

Non-Strategic Nuclear Weapon

NATO (2021) defines non-strategic nuclear weapons as weapons that travel less than 5500 kilometers and include tactical and operational nuclear weapons.

Nuclear Proliferation

Nuclear proliferation is understood as the spread of nuclear weapons to states that do not possess such weapons by either horizontal or vertical proliferation (Sidel & Levy, 2007). When attempting to understand illegal proliferation actions by terrorist groups or organized crime syndicates, horizontal proliferation is the main focus (Sidel & Levy, 2007).

Organized Crime

The Federal Bureau of Investigation defines organized crime as an enterprise of a group of individuals that have an identified hierarchy, or comparable structure, and are engaged in significant criminal activity prosecuted under Title 18 of the United States Code, Section 1961(4) or Title 21 of the United States Code, Section 848(c)(2) (Federal Bureau of Investigation, 2022).

Proliferation Financing

Proliferation Financing is the means by which terrorists and organized crime syndicates conduct illegal buying and selling operations (Drame et al., 2016). This task is completed by using a front company set up by an organized crime syndicate to divert the actual business of the advertised purpose of the company (Drame et al., 2016).

Sourced Nuclear Material

Sourced nuclear material is defined as material that contains thorium and natural or depleted uranium or the combination of these materials (USNRC, 2021). In addition, sourced nuclear material in the physical or chemical form includes any portion of these materials at one-twentieth of one percent (.05) or more chemical weight (USNRC, 2021).

Special Nuclear Material

The Atomic Energy Act of 1954 defines special nuclear material (SNM) as plutonium, uranium-233, enriched uranium-233, uranium-235, or any other special nuclear material the Nuclear Regulatory Commission determines to include (USNRC, 2021).

Strategic Nuclear Weapon

According to the North Atlantic Treaty Organization (NATO) (2021), the definition of Strategic Nuclear Weapons depends on what country the term is being used. The general rule of thumb is the weapons are intermediate-range weapons with a capability to cover 5500 kilometers. The definition is currently undergoing reconstruction to cover air-delivered weapons for NATO's dual-capable aircraft and a small number of United Kingdom Trident warheads in a sub-strategic role (NATO, 2021).

Terrorism

Section 2331 of the United States Federal Criminal Code defines terrorism as "the premeditated, politically motivated violence against non-combatant targets by sub-national groups or clandestine agents" either internationally or domestically (Doyle, 2019).

Transnational Organized Crime Syndicates

Transnational organized crime is defined by the Federal Bureau of Investigation as self-perpetuating groups that operate, wholly or in part, by illegal transactions irrespective of their current location on the globe in order to obtain power, influence associations, and for monetary gain (United States Department of Justice, 2021). These groups are a highly organized structure that utilizes corruption, violence, and international commerce to maintain and protect themselves from persecution (United States Department of Justice, 2021).

Vertical Proliferation

"Vertical" proliferation is defined as the selling and redistribution of Nuclear material via Nuclear States to illegal entities or illegal entities to Nuclear States in order to increase local stockpiles, improve a weapons technical sophistication and reliability, and develop new weapons (Sidel & Levy, 2007).

Summary

"For though we walk in the flesh, we are not waging war according to the flesh. For the weapons of our warfare are not of the flesh but have divine power to destroy strongholds," (2nd Corinthians 10:3, ESV). Societal awareness has dwindled regarding nuclear arms control. Overall, the disarmament of nuclear weapons has been of great success (Iverson, 2018; Neuneck, 2019). Despite agreements to decommission nuclear arsenals, however, the world has continued to struggle with a vast increase in nuclear arms proliferation by China, North Korea, and the Middle East completed through illegal movements of nuclear material (Iverson, 2018; Morgan & Williams, 2018). The dangerous combination of societal unawareness paired with growing nuclear arsenals and nuclear material stockpiles throughout these areas has placed the framework of nuclear arms control into a recognizable crisis that may lead to a total collapse of the nuclear arms control infrastructure and an accidental nuclear war phenomenon (Ackerman & Jacome, 2016; Anderson et al., 2019; Iverson, 2018; Martin & Wesley, 2016; Neuneck, 2019)

Nuclear material poses a significant threat to homeland security, international security, and modes of public safety (Iverson, 2018; Martin & Wesley, 2016). The growth of nuclear stockpiles not only by government agencies, but black-market philanthropists, organized crime syndicates, and terrorist organizations has placed both political and civil strain on a very sensitive global infrastructure (Ackerman & Jacome, 2016; Evans, 2002). To understand the nuclear threat, it is vital to investigate both qualitative and quantitative data of the illegal

movement of nuclear material via organized crime groups and terrorist organizations. These two organizations work in tandem, supporting one another through proliferation financing efforts to establish a small foothold in the nuclear world (MacCalman, 2016; Weber & Parthemore, 2019; Zartner, 2010). The following research will provide an interpretation of supporting data to provide a push towards discussion on the movement of nuclear material proliferation by illegal entities and establishing discussions forward on positive nuclear proliferation protection towards United States Critical Infrastructure and Key Resources.

CHAPTER TWO: LITERATURE REVIEW

Overview

Karl Marx and associates (1995) declared that in all retrospect, philosophy will always, at some point, become a reality. It is not feasible to be content with interpreting the world, but rather an individual needs to be concerned with transforming it (Marx et al., 1995). In 1939, Werner Heisenberg, a lead physicist at the German Nuclear Energy Project, was the first to conceive the idea of a nuclear reactor that could stabilize nuclear fission and generate sustainable energy (World Nuclear Association, 2021). In September of 1939, the outbreak of World War II stimulated a revolution in the ideas of physics and nuclear energy, and in Britain in 1941, German refugee physicists Rudolf Peierls and Otto Frisch made a mass discovery on the manipulation and stabilization of U-235, a strategic ingredient to nuclear energy (World Nuclear Association, 2021). The Frisch-Peierls Memorandum solidified the ideal that U-235 could be used to produce a militarized weapon equivalent to several thousand tons of dynamite (World Nuclear Association, 2021). The first U- 235 atomic bomb was released by the United States on August 6, 1945, on Hiroshima, Japan. The second, a plutonium Pu-239, was dropped on Nagasaki, Japan, on August 9, 1945. Japan surrendered to the United States the following day (World Nuclear Association, 2021).

Unknown to the world, a global race for nuclear domination had begun, creating one of the most strategic and influential chess pieces in world politics, shaping the construction and deconstruction of international policy (Countryman & Zagorski, 2018). The noticeable civil upheaval caused by the detonation of the nuclear bombs pushed global policies regarding the protection and security of nuclear material, driving forward the consequences and long-term ramifications that voiding such a world contract would have on all governing bodies

(Countryman & Zagorski, 2018). In response to the global political push for international cooperation concerning nuclear arms, an international conflict bloomed, and from 1950-1960, the political battle between the United States and Russia pushed international policies to a new global scale.

The United States and Russia have battled over nuclear power and national dominance since the first atomic bomb hit Hiroshima. In Russia's viewpoint, the then Soviet Union, the United States stood as the biggest threat to world peace and prosperity, forcing the Soviet Union to respond by growing and developing a nuclear arsenal (Lee, 2020). The concept here is that the dog with the giant stick wins. In retrospect, the United States recognized its power of destruction and, according to Eldrige Colby (2020), began several political initiatives to prevent future atrocities. However, as agreed upon by Colby (2020) and Lee (2020), the United States' political ambitions only stemmed towards big nation governments to protect the United States from assets and infrastructure from ultimate Russian destruction. In response, the Soviet Union initiated a targeting strategy that mirrors United States' actions, resulting in the Cold War standoff that still lingers today (Lee, 2020). This standoff, however, has been the focal point, distracting nations from the real problems of blooming nuclear power holders as the distribution of nuclear material continues to globally expand without checks and balances (Arbatrov, 2017).

Understanding Nuclear Policy Responsibility

For over fifty years, nuclear arms control has been the critical component in stabilizing the relationship between the United States and Russia. Despite these two countries’ vast differences in policy positions, non-violent communication and consistent negotiations have been vital to the nuclear arms control success (Arbatov, 2017). With the growth of the Cuban Missile Crisis of 1962, the possibility of accidental nuclear war and the enormous cost and

dangers nationally and globally of a continued arms race became of great concern to both nations (Neuneck, 2019). In 1972, the Strategic Arms Limitation Talks introduced a numerical balance of carriers and warheads, forming the basis for withdrawing from the arms race (Arbatrov, 2017; Neuneck, 2019).

The Intermediate Nuclear Forces Treaty (INFT) was signed in 1987 and was considered a decisive breakthrough to the central importance of European security (Neuneck, 2019). Overall, the INFT prohibits developing, testing, and producing land-based medium-range delivery systems (Neuneck, 2019). According to Oliver Meier (2018), the treaty ratified the destruction of 2,692 INF systems, including launch facilities, and introduced international inspection standards, and set new standards for disarmament verification. Following the establishment of the INF Treaty, more policies such as START I (1991), START II (1993), the Strategic Offensive Reductions Treaty (2002), and New START (2010) led to a massive reduction in strategic warheads from about 63,000 to 8,300 from 1963 to 2019 (Neuneck, 2019). According to Neuneck (2019), despite the good intentions of these treaties and their establishment of comprehensive verification mechanisms that built a sense of international trust and understanding, several doors remained open, leaving the ability for the proliferation of nuclear weapons to continue.

Currently, the foundational structure of the international policy of the nuclear non-proliferation ideology lies within the Nuclear Non-Proliferation Treaty (NPT) (Iqbal, 2018). The NPT is responsible for the organization of the International Atomic Energy Agency (IAEA) as well as for monitoring compliance of nuclear superpower countries (United Nations Office of Disarmament Affairs, 2020). The United Nations Office of Disarmament Affairs (2020) has defined countries as “superpowers” under the NPT after the successful construction, positive

testing, and successful reproduction of active weapons of mass destruction. In addition, the NPT was charged with the primary responsibilities to prevent the proliferation of nuclear weapons from occurring within non-nuclear states and establish an international rule that non-nuclear-weapon countries will not acquire nuclear weapons and will only follow the safeguards established by the IAEA (Iqbal, 2018).

The responsibility of the IAEA is to assure that these non-nuclear-weapon countries only conduct nuclear activities for peaceful purposes such as power and energy production (Iqbal, 2018). However, the lack of policy requirements and adherence to those requirements opened the door for the illegal proliferation of nuclear components. The United Nations Security Council (UNSC) adopted Resolution 1540 on April 28, 2004 (Drame et al., 2016). However, Bafode Drame, Lisa Toler, and Susan Pepper (2016) of the Brookhaven National Laboratory, concluded in their study that Resolution 1540 is a mere band-aid fix to the vague policy infrastructure of the NPT and fails to move the notion forward to prevent the proliferation of nuclear weapons.

In 2017, Mitsuru Kitano discussed the development of nuclear weapons by second-generation proliferators of Israel, South Africa, and Korea. According to Kitano (2017) nuclear proliferation by these countries were initially opaque in that they did not involve nuclear testing. Although each of these states' nuclear programs has generally gone from secret to public knowledge, they have taken divergent paths over the years (Kitano, 2017; Rezaei, 2017). Israel has maintained its opacity, South Africa has dismantled its weapons, and India, Pakistan, and Korea have shifted from opacity to visibility by conducting nuclear tests and establishing themselves as nuclear superpowers (Kitano, 2017). Farhead Rezaei (2017) and Jan Ruzika (2017) agree with Kitano's (2017) assessment solidifying that this phenomenon of proliferation

and power assertion has been caused primarily by the policy in the NPT that recognizes a states' rights for the peaceful use of nuclear energy.

According to Rezaei (2017), several new-age scholars have pointed out that NPT policy was not robust enough to prevent countries from nuclear growth. In addition, some experts doubted that the new crop of nuclear aspirants could be trusted with the kind of nuclear rationality that underpinned the stable nuclear system of the Cold War (Rezaei, 2017). Ruzika (2017) supported this conclusion claiming that the National Proliferation Treaty (NPT), although built off good intentions, has ultimately failed at its global goal to prevent the spread of nuclear material. Instead, it has allotted for the unequal distribution of nuclear material capabilities (Rezaei, 2017; Ruzika, 2017). According to Ruzika (2017), this phenomenon is caused by four allowances established in the NPT: the superpower collusion in the treaty's establishment, coercive diplomacy and the use of force in preventing access to nuclear materials and technology, institutional contestation regarding the aims of the non-proliferation regime and its technical maintenance, and the creation of particular hierarchies of states via the non-proliferation norm. Mathew Fuhrmann and Yonatan Lupu (2016) countered this argument establishing that the NPT has played a vital role in curbing the spread of nuclear weapons. Fuhrmann & Lupu (2016) accounted for strategic selection into the treaty and concluded that the ratification of the NPT is directly associated with a lower likelihood of pursuing nuclear weapons. Phillip Bleek and Eric Lorber (2013) addressed this as the simple understanding that an alliance with a superpower diminishes the probability of proliferation by a non-established nuclear state. However, Fuhrmann and Lupu (2016) and Bleek and Lorber (2013) are limited in their studies, only accounting for suggestive analysis rather than qualitative and quantitative variables associated with independent policy ramifications.

Since the early 2000s, global policy reviews have attempted to undertake issues within the NPT to establish a more cohesive and concrete treaty that disallows the proliferation of such materials (Neuneck, 2019). From 2001 to 2009, the United States pursued a greatly thinned-out approach to nuclear arms control and, beginning with the Anti-Ballistic Missile Treaty (1972) as well as erosion of several agreed treaties and policies, began to globally affect nuclear arms stability (Neuneck, 2019). In 2002, Russia withdrew from START II, which it had previously ratified in 2000. Ulrich Kühn and Anna Péczeli (2017) explain that policy changes to the Strategic Reductions Offensive Treaty limited the number of nuclear weapons that could be used to 1,700–2,200 per side but did not establish clear definitions and counting rules nor comprehensive verification obligations for counting and disarmament of excess weaponry. In addition, Kühn and Péczeli (2017) discovered that delivery systems and non-deployed warheads were not limited at all. In 2007, Russia suspended the Conventional Armed Forces in Europe (CFE) Treaty and began raising concerns towards implications in the NFP and INF Treaties that seemed only to target the United States and Russia and completely disregarding second-generation nuclear states (Putin, 2007).

In April 2010, New START was signed by the United States and Russia and ratified on February 5, 2011, with a term of 10 years to increase information sharing practices amongst the two nations (Rummer, 2018). The policy highlighted agreed-upon verification measures towards disarmament, including data exchanges, inspections, and mutual verification of strategic armed forces (Rummer, 2018). Eugene Rummer (2018) explains that this program ultimately failed after Putin returned to the presidency in 2012, who rejected the notion since the United Kingdom, France, and China was not involved in negotiations. As a result, Russia no longer showed interest in treaty-based arms control arrangements with the Obama administration, and

Putin suspended cooperation with the United States on the Plutonium Management and Disposition Agreement and the Cooperative Threat Reduction Program in 2016 (Nueneck, 2019; Rummer, 2018).

Amandeep Gill (2019) discovered in her analysis of the Nuclear Summits that the operational flexibility of Russia and the United States remain high, causing an increase rather than decrease in both strategic and non-strategic nuclear arsenals. Russia also did not participate in the 2016 nuclear security summit, the last of the four nuclear security summits initiated by the Obama Administration to prevent and respond to nuclear terrorism by securing, returning, and destroying dangerous nuclear material usable in bombs worldwide (Gill, 2019). David Holloway (2019) agrees with Gill's (2019) assessment solidifying that the review of the literature thus far has supported the lack of policy changes and implementations and suggests that the dangers of further proliferation remain of global concern.

Current Effects of Failed Policies

In July 2017, the United States Congress included several provisions to the NPT in response to Russian inflexibility. In essence, these provisions would allow for the dissolvent of the INF Treaty and prevent a continuation of the New START process (Reif 2017). According to Reif (2017) this allotted for the House of Representatives to make funds available for research and development of a new ground-based, road-mobile cruise missile in order to close the "gap" with Russia (Countryman & Zagorski, 2018). Additionally, in the Pentagon´s 2018 NPR, two new strategic nuclear weapons were proposed as a response to Russia's INF Treaty violation. In the longer term, a sea-based cruise missile which does not require approval to be launched via the INF or NPT (Countryman & Zagorski, 2018) treaties. Dual-use bombers such as the nuclear-weapon-capable F-35 are also under construction along with the development of a tactical B61-

12 nuclear weapon. In 2020, the Pentagon requested nearly $100 million in its FY 2020 budget for developing three ground-based missiles that are not compliant with the INF Treaty, including two new ground-based ballistic missiles (Countrymen, 2019).

After 31 years, the United States formally withdrew from the INF Treaty on August 2, 2019. President Putin followed one day later, announcing that Russia would only deploy land-based INF missiles such as the Kalibr cruise missile as a reaction to any US deployment in Europe. (Kristensen, 2018). According to Countrymen (2019) these missiles are the same as established protocols in the INF treaty and leaves the nuclear race virtually unchanged. However, since neither side has developed a substitute policy and procedure, the risk of a new unconstrained nuclear arms race lingers in the background (Countryman 2019). According to NATO Secretary General Jens Stoltenberg (2019),

> We have no intention to deploy new land-based nuclear missiles in Europe. We will not reflect the behavior of Russia. Because we do not want a new arms race and we remain committed to effective arms control, disarmament, and non-proliferation (p. 12).

In direct opposition to this statement, the United States development of new ground-launched missiles that are prohibited by the INF Treaty show the true danger allots for the suspicion of illegal nuclear proliferation via the superpower state agencies (Neuneck, 2019). According to the Department of Defense (2019), sixteen days after the formal end of the INF Treaty, the United Sates Defense Department conducted a test launch of a Tomahawk cruise missile from a ground-based Mark-41 canister traveling a distance of more than 500 kilometers. The Pentagon has included nearly fifty million dollars in its fiscal year 2019 budget request to begin work on two new missile systems. United States Secretary of Defense Mark Esper claims that the Defense Department will

> fully pursue the development of these ground-based conventional missiles as a prudent response to Russia´s actions and as a part of the joint force´s broader portfolio of conventional strike options (Mehta 2019, p 2).

In short, these developments open the door for new steps for deploying destabilizing INF missiles.

The Chinese government has rejected any participation in future arms control regulations. It is estimated that China has stockpiled approximately 290 warheads that include 130 land-based ballistic missiles, 48 sea-based ballistic missiles, and bombers equipped with an air-launched ballistic missile and gravity bombs (Kristensen & Norris 2018). It is also believed that the Chinese nuclear stockpile is growing, and that China is testing cruise missiles and hypervelocity vehicles. The introduction of multiple independently targetable reentry vehicles ensures that China can overcome United States missile defenses. According to Kristensen and Norris (2018), 50 to 75 of China's intercontinental ballistic missile launchers and 90 warheads can reach the continental United States. In addition, China is expanding its fleet of nuclear submarines and is currently developing a new nuclear-capable bomber (Kristensen & Norris 2018).

The Political Response to the Criminal Nuclear Enterprise

Thus far, the review of the literature has been focused on the lack of policy standards towards state proliferation. The lack of these policy standards causes great global security concerns that have come to light, especially with the proliferation of nuclear material conducted by Pakistan. Furthermore, with the concept that nuclear control runs the world, the illegal proliferation by non-state actors of such material cannot be ignored. In response, recognized

nuclear power holders have continued to rush to find policy stability to establish nuclear power compliance (Mallard, 2018; Reich, 2018).

The United Nations Security Council Resolution (UNSCR) 1540 became official in 2004 and complemented the old NPT regime, stating that any future proliferation of nuclear material would be considered weapons of mass destruction and allotted for harsher punishments of such acquirement (Mallard, 2018). According to Gregoire Mallard (2018) and Simon Reich (2018), it was the ideology of such policy that harsher sanctions such as 25 years to life imprisonment would be the deterrence necessary to prevent individual operators within the black-market realms from wanting to attain and sell nuclear material. In addition, all states were encouraged to adopt new and tighter export control laws and procedures, so as to close the loopholes of globalized free-market economies like Dubai and Malaysia (Reich, 2018). Lastly, the policy encouraged state actors' new procedures should be implemented to secure fissile materials in hospitals and research labs so as to avoid these materials being stolen by transnational terrorists (Mallard, 2018; Reich, 2018). In placing prevention above preemption, the new UNSCR encouraged states to act upon threats before they became imminent, by freezing assets of individuals suspected of terrorism or proliferation operations and financing (Aldridge 2008; Mallard, 2018).

According to Sarah Shirazyan (2019), UNSCR 1540 lacked legitimacy in the eyes of several United Nation member states as it departed from the consensual mode of international law. As a result, the policy was fought by several countries including India, Cuba, Mexico, Namibia, Algeria, Nepal, Indonesia, South Africa, Iran, and Pakistan (Shirazyan, 2019). Ignoring the outcry from these countries and utilizing Chapter VII powers given to nuclear superpower states, the Security Council's fifteen members formulated general and binding nonproliferation requirements for one hundred ninety-three countries without their explicit consent (Shirazyan,

2019). According to scholars Klaus Dicke, Jasper Finke, and Christiane Wandscher, UNSCR 1540 was a severe overreach in transnational policy causing it to be denounced by United Nation member states, resulting in major gaps that allotted for continuation of nuclear proliferation through illegal means to continue (Shirazyan, 2019). Resolution 1540 is considered a Band-Aid fix to the vague policy infrastructure of the NPT. According to Bafode Drame, Lisa Toler, and Katherine Backner (2016),

> The resolution obliges signatory countries to do three things: (1) refrain from providing support of any kind to non-state actors; (2) adopt UN legislation establishing an international nuclear nonproliferation policy; and (3) establish sound import and export controls to ensure nonproliferation. The resolution also encourages information sharing as an essential tool to combat proliferation (p. 4).

This policy, however, only reinforces policies already established through the NTP and does not move the notion forward to prevent proliferation of nuclear weapons (Drame et al., 2016; Shirazyan, 2019). This view was supported by James Russell (2019) who concluded in his study that UNSCR 1540 is one-dimensional nature. This policy in its entirety focuses strictly on the demand side of proliferation from terrorists but inexplicably leave unaddressed the role that a growing variety of non-state actors such as transnational organized crime groups, may play in the proliferation of dangerous nuclear weapons and material (Drame et al., 2016; Russell, 2019)

The Policy Problem

Daniel Aldrich and Timothy Fraser (2017) found in their qualitative analysis that a single entity does not stimulate debates among nuclear control and growth but rather a combination of specific physical conditions and vetoes from relevant actors throughout both local and government jurisdictions in variety with those involved in the nuclear regime itself.

Unfortunately, however, the decision for a government to become nuclear is solely based on a nation's domestic economy and diplomacy standing along the global sphere (Cho, 2021). As such, nuclear policy often gets limited focus to big government capacity, focusing on recognized superpowers and their destruction capacity (Colby, 2020). Drame et al. (2016), as well as McCalman (2016), Novakoff (2016), and Zartner (2010), agree that there currently exists no national policy within the nuclear regime that counters proliferation efforts of organized crime and terrorist groups. In fact, despite the five nuclear policy reviews conducted through the agreed-upon Nuclear Summits, the only countries placed under policy restrictions consist of the established nuclear superpowers of the United States, Russia, China, France, and the United Kingdom (Martin, 2016). Nueneck's 2019 quantitative study found approximately 14,465 nuclear weapons found in possession of at least nine different countries. As Nueneck (2019) and Martin (2016) explain, only the five countries listed have to follow nuclear policy rules, allowing the other four countries to open their doors to nuclear innovation and technological advances and leave the door to non-state actors open to nuclear proliferation strategies.

As previously explained, Kitano (2017), Rezai (2017), and Ruzika (2017) agree that the phenomenon of proliferation is simply a side effect of lack of initiative within the original Nuclear Proliferation Treaty. However, it is essential to note that five nuclear policy reviews have been completed since 2000. Amandeep Gill's 2019 quantitative analysis agrees with Nueneck's (2019) quantitative study concluding that despite the Nuclear Summits purpose, the number of nuclear warheads and operational flexibility of nuclear superpower arsenals remains exceptionally high. As agreed upon by Gill (2019), Rebecca Hersman (2018), and Vincent Intondi (2020), the nuclear summits, including those of the New START Initiative, lack recognition of nuclear proliferation and nuclear armament by non-state actors, terrorist

organizations, and organized crime syndicates and their vast role in the nuclear proliferation game. The New START Initiative only recognizes that these organizations have obtained nuclear material feasible of nuclear power growth but does not deal strictly with proliferation prevention. Instead, the initiative's primary purpose is to re-secure the material, return it to the actor from which it was stolen, and then assure the destruction of the material (Gill, 2019; Hersman, 2018). Thus, the initiative dealt strictly with already proliferated nuclear material rather than its prevention (Gill, 2019; Hersman, 2018; Holloway, 2019; Intondi, 2020). However, this does line up with Ackerman and Jacome's (2018) quantitative study and Allison's (2018) quantitative analysis that nuclear proliferation via organized crime and terrorist organizations is simply inevitable.

It is the supported idea of inevitableness that allowed the Trump Administration's 2018 Nuclear Policy Review to gain ground, bringing to light the lack of policy initiative that strictly prevents nuclear proliferation protocols and inspires nuclear growth rather than disarmament (Hersman, 2018). Hersman (2018) and Jacek Durkalec (2018) agree in their qualitative analysis that this particular nuclear review brought many concerns to nuclear alliances. Mitsuru Kurosawa (2020) agrees with Hersman (2018) and Durkalec (2018), concluding that the review was a severe detriment to international relations and a complete disregard to established treaties and cooperation efforts. Keith Payne, John Foster, and Larry Geipal (2017) disagreed with this assessment, providing a quantitative analysis that solidified those issues addressed within the 2018 Nuclear Policy review were initially brought forth in the review conducted in 2010. The proliferation problems in the 2010 review were ignored, causing a deteriorating security environment that has been the cause of international strain (Payne et al., 2017). David Holloway (2019) assures it is vital to note that neither the 2018 Nuclear Policy Review nor the Obama

Administration New START Initiative have accomplished their true purpose. Neither review has established any fundamental policy changes, leaving the globe at risk of further proliferating by organized crime groups and terrorist organizations (Holloway, 2019; Payne at al., 2017).

Suggestions to Policy Repair

Currently, the world stands at an impasse, and the potential for a plausible nuclear exchange has never been more pronounced since the United States and Russia's Cold War standoff (Hersman, 2018). Annette Schaper (2018) and Hersman (2018) found that few initiatives have come to light that poses suitable policy protocols that can be agreed on fully. A prime example is that of the Comprehensive Nuclear Test Ban Treaty. This treaty, in particular, has created a strong face and has almost gained universal support from all nuclear-powered states (Schaper, 2018). According to Schaper (2018), this treaty prevents the testing of entirely new nuclear-weapon designs and discourages vertical proliferation, which has been critical for countries to establish themselves as a superpower entity. The most strategic treaty on the table of the United Nations that has to seem to be cast into the dark is that of the Fissile Material Cutoff Treaty of 1994 posed by the Geneva Convention to prevent acts of nuclear war (Hersman, 2018; Schaper, 2018). Lewis Dunn (2017) and Shaper (2018) agree that if actual disarmament is the real goal, then it cannot be limited to monitoring the disarmament of full-blown nuclear weapons itself, but also needs to monitor and control the material that is responsible for the creation of such weapons. According to Dunn (2017), the growing terrorist threat to utilize nuclear material and weapons of mass destruction should make this policy initiative an easy decision.

As previously discussed, the nuclear regime has yet to recognize proliferation prevention efforts within an international global policy perspective. Drame et al. (2016), Zaitsiva (2017), and Unal (2019) all agree that policy measures addressing these specific non-proliferation efforts

need to be thoroughly addressed. This includes an agreement in safeguards and security initiatives, nuclear material accountability strategies, and strategic deterrence agreements on a global scale (Drame et al., 2016; Unal, 2019; Zaitsiva, 2017). Unal (2019) further affirms that nuclear policies should incorporate border and port security initiatives and material export control mechanisms in areas considered highly corrupt in the realms of nuclear trafficking. Hanna Kassab and Jonathan Rosen (2018) agree with Unal's (2019) synopsis concluding that the simple lack of border controls, especially within the United States and Russia, leaves the door wide open to organized crime and terrorist movement of nuclear material, and a developmental growth of rogue nations.

In 2019, Ryan Hill concluded in his report of rogue nations that the United States has recognized North Korea and Iran as rogue nations due to sustained efforts to possess and grow nuclear weapon arsenals. In response, the United States developed a strategy with the purpose of achieving two objectives: (1) altering the behavior through developed nuclear sanctions that bring rogue nations into compliance with international requirements; (2) preventing or disarming current nuclear programs (Hill, 2019). This strategy, however, has been found to be overly ambitious, leading to hard power strategy that has proven ineffective and counterproductive as these nations continue to push nuclearization development efforts (Hill, 2019; Kahn, 2020).

Hill (2017) suggests United States efforts should focus strictly on the objective of non-proliferation through a strategy of balanced hard and soft power objectives. However, Feroz Kahn (2020) would further acquire a solidified definition of "risk" associated with countries. As solidified by Kahn (2020), Pakistan is a prime example of instability, yet has procured, built, and managed its' nuclear arsenal far better than its stable counterparts. Kahn (2020) and Zaitsiva (2017) suggest a more robust international intelligence and information sharing system. In

addition to this system, Drame et al. (2016) request that reporting policies are made a requirement for all countries that have sustained any type of nuclear material, not just those countries recognized to be a global superpower.

Suppose nuclear proliferation becomes recognized through suggestions brought forth through nuclear policy. In that case, researchers such as Todd Scheshcer and Mathew Furhmann (2017), Caitlin Talmadge (2018), and Alexey Arbatrov et al. (2021) agree that a deterrence strategy agreement would be a more helpful initiative than that of disarmament. It is the argument among these researchers that a pro-active nuclear arsenal through a cohesive international agreement would provide a less intense relationship among all countries, whether they be State or non-State actors (Arbatrov et al., 2021; Scheshcer & Furhmann, 2017; Talmadge, 2018). Paul Avey's (2021) quantitative analysis agrees with this synopsis, providing the conclusion that nuclear weapons do not provide a foreign policy foothold and can be added as a deterrence strategy to prevent nuclear altercations. However, these strategies are limited to the feelings of either Russia or the United States, and a full-blown international consensus has yet to be proposed (Avey, 2021).

Conceptual Framework

Blooming from the Shadows

The proliferation of nuclear material has been an essential question with concepts behind nuclear control. In 1997, Scott Sagan explored the ideas of nuclear proliferation through a tri-pillar framework of nuclear government strategy. Simply put, the growth of nuclear threats through the Cold War stimulated every nation to incorporate a method to deter external aggression, control domestic political lobbies, and display a sense of country prestige (Sagan, 1997). Sonali Singh and Christopher Way (2004) established the ideology that whether or not a

state wants a stockpile of nuclear weapons is irrelevant if it cannot acquire these types of weapons through lack of technology, resources, or expertise required for the weapon construction (Singh & Way, 2004). Singh and Way (2004) further concluded that once a country acquires the advancements and resources necessary and the appropriate expertise to develop nuclear weapons, it is only a matter of time until it is expected to solidify its arsenal. This is supported by Dong Joon Jo and Erik Gartzke's (2007) conclusions that the supply-side approach to proliferation claims that states with advanced industrial capacity have better abilities to create and maintain a nuclear weapons program, making them more likely to acquire nuclear weapons than less-developed states. Thus, nuclear material becomes a highly desired commodity.

Like any commodity, nuclear material is what many consider an excellent sell-and-buy product (Volpe, 2017). Jo and Gartzke (2007) categorized nuclear proliferation into demand-side and supply-side. The demand-side approach refers to a state's willingness to acquire nuclear weapons, while the other defines the State's opportunity to acquire nuclear weapons. Tristan Volpe (2017) and Etel Solingen (2009) agree with this assessment concluding that domestic political coalitions between nuclear states and economic development strategies determine a state's demand for nuclear weapons and a nuclear State's willingness to supply such weapons. Venelin Terziev, Veselin Madanski, and Marin Georgiev (2017) further explain this concept as an “offset agreement.” According to these researchers, a developed country that has incorporated a well-established Technological and Industrial Defense strategy will utilize an offset transaction to target activities to business organizations. Paul Avey (2021) further defines this strategy as the Mutually Assured Destruction (MAD) protocol, concluding in his study that the majority of nuclear security officials and international relations scholars agree that having a nuclear arsenal in itself is a deterrence strategy for control of both political and economic assets. On the other

hand, countries with failed economies looking to gain an economic foothold on the global sphere use offset to gain military and commercial benefits (Terziev et al., 2017). The prime example of this scenario is the constantly strained relationship between Iran and Saudi Arabia and the economic control of these areas by the United States and China (Terziev et al., 2017).

Iran and Saudi Arabia have been in a constant cycle of conflict as both nations look to rise the global economic ladder (Garlick & Havlova, 2019). In 2019, Dilip Hiro (2020) reaffirmed Flynt Leverette and Hillary Mann Leverette's 2010 declaration that the New Middle Eastern Cold War needed to be considered a significant global concern. Furthermore, in 2017, the Qatar Crisis stimulated serious deterioration effects of Saudi Arabian relations in Qatar as Qatari leaders became suspect of support for Iranian terrorism (Garlick & Havlova, 2019). According to Jeremy Garlick and Radka Havlova (2019), this deterioration effect combined with the Syrian conflict and the exclusion of Iran from the protection of the Gulf Cooperation Council has added to uneven regional development. In addition, the United States' strict security support for Saudi Arabia has generated a perception of high risk to the Iranian nation (Garlick & Havlova, 2019).

With Iran's perception of high risk to their national security, a validated response with the growth of Iran's nuclear weapons program has been recognized (Mabon, 2019). In response to the development of the program, the 2015 Nuclear Deal proposed by United States President Barrack Obama attempted to control the Iranian Nuclear Weapons growth (Garlick & Havlova, 2019). However, as Garlick and Havlova (2019) explain, the deal undermined Saudi Arabia and the United States nuclear security agreements, forcing the United States to rescind the deal and reinstitute nuclear security sanctions on Iran. This, in turn, caused a severe downfall to the Iranian economy and an increased militarized strategy toward economic stabilization by the Iranian government (Garlick & Havlova, 2019; Mabon, 2019).

The Nuclear Chess Game

In 1995, the German Internet Chess Server introduced a new interactive online computer game known as Atomic Chess. All the laws of chess apply aside from rules of capture. In a capture, an explosion destroys all surrounding white and black pieces other than pawns, and they are removed from play. In retrospect, this is an accurate representation of the nuclear game we play today. In 2009, Mathew Kroenig suggested that the spread of nuclear weapons is more threatening to those considered power states than those considered weak and unstable. Andrew Selth (2020) agrees with this analysis as his combined qualitative and quantitative analysis of the State of Burma provides a militarized government with a history of irrational behavior and disdain for international cooperation. As such, Russia, after making a contract to supply nuclear power to the area, found the area to be a high-risk nuclear production area, stimulating the removal of Russia from any associated agreements (Selth, 2020). However, as Selth (2020) points out, North Korea did not hesitate to begin agreements, putting the globe at more risk towards a nuclear exchange than ever before.

Running with the Soviet Union concept that the dog with the bigger stick wins, Tristan Volpe (2017) explains that a "sweet spot" exists for nuclear power countries supplying nuclear material. In other words, the seller must be sure that the buyer will not turn the nuclear material upon the seller (Volpe, 2017). Eunil Cho (2021) agrees with Volpe's (2017) conclusion and Selth's (2020) fear that one countries friend may be another's enemy. This concept is valid with Iran and India's nuclear power growth in the 1970s and current Pakistan and North Korean growth within the past decade (Alcaro, 2019; Cho, 2021; Robinowitz & Salkar, 2017; Volpe, 2017). In addition, Iran has strategically maneuvered economic stake-holds into Latin America, assuring Iran’s stabilization of its nuclear program, as well as a military strategy, preventing the

United States interference of the Iranian nuclear regime. The question remains, however, how do these non-nuclear states acquire such dangerous nuclear material while remaining underground?

The Criminal Enterprise

At the collapse of the Soviet Union in 1991, a wave of nuclear thefts and smuggling attempts in Russia, Lithuania, Ukraine, Kazakhstan, and other former Soviet republics displayed great concern regarding combatting nuclear proliferation (Zaitsiva, 2017). With the fall of the Soviet Union came the massive growth in new possibilities for securing access to wealth through crime. Gang members of Russian organized crime groups finally had free reign to increase enterprise without repercussions from the state (Finckenauer & Voronin, 2016). Currently, the groups are well connected to the political authorities as well as law enforcement entities (Finckenauer & Voronin, 2016). According to Svetlana Stephenson (2016), the Uralmash group alone controls approximately 140 commercial enterprises, including a network of banking and lending institutions heavily engaged in exporting raw materials, rare and precious metals, weapons, medicines, and, from time to time, radioactive materials. Their international connections extend to China, Cyprus, Germany, Poland, and the United States, among other countries (Stephenson, 2016).

From 1991 to 1995, the concept of ‘Loose Nukes’ in the former Soviet Union came to light, and smugglers started bringing radioactive goods into Germany, Austria, Italy, Poland, and the Czech Republic hoping to find a buying market (Zaitsiva, 2017). Germany alone had recorded 75 incidents where these smugglers were apprehended for the sale of nuclear material. In 1994 and 1995, several samples and two batches of plutonium were seized in Germany and the Czech Republic (Zaitsiva, 2017). In 1995, the nuclear black market emerged in South Asia and Africa, and the total number of thefts and seizures of ionizing radiation sources increased

significantly (Zaitsiva, 2017). From 2001 to 2005, the number of international cases involving radioactive sources steadily grew following September 11, 2001 (Zaitsiva, 2017).

Nine months after the United States invasion of Iraq, Pakistani scientist A.Q. Khan replaced Saddam Hussein as the world's biggest nuclear proliferation threat (Mallard, 2018). In October 2003, the CIA and MI6 intercepted a ship from Dubai to Tripoli which contained centrifuge parts sold by Khan to the leaders of Libya, a clear violation of Libya's obligations under the NPT and its safeguards agreement with the International Atomic Energy Agency (IAEA) (Mallard, 2018). This resulted in the revelation of the main threat to the National Non-Proliferation Treaty regime as this Pakistani-centered network displayed ties to Malaysia, South Africa, Germany, and even Switzerland. European sub-contractors building centrifuge parts throughout the European continent managed to gain hefty monetary profits (Mallard, 2018). According to Albright (2010), all nuclear proliferation efforts were tied to Kahn and his network, stimulating new policy attempts to address the issue of these non-state actors.

In 2016, the United States National Security Council concluded that transnational organized crime groups pose the most significant threat to both homeland and international global security (Novakoff, 2016). According to Renee Novakoff (2016), these types of enterprises have a unique ability to not only expand but diversify their activities, resulting in a convergence of threats with explosive and destabilizing effects. Ross Anderson and his research associates agreed, concluding in their 2019 study that these organizations give birth to the black-market enterprise, supplying some of the most dangerous radical groups and terrorist organizations worldwide. Anderson et al. (2019) further explains that the quantitative value of illicit transactions in strictly illegal weapons easily profits $100 million a year to these organizations.

Today, much of the world relies on technology and the advancements that come with it. With that comes advances in the criminal world. In 2010, Dana Zartner of Tulane University concluded that special nuclear material was a high-end sale within the black-market commodities controlled by organized crime syndicates spread worldwide. The easy sale of these dangerous commodities is completed via an innovative technological advancement known as the "dark web" allows these syndicates to control and disseminate nuclear material to struggling governments and terrorist cells (Zartner, 2010). Molly MacCalman (2016) and Zartner (2010) both conclude that the most prime example of this type of transaction was the growth of Pakistan's nuclear weapons program. MacCalman (2016) explained that Abdul Qadeer Kahn, the father of Pakistan's nuclear weapons program, had developed a prospering network of nuclear technology and equipment through smuggling operations that also supplied areas of Korea and the Middle East, including terrorist cells. Due to Kahn's dark web enterprises and the utilization of organized crime tactics, very few members of his network have been apprehended, and, according to MacCalman (2016), black-market nuclear arms dealings continue to be on the rise.

In 2016, Renee Novakoff explored the world of transnational organized crime, concluding that these organizations' penetration of government establishments is deepening. Insinuating themselves into the political process of government establishments through direct bribery, shadow economies, infiltrating official offices, and strategic positioning as alternate providers of governance and security, these groups have a unique foothold in the ability to acquire and supply distinct commodities, including nuclear material (Novakoff, 2016). However, the most concerning of these black-market commodities is the hands into which commodities like nuclear material pass.

These particular criminal networks play a significant role in arms dealing along with the black-market enterprise where other radical groups such as terrorists and drug traffickers procure some of their most dangerous weapons (Anderson et al., 2019). For example, the 2010 UNODC report concludes that the documented global authorized trade value in firearms has been estimated at approximately $1.58 billion in 2006, with unrecorded but licit transactions making up another $100 million (Anderson et al., 2019). In addition, United States federal law enforcement agencies have intercepted large numbers of weapons or related items being smuggled to China, Russia, Mexico, the Philippines, Somalia, Turkmenistan, and Yemen within the last few years (Novakoff, 2016).

Eastern Europe receives particular attention concerning black market dealings of nuclear materials. According to Unal (2019), this has become possible through organized crime units taking advantage of the looseness of security systems intended to safeguard nuclear materials or Russian nuclear stockpiles. The International Atomic Energy Agency's (IAEA) Incident and Trafficking Database documented around 2,500 incidents from 1993-2003, 400 reports for theft and losses (Unal, 2019). Moreover, organized crime and terrorist organizations' convergence has been identified in at least seven post-conflict locations worldwide.

Unal (2019) and Drame et al. (2016) concluded in their studies that organized crime networks are highly adept at identifying security weaknesses in borders and ports and exploiting those weaknesses to smuggle radioactive and nuclear materials to terrorist groups. These networks, moreover, have direct connections with local authorities such as government officials, police departments, judiciaries, and intelligence units and use the aspects of corruption as their primary tool to gain access to all sorts of nuclear material (Unal, 2019). In addition, the constant international disputes occurring along the borders of Russian states have made these areas a

highly utilized black market railway leading into areas of Africa and the Middle East, supporting illegal nations and terrorist group's nuclear proliferation efforts (Drame et al, 2016; Unal, 2019).

According to Drame et al. (2016), terrorists that look to proliferate nuclear weapons go through a process that has been labeled "proliferation financing." In doing so, terrorist organizations utilize front companies established by organized crime syndicates to proliferate nuclear material. This front company is the most common deceptive financial practice in the world today and is especially common among criminal behavior associated with nuclear proliferation (Drame et al., 2016). According to Stuneve & Fetter (2017), there is enough plutonium and uranium to build up to ten nuclear weapons outside authorities' control.

The Nuclear Terrorist Threat

In recent years, the world has witnessed highly publicized terrorist attacks including Bali bombings (2002 and 2005), Madrid train bombings (2004), London bombings (2005), Norway terror attack (2011), Boston Marathon bombings (2013), Ontario shooting (2014), Sydney Siege (2014), Charlie Hebdo attack (2015), and the Copenhagen terror attack (2015). These events, which have predominately affected Western communities, comprise only a small portion of the total number of terror attacks globally (Kellman, 2019). In 2013, there were 11,952 terrorist attacks resulting in 22,178 deaths and 37,529 injuries compared to 10 years earlier when there were 190 attacks, 307 deaths and 951 injuries (Kellman, 2019).

Miles Pomper and Gabriel Tarini (2017) confirmed in their qualitative analysis that nuclear terrorism is a low probability, high impact threat. According to the United States Central Intelligence Agency (2020), Al Qaeda is most interested in radiological dispersal devices known as “dirty bombs.” Construction of a dirty bomb is relatively easy as radiological materials can be acquired from simple industrial or medical sources (Central Intelligence Agency, 2020). The

Central Intelligence Agency (2020) noted that some operatives might try to launch conventional attacks against the nuclear industrial infrastructure of the United States in order to cause contamination, disruption, and terror. However, in 2013, the Central Intelligence Agency recovered a document from an Al Qaeda facility in Afghanistan that contained a sketch of a crude nuclear device (Central Intelligence Agency, 2020).

In recent years, the Islamic State in Iraq and Syria (ISIS) territorial holdings and confiscated military stores provide the organization with considerable leniency to experiment with chemical and nuclear grade weapons (Tallis et al., 2017). The product of this experimentation has resulted in chemical Improvised Explosive Device attacks and the construction of chemical mortar shells used to target both security forces and civilians (Tallis et al., 2017). Joshua Tallis, Ryan Bauer, and Laren Frey (2017) agree with Michelle Bentley (2017) that although ISIS's crude chemical weapons are less lethal than those of military-grade, attacks from this group have shown a profound psychological impact. In addition, Tallis et al. (2017) and Bentley (2017) further conclude that intelligence gathering has reported that the ISIS organization is actively recruiting experts in chemical and nuclear grade weaponry, lending further credence to the concern that ISIS could employ a military-grade chemical or nuclear terror attack. Such knowledge is highly transferable, particularly if ISIS attracts university students or graduates in the West (Bentley, 2017; Tallis et al. 2017). Currently, there have been no recordings of a successful nuclear terrorism event (Pomper & Tarini, 2017).

Even though Pomper and Tarini (2017) declared that a nuclear terrorist attack is a low-probability high-impact even, these researchers also confirm that if an event by a terrorist cell were to be executed successfully, the event would cause severe socioeconomic damage and global psychological disruption. Rizwan Naseer and Musarat Amin (2020) found that the danger

of nuclear terrorism has heightened significantly in recent years as transnational terrorist networks have expanded, demonstrating unrelenting efforts to acquire nuclear technology. Zartner (2010), MacCalman (2016), and Rezai (2017) agree with Naseer and Amin's (2020) assessment, finding that terrorist cells continue to be on the rise with these dangerous weapons.

Gary Ackerman and Michelle Jacome (2018) of the University of Albany came to similar conclusions with their research counterparts, concluding that weapons of mass destruction that include the utilization of nuclear material are of great concern to the risk that terrorist organizations pose. However, Graham Allison's 2018 study disagrees, concluding that the concern for terrorist organizations to utilize such weapons is minimal at best. As established by Rezai (2017) and Ackerman and Jacome (2018), a concern still means plausibility exists, and risk is to be acknowledged. This does not mean, however, that the concern should be overemphasized. As David Seed (2019) explained, the Hollywood portrayal of "suitcase nukes" should not be the driver behind establishing terrorist risk analysis as it is simply an ideology portrayed by famed novelists and Hollywood screenwriters. Rezai (2017) and Ackerman and Jacome (2018) agree with Seed's (2019) synopsis, concluding that terrorist organizations and nuclear weapons cannot be ignored but instead can be prevented. The most strategic prevention mode is through international cooperation and a cohesive nuclear policy acceptance (Ackerman & Jacome, 2018; Rezai, 2017; Seed, 2019). Though these studies show strong support for the nuclear proliferation problem, each one has failed to address the central issue of lousy policy and criminal opportunity that put not only United States assets at risk, but also severely impacts the United States ability to secure its homeland.

Critical Infrastructure and the Nuclear Perspective

The system of critical infrastructure in the United States is vast not only size, but also the geographic layout (Kenter & Goldsmith, 2021). Robert Kenter and Michael Goldsmith (2021) explain that these two factors along with the American Federalist idealism imposes vast challenges to the protection of United States CIKR systems. This is due to the recognition of state and local government control, making federal protections almost obsolete (Kenter & Goldsmith, 2021). Furthermore, the large number of critical infrastructures are owned by multinational corporations or as Private Public Sector Partnerships (PPP's) (Drame et al., 2016; Kenter & Goldsmith, 2021). In addition, the modernization of technology throughout Critical Infrastructure systems has placed the CIKR's more vulnerable to technological attacks (Department of Homeland Security, 2022; Kenter & Goldsmith, 2021). According to the Department of Homeland Security (2022), particular CIKR's at risk for attack, espionage, theft, and sabotage include the energy, nuclear, water, aviation, and critical manufacturing sectors. In addition, the Department of Homeland Security (2022) warns that with the increasing of highly educated individuals into terrorism groups comes the strategic opportunity for radical groups to become more technologically advanced. This opens the United States up to hybrid attacks including a distraction technique such as a school shooter in tandem with a more precise, damaging attack on a critical infrastructure asset such as a nuclear powerplant (Department of Homeland Security, 2022).

Fabio De Felice, Illaria Baffo, and Antonella Petrillo (2022) affirm that a global concern exists to protect United States critical infrastructures. Though critical infrastructure was recognized during the Cold War era, the importance of its protection was not fully recognized until the terrorist attacks of 09/11, the terrorist metro and railway attacks in Madrid in 2004, and the London metro bombings in 2005 (De Felice et al., 2022). According to De Felice et al.

(2022), most critical infrastructure responses are geared around efforts of States initially focused on the protection of civilian infrastructure against acts of terrorism. However, general policy documents present a multi-risk approach that also extended to natural disasters such as Hurricane Katrina (2005) and the Fukushima Nuclear Disaster (2011) and technological accidents stemmed from occurrences such as the Chernobyl Nuclear Disaster (1986) (De Felice et al., 2022; Morita et al., 2018).

According to the Cybersecurity and Infrastructure Security Agency (2020), there are sixteen critical infrastructure sectors whose assets, systems, and networks, whether physical or virtual, are considered vital to the United States. These systems are so vital that any incapacitation or destruction of a sector would have a debilitating effect on physical security, national economic security, or national public safety (Cybersecurity and Infrastructure Security Agency, 2020). Critical Infrastructure and Key Resources (CIKR) recognition has emerged as an increasingly important framework for understanding and mitigating threats to security. Widespread discussion of critical infrastructure protection in the United States began in 1996, when President Clinton formed a Commission on Critical Infrastructure Protection (Coats, 2019). The Commission's 1997 report, Critical Foundations, established the central premise of infrastructure protection efforts through economic prosperity, military strength, and political vitality (Coats, 2019). These efforts all depend on the continuous functioning of the nation's critical infrastructures to uphold the foundational wealth of the nation and solidify good quality of life for its' citizens (Coats, 2019).

Both the Department of Homeland Security and the Department of Defense work to secure and defend the United States including protecting and securing key resources and critical infrastructure (Cybersecurity and Infrastructure Security Agency, 2020). The Critical

Infrastructures Protection Act of 2001 articulates the national security goal to be the protection of critical infrastructure by public-private partnership while the Homeland Security Act of 2002 specifically tasks the Department of Homeland Security with preventing terrorism and protecting critical infrastructure (Clark & Hakim, 2018). According to Clark & Hakim, (2018), most of the nation's critical infrastructure is interdependent and interconnected and is not owned by the federal government. As a result, two key tasks for critical infrastructure protection emerge as crucial: establishing standards and enforcing compliance with those standards and routinely physically protecting and securing critical infrastructure. (Clark & Hakim, 2018).

Since the end of World War II, infrastructure has progressed significantly and contributed positively to development (Clark & Hakim, 2018; Gu, 2017). Qingyang Gu (2017), however, explains that despite the recognition of development, there are unique challenges to the infrastructure framework. Infrastructure requires significant investment that many countries lack funds to sustain (Clark & Hakim, 2018; Cybersecurity and Infrastructure Security Agency, 2020; Gu, 2017). As infrastructure is usually considered a public good, the responsibility for its provision rests on the public sector. As explained by Gu (2017), this becomes a major issue as many global government revenues are severely limited, leaving the government reliable on Public Private Partnership’s (PPP’s). Thus, it is vital for the government of each country to establish good governance and population loyalty. As established by Gu (2017), good governance plays an integral role in the delivery of PPP infrastructure projects. In addition, good governance with a sound legal system is vital in mitigating risks and fostering a climate conducive for attracting private infrastructure investment. With that said, Gu (2017) concludes that governments with weak institutional regimes and poor public governance make

infrastructure projects less attractive to secure private sector financing, placing the country at risk for higher critical infrastructure failure.

As previously discussed, organized crime syndicates prey on weak institutional government regimes. Anderson et al. (2019) and Novakoff (2016), both affirm that organized crime syndicates in destabilized countries hold much of the enterprise over the PPP Infrastructure of a destabilized area, allowing them a critical role in establishing security over key resources. As a result, establishing standards and enforcing compliance from big government capacity, such as policies implemented for United States resources, becomes extremely difficult (Anderson et al., 2019; Clark & Hakim, 2018; Novakoff, 2016) According to Novakoff (2016), these types of enterprises have a unique ability to not only expand but diversify their activities, resulting in a convergence of threats with explosive and destabilizing effects.

Anderson et al. (2019) agrees, concluding in their study that these organizations give birth to the black-market enterprise, supplying some of the most dangerous radical groups and terrorist organizations worldwide. Anderson et al. (2019) further explains that the quantitative value of illicit transactions in strictly illegal weapons easily profits $100 million a year to these organizations. Gianluca Pescaroli and David Alexander (2018) explain this as a cascading domino effect and affirm that these occur most prominently in high-impact low-probability event situations. From a nuclear material perspective, Dr. Beyza Unal (2019) confirmed in her quantitative analysis reported from 1993-2003, 2,500 nuclear trafficking incidents were noted in the International Atomic Energy Agency’s Incident and Trafficking Database. Of that number, four hundred of those incidents were a direct result of the theft of nuclear material (Unal, 2019).

Securing the Homefield

In 1916, the Council of National Defense came into effect as World War I had come into full swing and began affecting American assets. The board was simply an advisory board utilized to coordinate resource efforts for American Industries and stimulate civilian morale towards World War I efforts (Homeland Security National Preparedness Task Force, 2006). According to the Department of Homeland Security (2006), this commission was disbanded following the end of World War I simply due to lack of plausibility of an attack on American soil. In 1933, President Franklin Roosevelt invigorated the National Emergency Council (NEC) in response to growing arms and tensions in Europe once again. The duties of NEC included establishing national emergency response programs among national agencies and, understanding the costly destruction of World War II, Roosevelt reinvigorated the Council of National Defense to assist with civilian efforts (Homeland Security National Preparedness Task Force, 2006). Despite their purpose to assist with Civilian efforts however, these programs were focused primarily on the war efforts overseas. Understanding the need for civilians to be prepared for the upscaling war culpabilities, Roosevelt responded by the creation of the Office of Civilian Defense (OCD) in 1941 to increase civilian morale, promote volunteer involvement, and assure nutrition and education for civilian response to potential events including air raid drills, sandbag stockpiling, and black out drills (Homeland Security National Preparedness Task Force, 2006). However, according to the Homeland Security National Preparedness Task Force (2006), all programs were suspended following the conclusion of World War II as government agencies again declared that an attack on United States soil was an extremely low probability event. From 1945 through early 2017, response initiatives have been a United States nightmare as country leaders attempted to develop their own initiatives in a response to an attack on American soil. This included, but is not limited to the Office of Emergency Planning (OEP), Office of Civil Defense,

Defense Civil Preparedness Agency (DCPA), Crisis Relocation Plan (CRP), Federal Disaster Assistance Agency, Federal Emergency Management Agency (FEMA), Office of the National Coordinator for Security, Infrastructure Protection, and Counter-Terrorism, Office of Domestic Preparedness, U.S. Commission on National Security in the 21st Century, Advisory Panel to Assess Domestic Response Capabilities for Terrorism Involving Weapons of Mass Destruction, Counterterrorism and National Preparedness Policy Coordinating Committee, Office of Homeland Security, Homeland Security Advisory Council, USA Freedom Corps, Citizen Corps, Homeland Security Advisory System (HSAS), National Strategy for Homeland Security (NSHS), and the Department of Homeland Security (DHS) (Homeland Security National Preparedness Task Force, 2006).

Despite the efforts of Presidential leaders to establish effective strategies to responding to emergency events, a 2016 study completed by Jonathan Raikes and Gordon McBean proved these initiatives lacked not only leadership and solubility, but also emergency management legislation, restricted access to financial assistance, and increased liabilities for civilians to respond and address a possibility of an event without guidance or resources. Raikes and McBean (2016) agree with Donald Moynihan's (2012) synopsis that despite the several Acts and Initiatives set in place by United States political leaders, the concept of political responsibility is centered in a culture where intra-network and extra-network reputations spurs blame avoidance strategies when failure of the organization occurs, rather than stimulating a repair to the response legislation. A failure to address such problems assures the ultimate failure of not only protection to civilians, but failure to the National Infrastructure Protection Plan that protects American CIKR's vital to the function of American civilian and government prosperity (Department of Homeland Security 2018; Moynihan, 2012; Raikes & McBean, 2016). When it comes to low

probability high impact events, the United States is more open than ever to the plausibility of threats surrounding chemical, biological, radiological, and nuclear (CBRN) attacks from both external and internal actors (Bentley, 2017; Moynihan, 2012; Raikes & McBean, 2016).

Concepts surrounding CBRN and WMD responses to CIKR's is relatively new and lies primarily on a theoretical standpoint rather than a realistic view (Taquechal & Saitgalina, 2018). Eric Taquechel and Marina Saitgalina (2018) agree with Pomper and Tarini (2017) confirming this to be especially true for nuclear events due to a label of low probability high impact event. To put this in perspective, the last associated nuclear event not associated with a natural disaster is considered to be the bombs dropped on Hiroshima and Nagasaki to end the WWII conflict with Japan (Pomper & Tarini, 2017; Taquechal & Saitgalina, 2018; Mishra, 2021). Eric Taquechel and Marina Saitgalina (2018) affirm John J. Fay's (2011) assertion that responses to CIKR during a nuclear event are primarily reactionary in nature. Since CIKR's are generally under a PPP corporation, Fay (2011) explains that a private business can assume it is at risk of an active attack whether it be national through acts of war or through terrorism but can never be sure. As such, the possibility of attack can be assessed but not to any degree of accuracy, leaving the CIKR open to adversary violence (Fay, 2011; Pomper & Tarini, 2017; Taquechal & Saitgalina, 2018).

Currently, the deterrence strategy associated with the protection of CIKR from active assailants relies on preventing attempts through efforts put forth in physical security, information security, and cybersecurity measures (Andres, 2014; Pomper & Tarini, 2017; Taquechal & Saitgalina, 2018). Much of the material support from a CIKR to national infrastructure requires a smooth and uninterrupted delivery system (Andres, 2014). Any interruption that causes supplies to be misrouted have significant delays in operations and severely effect the nation's

infrastructure as a whole and prevention measures are of paramount concern (Andres, 2014; Taquechal & Saitgalina, 2018). However, the deterrence strategy set forth to respond to a threat to CIKR also requires that an event is to happen before protocols and changes to the deterrence strategy can be understood and reflected in the response matrix (Andres, 2014; Taquechal & Saitgalina, 2018). Thus, responding to an assailant incident against a CIKR is reactionary in nature, escalating in tandem with the event occurring (Pomper & Tarini, 2017; Taquechal & Saitgalina, 2018).

A History of CBRNE

Currently, Western states have no clear or consistent way to define the difference between terrorist acts and acts of war (Cordesman & Burke, 2018). Extreme violence has been a constant tactic of war and insurgencies and civil wars have always used asymmetric and extreme means of combat (Cordesman & Burke, 2018). Anthony Cordesman and Arleigh Burke (2018) and David Cook (2015) affirm that almost all warfare has a decisive phase in heavily populated areas that raises questions about the resulting uses of force, and every act of military violence and intimidation has some elements of terrorist impact on combatants and civilians. The phrase that "one man's terrorist is another man's freedom fighter," may be a cliché but is unfortunately accurate (Cordesman & Burke, 2018). It is a shared assertion by Cook (2015), Cordesman and Burke (2018) and Islam (2019) that any civilization, including those that practice Jihad, facing serious governmental opposition feel they are forced to use the population as both a shield and a weapon. These problems are particularly serious in the cases where terrorism succeeds in escalating to the level of insurgency in an environment where there are many other incidents of serious internal violence (Islam, 2019). Cordesman & Burke (2018) and Sunde et al (2020)

describe the serious internal violence as sectarian, ethnic, tribal, and regional differences, as well as deep political tensions caused by the failure of the state to provide effective governance.

In 1995, Sarin, a deadly nerve agent, was released by a well-funded Japanese religious cult called Aum Shinrikyo. The cult released sarin into five separate subway cars in downtown Tokyo, causing panic, confusion, and terror (Pastel & Ritchie, 2011). On April 4, 2017, a chemical attack in Syria, killed close to 100 people and wounded 500. The world was in shock and outraged since 80% of the casualties were woman and children (Bentley, 2017; Pastel & Ritchie, 2011). Syrian President Bashar al-Assad denied that his military used chemical weapons, blaming rebel fighters for the incident (Bentley, 2017). The United States responded on April 6, 2017 with a missile strike followed by sanctions, making it one of the largest sanction actions in history. The United States claimed that 271 employees of Syria's Science Studies and Research Center were responsible for developing and producing nonconventional weapons and delivery components (Bentley, 2017). Michelle Bentley (2017) and Rene Novakoff (2016) affirm that non-state actors and terrorist organizations interested in the mass lethality and the powerful psychological effects of CBRN agents has resulted in an increased concern for the weapons potential use. Due to new and growing technology such as the internet, non-state actors have the ability and knowledge to develop CBRN WMD (Bentley 2017; Novakoff, 2016; Pastel & Ritchie, 2011).

"For though we walk in the flesh, we are not waging war according to the flesh. For the weapons of our warfare are not of the flesh but have divine power to destroy strongholds," (2nd Corinthians 10:3, ESV). Daniel Koehler and Peter Popella (2018) affirm that the threat of CBRN terrorism is widely attributed to collective actors based on a religious ideology such as globally operating Salafi-jihadist groups like al-Qaeda or ISIS. In addition, Koehler and Popella (2018)

warn that Al Qaeda and associated extremist groups have a wide variety of potential agents and delivery means to choose from for CBRN attacks with an end goal being to cause mass casualties and fear using an extremely crude CBRN device. This goal was exemplified in 2018 when several groups of mujahidin associated with Al Qaeda attempted to carry out poison plot attacks in Europe with easily produced chemicals and toxins best suited to assassination and small-scale attacks (Koehler & Popella, 2018).

Although chemical and biological weapons as demonstrated by the Sarin and chemical attacks through Japan and Syria are more likely to occur, Brecht Volders and Tom Sauer (2016) affirm that nuclear terrorism is one of the most immediate and extreme threats to global security and civilian prosperity. Although nuclear material itself is difficult to make, Volders and Sauer (2016) reaffirm Mueller's (2010) and Rehman's (2012) statement that it is easy to steal as demonstrated by the Y-12 incident of 2016 where an 82-year-old nun was able to penetrate and sabotage the nuclear facility located in Oak Ridge, Tennessee. Currently, terrorist threat assessments towards utilizing nuclear weapons are based off three components: (1) a terrorist motivation to use a nuclear device (2) the availability of nuclear know-how and technology (3) a clandestine organizations' opportunities to obtain fissile material (Volders, 2019). As an attempt to bring these components into a more focused and responsive framework, U.S. President Donald Trump signed the Countering Weapons of Mass Destruction Act in 2018, charging the Department of Homeland Security to oversee the detection, forensic, and response to a full-scale nuclear attack on United States soil and oversea assets (U.S. Department of Homeland Security, 2022). To accomplish this mission, the United States Department of Homeland Security established the Countering Weapons of Mass Destruction (CWMD) Office to pull interagency efforts, both nationally and internationally, to adjust and reconstruct today's Global Nuclear

Detection Architecture (GNDA) (U.S. Department of Homeland Security, 2021). This includes, but is not limited to, purchasing radiological scanning equipment to be placed at ports and country border lines, funding training to both city and outer city response efforts, and funding and providing radiological and nuclear threat detection equipment and training to United States military branches (Department of Homeland Security, 2021).

United States Efforts in Addressing Nuclear Crime

In 1946, the Atomic Energy Act (AEA) enacted 42.USC.2077 and 42.USC.2084 that prohibits the shipment, transfer, or possession of special nuclear material (Mishra, 2021). Under these statues, those found in possession of nuclear material with the intent to injure the United States or to secure an advantage to any foreign nation may be fined up to $20,000 and be subject to life imprisonment (Mishra, 2021). In addition, those that intend to sabotage nuclear facilities or fuel may receive a penalty up to $10,000- and 20-years imprisonment unless death of personnel or civilians are suffered, then life imprisonment is enforced (Mishra, 2021). Thirty years following these initiatives, 18.USC.831 was created to protect the international infrastructures under the control of the United States and provides for the international prevention, detection, and punishment of offenses relating to nuclear material (Mishra, 2021). Under this order, the intentional reception, possession, or use of any nuclear material or nuclear byproduct material when these actions lead to or are likely to lead to death, serious bodily injury, or substantial damage to property or the environment as well as the cross-border movement of nuclear materials ensue penalties up to twenty-years imprisonment, or if death results, life imprisonment (Mishra, 2021).

Historically, the vast majority of incidents involving nuclear material have not led to comprehensive legal investigations, incarceration, or significant punishment of perpetrators

(Balatsky & Severe, 2019; Mishra, 2021). Galya Balatsky and William Severe (2019) affirm that society today has developed a wide variety of uses for nuclear material that include daily operations in hospitals, industrial facilities, colleges, and research institutions. However, despite their innovations in technology allowing the use of nuclear material for increases in science and medicine, this has opened the door to the nuclear materials use to make a dirty bomb in almost any country in the world (Balatsky & Severe, 2019; Mishra, 2021).

In 1987, a radiotherapy unit, containing 1,375 Ci (curies) of cesium-137 was abandoned by a Brazilian clinic in Goiania. Unsuspecting residents subsequently opened the source, resulting in an exposure that killed five people and made dozens sick (Balatsky & Williams, 2019). In 2016, Szuhsiung Ho, a Chinese engineer, was convicted in the Eastern District of Tennessee under 42.USC.2077 for conspiracy to unlawfully engage in the production of special nuclear material to China's benefit (Mishra, 2021). In November of 2019, Austrian police infiltrated a transnational organized crime group involved in a nuclear smuggling ring and discovered a container of U-235 worth approximately 3 million dollars was being prepared for transport to a determined buyer (Harley, 2019). In 2019 alone, 189 incidents of nuclear trafficking and potential misuse were reported by 36 States of the unauthorized possession and intention of malicious use of nuclear material (International Atomic Energy Agency, 2020). In April of 2021, Ronen Bergman, Rick Gladstone and Farnaz Fassihi reported the Natanz Nuclear Facility in Iran suffered a cataclysmic power failure that could have resulted in the death and or injury of thousands if the blackout were not to be responded to effectively. Currently, Iranian officials have labeled this blackout to be caused by an act of nuclear terrorism (Bergman et al., 2021).

On November 22, 2019, Transport Logistics International Inc. president Mark T. Lambert was convicted of four counts of violating the Foreign Corrupt Practices Act (FCPA), two counts of wire fraud, and one count of conspiracy to violate the FCPA and commit wire fraud (Department of Justice, 2020). According to the Department of Justice (2020), Lambert partook in a scheme to bribe Russian official Vadim Mikerin of JSC Techsnabexport (TENEX), a subsidiary of Russia's State Atomic Energy Corporation (ROSATOM) and the sole supplier and exporter of Russian Federation uranium and uranium enrichment services to nuclear power companies worldwide, in order to secure nuclear transportation contracts both nationally and internationally. Lambert was sentenced to 48 months in prison, 3 years supervised release, and a $20,000 fine whilst Vadim Mikerin served 48 months in federal prison for money laundering (Department of Justice, 2020).

On October 9, 2021, Jonathan and Diana Toebbe of Annapolis, Maryland were arrested for espionage after attempting to sell designs of United States Naval Reactors through his work in the Naval Nuclear Propulsion Program (Department of Justice, 2022). On February 14, 2022, Toebbe pleaded guilty to count one of the indictments, charging him with conspiracy to communicate Restricted Data which carries a maximum statutory penalty of up to life in prison, a fine up to $100,000, and term of supervised release not more than five years. In addition, Jonathan Toebbe is currently serving 12 years in a federal prison whilst Diana is serving a 3-year sentence (Department of Justice, 2022).

According to the Department of Justice (2022) the Department of Public Affairs has unsealed two indictments charging four defendants on March 24, 2022, with attempting, supporting, and conducting computer intrusions in two separate conspiracies that targeted the global energy sector between 2012 and 2018. The individuals were considered Russian nationals

working for the Russian government in an attempt to sabotage and gain information for economic and political gains by causing an emergency shut down of a targeted critical infrastructure energy site; one in Europe and the other being the Wolf Creek Nuclear Energy Generating Station in Coffey County, Kansas (Department of Justice, 2022). In total, these hacking campaigns targeted thousands of computers, at hundreds of companies and organizations, in approximately 135 countries (Department of Justice, 2022). According to the Department of Justice Report (2022) the individuals are being indicted with one count of conspiracy to cause damage to an energy facility, and one count of conspiracy to commit computer fraud, totaling an amount of 45 years in federal prison.

Related Literature

Understanding the Risk

The choice between pursuing a nuclear weapons arsenal and exercising political nuclear power is never a straightforward decision by state actors (Singh & Way, 2004). Sonali Singh and Christopher Way (2004) explain it is a long, arduous process from the initial effort of obtaining and building a program to the countries first explosion of a nuclear device. In 1953, President Dwight D. Eisenhower initiated his Atoms for Peace Program with the goal to distribute non-militarized nuclear technology to countries looking to advance nuclear energy initiatives without production of nuclear weapons (Munroe, 2018). This was followed in 1957 by the Atoms for Peace program and the institution of the International Atomic Energy Agency, and, in 1968, the institution of the Treaty on the Non-Proliferation of Nuclear Weapons as an attempt to balance technological advancements towards peaceful uses of nuclear technology combined with a disarmament strategy of nuclear arms. (Munroe, 2018). As explained by Andre Munroe (2018) and Morgan and Williams (2018), the premise of this treaty was surrounded by a strict honor

code agreement between nations to not buy or sell nuclear material for the creation of a nuclear arsenal to one another or to other nations not in possession of nuclear material. However, the illegal proliferation of nuclear material and technology has remained a primary concern as more and more nations grow and develop their own nuclear prowess, and big dog entities such as Russia, China, North Kores, and the United States continue to fight for nuclear supremacy (Morgan & Williams, 2018; Munroe, 2018).

In January of 2018, the Hawaii Emergency Management Agency sent an alert warning to civilian cell phones throughout the state that stated, “BALLISTIC MISSILE THREAT INBOUND TO HAWAII. SEEK IMMEDIATE SHELTER. THIS IS NOT A DRILL” (Moe et al., 2018). According to Rodger Iverson (2016), homeland security is the most vital component in establishing peace, prosperity, and economic growth. With that said, the responsibility of accounting for nuclear material and nuclear actions is of utmost importance (Iverson, 2016). In 2006, the Homeland Security Presidential Directive 14 and the SAFE Port Act of 2006 mandated the Global Nuclear Detection Architecture (Department of Homeland Security, 2021). The mandates charged the Department of Homeland Security with the directive to detect and counter a domestic nuclear event. In order to do so, the Department of Homeland Security (2021) has initiated response protocols under three specific goals; (1) Anticipate, identify, and assess current and emerging WMD threats; (2) Strengthen detection and disruption of Chemical, Biological, Radiological, and Nuclear Event (CBRNE); (3) Synchronize homeland counter-WMD and health security planning and execution. Currently, risk assessments associated with nuclear devices are closely linked to CBRNE response matrixes as each has the potential to be considered a weapon of mass destruction (WMD) (Department of Homeland Security, 2021).

In 2016, a military coup threatened a United States nuclear stockpile located at the Incirlik Air Base where a takeover would have devastating effects, placing the world closer to a nuclear event not seen since Japan in World War II (Gale & Armitage, 2018). Although electronic safeguards and security measures are in place to prevent immediate use of the devices, researchers agree that this would not prevent a rogue player or nation from utilizing the device contents (Gale & Armitage, 2018). Alex Moe and associates (2018) concluded in their risk analysis that an improvised nuclear device (IND) and a nuclear-tipped ballistic missile share the attributes of a nuclear detonation. These attributes include similarities in blast damage, thermal damage, radiation, and the electromagnetic pulse range (Moe et al., 2018). However, according to Moe et al. (2018), the most significant difference is that a ballistic missile set by a rogue nation allows for a timelier forewarning to the populace than an act of nuclear terrorism or the detonation of a dirty bomb by a rogue player. Robert Gale and James Armitage (2018) would agree, concluding that an improvised nuclear device set off by a terrorist organization or rogue players would result in approximately 100,000 immediate deaths and 100,000 casualties due to the effects of nuclear fallout.

As previously discussed, a nuclear event is considered a low-probability, high-impact event (Pomper & Tarini, 2017; Zweglinski & Smolarkiewicz, 2019). Unfortunately, researchers such as Shereen Chaudry, Michael Hand, and Howard Kunreuther (2020) found that nations are underprepared for a CBRNE possibility regarding concepts behind low-probability high impact events. Though chemical, biological, and radiological events tend to take up most of the homeland security response initiative space, the nuclear event possibility must not be ignored (Chaudry et al., 2020). In a qualitative analysis conducted by Sergeant Simon D.H. Wells (2019), CBRNE responses are primarily based exclusively upon the calculated risk to infrastructure, with

a strict focus upon a premium business or economic stability, or upon a broad hazard identification matrix does little to address scenario-specific events. Pomper and Tarini (2017), Wells (2019), and Zweglinski and Smolarkiewicz (2017) all agree that new policy initiatives need to be placed to enforce the recognition that a nuclear event not only has an impact on the economic infrastructure but also incorporates all avenues under a chemical, biological, and radiological hazard that desperately needs to be addressed. As such, global policies in response to CBRNE events and, more specifically, the current nuclear strategy and policy needs to include decisive policy decisions as well as public education on impacts of the nuclear events in association with the chemical, radiological, and biological partners (Gale & Armitage, 2018; Pomper & Tarini, 2017; Wells, 2017; Zweglinski & Smolarkiewicz, 2019).

Organized-Crime and the Terrorist Nexus

Today, Russia is known to have one of the most considerable organized crime problems in the world (Marchenko, 2018). Following the fall of the Soviet Unit in 1991, Russia has been a constant evolving door for criminal groups as the struggle for power and governmental balance ensures (Siegel, 2012; Marchenko, 2018). Dina Siegel (2012) explains that organized crime syndicates in Russia took an explorative and successful role in the Russian Federation as they embarked on their journey towards Russian Capitalism. As a result, members of political society and criminal trust networks in the civil society developed new collaborations and interdependencies that allowed organized crime groups to establish social orders on the streets and segregate themselves from penalties of state law (Siegel, 2012; Marchenko, 2018). Organized crime syndicates further developed their economic and political prosperity by providing protection services to illicit Soviet entrepreneurs and developed their own criminal operations under the cover of corrupt members of the local police, giving the organization a

strategic foothold in the Russia PPP and Critical Infrastructure that has since spread throughout Europe and the United States (Siegel, 2012; Marchenko, 2018).

Thomas Poueke and Jan Wouters (2021) claim that the nexus between organized crime and terrorist organizations is most interactive in post-conflict areas. Sam Withers and James Mullin (2016) explain that four types of overlap currently exist between terrorism and organized criminal groups and are as follows: interaction, appropriation, assimilation, and transformation. According to these researchers, organized crime and terrorist groups share similarities in tactics and strategies to accommodate their goals (Poueke & Wouters, 2021; Withers & Mullin, 2016). This includes but is not limited to infiltrating government systems, enforcing political agendas, and committing heinous, violent crimes to achieve ultimate goals (Poueke & Wouters, 2021; Withers & Mullin, 2016). Withers and Mullins (2016), Tallis et al. (2017), and Poueke & Wouters (2021) revealed that these goals are often reached during a time where a country or specific area is vulnerable to the organization's successes.

The instability and weak government institutions open the door for the two entities to conduct virtually undetected business without resistance or the pursuance of abstaining authorities (Poueke & Wouters, 2021). In their quantitative analysis, James Piazza and Scott Piazza (2017) found that terrorist groups such as the Taliban, Al-Qaida, and ISIS have participated in business engagements with several different organized crime groups. As a result, these terrorist group's chance of demise was reduced by 50%, and lifespans for each umbrella cell extended by seven years on average despite international efforts to cease terrorist activities (Piazza & Piazza, 2017). When it comes to addressing the crime-terror nexus problem, although there remain many ongoing challenges that include, but are not limited to, recognition of the problems that exist within the area, types of crime overlap, and proper recognition that the

relationship between the two groups exist (Withers & Mullin, 2016). Withers and Mullins (2016) and Piazza and Piazza (2017) agree that current strategic defense policies fail to address the associated threats of the organized crime and terrorist relationship that a lot for the groups to move and conduct business freely. This includes high-end sales of drugs, human trafficking, and military-grade weaponry, and chemical, biological, radiological, and nuclear material with the potential to cause mass destruction if deployed properly (Kunreuther, 2020; Moe et al., 2018). As such, it is vital to recognize these relationships as the groups gain power and control in their chosen targeted areas of advantage (Piazza & Piazza, 2017; Poueke & Wouters, 2021; Tallis et al., 2017; Withers & Mullin, 2016).

Destabilization of the Middle East

Today's ultimate violent jihad culture behind groups such as Al Qaeda and ISIS believes that only a global agenda can sustain the group's local infrastructures (Rahmatullah, 2017; Teneski et al. 2020). Ismail Saifnazarov, Azamat Muhtarov, Tursunboy Sultonov, and Abdurauf Tolibov (2020) explain that the current Salafi-jihadist culture is developed primarily around conflict with the non-Muslim world, especially the West. Though some individuals or groups within the jihadist culture may eschew such conflict, their creed itself defines the West as an enemy, making terrorist actions and warfare between the two groups inevitable (Saifnazarov et al., 2020). In addition, Saifnzarov et al. (2020) confirmed that transnational groups such as Al Qaeda intertwine their networks with the Western local networks, rooting these branch cells into local conflicts and creating openings for jihadist establishment. Today, the recent end to the War on Terrorism and the evacuation of United States Troops from Afghanistan have put the jihadist movement closer to establishing a strategic foothold in their battle against the West (George et al., 2021).

August 2021 and the Taliban takeover of Afghanistan have proven to be one of the most significant current events associated with a striking risk to nuclear non-proliferation strategies. Asher Susser (2017) and Daniel Augusto and Jeffery Gagliano (2020) agree that the interaction between the United States and radical jihadists is a form of mutually assured destruction. In 2009, Shaun Gregory explored the risk of the Pakistan Nuclear Arsenal in conjunction with the resurrection of the Taliban, declaring that, despite Pakistan assurances, no screening processes exist within their nuclear security program that can weed out all Islamist sympathizers or anti-Westerners among Pakistan's military or civilian populace that hold nuclear weapons expertise. In addition, the 2015 revelation of the death of Taliban Commander Mullah Omar fractured the Taliban structure, causing splinters in the Taliban infrastructure and a constant inner conflict between Taliban groups for the power of the organization (Dupee, 2018). In 2020, Sharad Joshi concluded in his qualitative analysis that the Taliban continues to increase participation in the nuclear politics of Pakistan. In a case study completed by Raj Verma (2021), the Iran and Pakistan relationship with the Taliban has continued to flower and evolve. However, the relationship between Iran and Pakistan continues to destabilize (Verma, 2021). Thus, a Middle Eastern power struggle between the nations becomes prominent, opening the Pakistan and Iranian nuclear weapons regimes to a possible takeover by Taliban jihadist groups (Verma, 2021). With the combination of destabilization of the Taliban organization and the nuclear control interest by the splintered Taliban groups, there is no doubt that a risky foothold in the global nuclear regime has become of paramount concern (Dupee, 2018; Joshi, 2020).

Russia and Ukraine Crisis

Tatiana Kasperski (2015) described the conflict between Russia and Ukraine as a post-USSR nuclear renaissance. Despite each countries differences and recognition of right of

independence, they share a deep-rooted connection through USSR reactor technology, nuclear fuel and waste disposal agreements that shape and constrain Russia and Ukrainian behavior and leave great uncertainty for the future given the ongoing conflict between the two nations (Kasperski, 2015). After the fall of the Soviet Union in 1991, Ukraine declared independence from Russia and began its democracy. In 2005, President Victor Yoshenko promised the Ukrainian people that one day, Ukraine would form an alliance with NATO and the European Union, solidifying their independence from Russia (Aloisi & Daniel, 2022). However, in 2010, Victor Yanukovich was elected as the new Ukrainian president and changed initiatives in attempts to foster and rebuild Ukrainian ties with Russia. Ukrainians fought this proclamation through bloody protests, eventually resulting in the fall of Crimea now recognized as Russian territory (Aloisi & Daniel, 2022). During this bought, Yanukovych is removed forcefully from office of the Ukrainian Presidency, the European Union opens markets for free trade of goods and services, visa-free travel to the European Union for Ukrainians is opened, and, in 2019, Volodymyr Zelensky is elected president of Ukraine. In January 2021, President Zelensky appealed to United States officials for permissions to join NATO (Aloisi & Daniel, 2022). According to Russian President Vladimir Putin, this was a direct violation of agreements established between Russia and Ukraine during the presidency of Yanukovich (Aloisi & Daniel, 2022). On February 24, 2022, Russia initiated military action on Ukraine for violations associated with these agreements.

Daryl Kimball (2022) confirmed that Vladmir Putin's military exploits that includes Russia's conflict with Georgia in 2008, the takeover of the Crimean Peninsula in 2014, and the consistent cyberattacks and political influence games throughout the European Union and the United States has already spurred the West and its NATO member states to bolster military

postures. The current military action against Ukraine violates the 1994 Budapest Memorandum signed by Russia, the United Kingdom, and the United States extended security assurances against the threat or use of force against Ukraine, its territory, and political independence (Kimball, 2022). As part of this agreement, Ukraine acceded to the nuclear NPT as a non-nuclear-weapon state and returned 1,900 nuclear warheads it inherited from the fall of the Soviet Union (Kimball, 2022). According to Kimball (2022) the invasion of Ukraine by Russian forces reinforces the impression that nuclear-armed states can bully non-nuclear states. As a result, nuclear proliferation preventative efforts become more difficult to enforce (Kimball, 2022).

Sarashiki Rai and Sylvan Lane (2022) affirm that the invasion of Ukraine by Russian forces has uprooted United States CIKR's through the destabilization of supply chains for crucial food, inflation of energy and industrial products, and the derailing of global travel that has stimulated volatility into the global stock market exchange. In 2018, James Acton affirmed that an entanglement between Russia and the United States could lead to escalation between both U.S.-Russian relations and U.S.- China relations that could stimulate strong incentives to attack CIKR command and control systems that undermine each countries nonnuclear operations. As a result, a recognized crisis or ultimate war would severely degrade each nations culpabilities to support not just itself, but the countries in which it has agreements (Acton, 2018). As previously discussed, organized crime syndicates thrive on the destabilization of countries such as the US, China, Russia, and Ukraine. As war rises, government security protocols falter and opens the door to these groups to disseminate nuclear material to struggling governments and terrorist cells both trying to gain a strategic foothold in the crisis at hand (Zartner, 2010).

In 2016, Svetlana Stephenson conducted a qualitative analysis on Russian prosperity following the fall of the Soviet Union in 1991. In her conclusion, Stephenson (2021) reported that Russia has a vast criminal enterprise background as the State and Russian organized crime actors' ambitions led to an increasing integration of organized crime into political structures. This created a complex web of interdependencies in which actors from criminal networks and political authorities collaborated through shared resources (Stephenson, 2016). Danilo Mandic (2022) however, declares it is important to note that organized crime syndicates, especially those in destabilized countries, hold a deep interest in patrimonial governance and even state-building. With that said and the knowledge that Ukraine and Russia hold the largest nuclear energy producing infrastructure in the world, the concepts of organized crime and the movement of nuclear material throughout the regions and into other states should be of great concern (Kimbell, 2022; Mandic, 2022; Stephenson, 2016).

Summary

The vivid Old Testament saga of the Ten Plagues that devastated the land of Egypt and its people has intrigued some to seek rational explanations for a chronicle of disasters that befell one population yet spared another. The ten plagues are described in Exodus 1-12: 1. the Nile River turns bloody, fouling drinking water and killing fish. 2. Frogs leave the Nile for dry land, invade Egyptian homes, and die, causing a great stench. 3. Annoying tiny insect's swarm. 4. Annoying large insect swarm. 5. An epizootic kills different types of livestock in the pasture. 6. Boils afflict beasts and humans. 7. An especially severe thunderstorm with lightning and hailstones destroys crops near harvest. 8. Strong winds bear swarms of locusts to obliterate remaining crops. 9. "Palpable darkness" obscures all light. 10. Firstborn Egyptians and their surviving firstborn animals die, while Israelites and their livestock live. The concerns of the

Earth’s apocalyptic future have plagued the minds of humanity for centuries and today, that may be closer than ever.

Beginning with the first drop of the Nuclear Bombs to end World War II, the world has lived in fear and misunderstanding. The concept of nuclear power that can sustain life through its energy processes has been labeled a key to the Earth's plausible destruction (Countryman & Zagorski, 2018). However, it is not the fear of the destruction itself but rather those who control the destruction. The Cold War initiated between the Soviet Union and the United States put the world into a political tailspin, forever looking for a means to an end (Countryman & Zagorski, 2018). However, this big government distraction has been one of the most vital flaws to the nuclear superpower solution, allowing smaller entities to blossom and grow into global problems (Countryman & Zagorski, 2018).

Like any commodity, nuclear material is what many consider an excellent sell-and-buy product holding a unique demand and supply culpability. (Jo & Gartzke, 2007; Volpe, 2017). Currently, domestic political coalitions between nuclear states and economic development strategies determine a state's demand for nuclear weapons and a nuclear State's willingness to supply such weapons (Solingen, 2009; Volpe, 2017). In addition, transnational organized crime syndicates penetration of government establishments is deepening as they insinuate themselves into the political process of government establishments giving these groups a unique foothold in the ability to acquire and supply commodities including nuclear material (Novakoff, 2016). As such, it is important to recognize that the world is closer to a true nuclear event than ever before. (Anderson et al., 2016; Drame et al., 2016; Gu, 2017; Novakoff, 2016; Volpe, 2017).

Although a nuclear event is considered a low-probability, high-impact event found that nations, including the United States, are underprepared for an actual occurrence. Despite the

efforts of Presidential leaders to establish effective strategies to responding to these types of emergency events, these initiatives lack leadership and solubility, emergency management legislation, restrict access to financial assistance, and increased liabilities for civilians to respond and address a possibility of an event without guidance or resources (Raikes & McBean, 2016). In addition, the concept of political responsibility is centered in a culture where intra-network and extra-network reputations spurs blame avoidance strategies when failure of the organization occurs, rather than stimulating a repair to the response legislation (Moynihan, 2012; Raikes & McBean, 2016). This is a drastic failure of the United States to not only protect civilians, but also a failure to the National Infrastructure Protection Plan that protects American CIKR's around the globe vital to the function of American civilian and government prosperity (Department of Homeland Security 2018; Moynihan, 2012; Raikes & McBean, 2016).

The system of critical infrastructure in the United States is vast not only size, but also in geographic layout (Kenter & Goldsmith, 2021). These two factors along with the American Federalist idealism imposes vast challenges to the protection of United States CIKR systems (Kenter & Goldsmith, 2021). This is due to the recognition of state and local government control, making federal protections almost obsolete. Furthermore, the large number of critical infrastructures are owned by multinational corporations or as Private Public Sector Partnerships (PPP's) (Drame et al., 2016; Kenter & Goldsmith, 2021). In addition, the modernization of technology throughout Critical Infrastructure systems has placed the CIKR's more vulnerable to technological attacks (Department of Homeland Security, 2022; Kenter & Goldsmith, 2021). According to the Department of Homeland Security (2022), particular CIKR's at risk for attack, espionage, theft, and sabotage include the energy, nuclear, water, aviation, and critical manufacturing sectors.

The choice between pursuing a nuclear weapons arsenal and exercising the political nuclear power is never a straightforward decision and is considered a long, arduous process from the initial effort of obtaining and building a program to the countries first explosion of a nuclear device (Singh & Way, 2004). Currently, organized crime syndicates prey on destabilizing and post-conflict nations that give birth to the black-market enterprise, supplying some of the most dangerous radical groups and terrorist organizations worldwide (Anderson et al., 2016). Current events including the Taliban takeover in 2021 and the Russian-Ukraine Conflict of 2022 has opened a strategic door for these criminal enterprises to reemerge, making the nuclear material proliferation prevention a grueling task (Kimbell, 2022; Stephenson, 2021).

The destabilization of nations such as Afghanistan, Russia, and Ukraine have placed a strain on United States CIKR command and control systems that undermine its current nonnuclear operation, opening the door for nuclear material proliferation efforts within the United States (Acton, 2018). Terrorists that look to proliferate nuclear weapons go through a process that has been labeled "proliferation financing." In doing so, terrorist organizations utilize front companies established by organized crime syndicates to proliferate nuclear material (Drame et al., 2016). Currently, these front companies, including PPPs associated with United States CIKR's, is especially common among criminal behavior associated with nuclear proliferation (Drame et al., 2016). Currently, there is enough plutonium and uranium to build up to 10 nuclear weapons outside authorities' control (Gu, 2017; Stuneve & Fetter, 2017).

Russia has a vast criminal enterprise background as the State and Russian organized crime actors' ambitions led to an increasing integration of organized crime into political structures. This created a complex web of interdependencies in which actors from criminal networks and political authorities collaborated through shared resources (Stephenson, 2016).

Danilo Mandic (2022) however, declares it is important to note that organized crime syndicates, especially those in destabilized countries, hold a deep interest in patrimonial governance and even state-building. With that said and the knowledge that Ukraine and Russia hold the largest nuclear energy producing infrastructure in the world, the concepts of organized crime and the movement of nuclear material throughout the regions and into other states should be of great concern (Kimbell, 2022; Mandic, 2022; Stephenson, 2016).

CHAPTER THREE: RESEARCH DESIGN AND METHODOLOGY

Overview

Much research completed regarding nuclear weapons focuses on arguments regarding whether to arm or disarm nuclear arsenals (Martin. 2016). With the demise of the Range Nuclear Forces Treaty and the rise of more innovative modernization of deployable nuclear weapons, the threat of another World War lingers that could drastically impact the future (Weber & Parthemore, 2019). As a result, an international response has invigorated more efforts in deploying policies that will limit and eliminate the creation and role of nuclear arms in big government capacity (Weber & Parthemore, 2019). This thought process, however, only considers big government policies, and fails to understand the effects of such limitations that would put vast countries at risk to terrorist groups and organized crime syndicates. Therefore, collective research correlating the illegal acquisition of nuclear material from organized crime groups, terrorist organizations, and nuclear rogue countries need to be explored. In addition, the collective research needs to add to the knowledge base and provide a step forward into creating a constructive policy and procedure on increasing nuclear security awareness and filling the nuclear security gaps that negatively affect the Homeland Security response nexus and the lack of protection to important United States critical infrastructure and key resources (CIKR).

Design

The following research is a qualitative exploratory design model through a grounded theory framework. The goal of the study will be to add to the knowledge base of nuclear proliferation to provide a well-grounded picture of the illegal distribution of nuclear material and the threat they pose to specific United States CIKR's (Chun Tie et al., 2019; Miller, 2020; Terrell, 2016). The grounded theory framework will be composed of elements belonging to a

traditional grounded theory study in an attempt to display patterns of behavior associated with the illegal proliferation of nuclear material, the organizations that hold them, and the threat they pose to the United States (Chun Tie et al, 2019; Miller, 2020).

Despite the vast amount of data provided on nuclear weapons, nuclear stockpiles, and nuclear proliferation, the data has yet to be collective in an offensive counterstrategy to the nonproliferation of nuclear material approach and continues to remain stuck in the defensive disarmament versus armament argument stage (Ackerman & Jacome, 2016). As such, this research model will utilize a secondary research collection method in order to re-gather data as well as primary research collection methods to insert new data that address solely the criminal aspect of nuclear proliferation and the illegal proliferation correlation to a direct threat of United States CIKR's (Antony 2021; Breese, 2016). This type of data will be collected from various United States criminal justice entities to show a trend between criminal groups and terrorist organizations material who proliferate nuclear material, confiscated from, locations and destinations of the confiscated material, and the potential use and or threat against a United States CIKR (Antony 2021; Breese, 2016; Gochua & Zedelashvili, 2020). Due to the nature of transnational movement of nuclear proliferation, transnational organizations such as EUROPOL, Arms Control Organization, Federation of International Scientists, International Atomic Energy Agency, and the Department of Energy (Gochua & Zedelashvili, 2020; Miller, 2020).

This methodology will not provide solid conclusions on what needs to be done, but rather open discussion to direct more strategic and solidified Homeland Security initiative that will oversee the nuclear material proliferation problem (Antony 2021; Breese, 2016; Gochua & Zedelashvili, 2020). Using secondary research methods to the qualitative experimental design model will allow for a more in-depth analysis of the movement of nuclear material. The utilization of 90%

primary sources to assess the proliferation of nuclear material as well as their probability of use by organized crime and terrorist organizations will allow the research to correlate a direct threat to the United States and its CIKR's (Antony et al., 2021; Gochua & Zedelashvili, 2020; Miller, 2020). Nuclear proliferation literature, case studies, and online nuclear databases including, but not limited to, the ITDB, AEA, Federal Bureau of Investigation, Central Intelligence Agency, Department of Justice, and Office of Public Affairs. Additionally, resources provided by the facets of Nuclear Administration will be utilized to create graphical charts and data that will allow a picture view of the movements and seizures of nuclear material in direct relation to United States CIKR assets (Antony, 2021; Chun Tie et al., 2019).

Research Questions

RQ 1: What are the relationships, if any, between the black market, terrorist groups, organized crime syndicates, and the illegal distribution of nuclear material?

RQ 2: What impact, if any, does the distribution of nuclear material from these illegal organizations have on United States Critical Infrastructure and Key Resources?

Setting

Due to the national security sensitivity of data, the research will be limited to strict document analysis of already previously unclassified information. Previous research in combination with the Arms Control Organization, Federation of American Scientists, and the International Tracking Database hold rich information on the quantitative and qualitative trends of nuclear proliferation from the 1990's to the present. Reports provided by the Federal Bureau of Investigation, Central Intelligence Agency, Department of Homeland Security, Department of Energy, International Atomic Energy Agency, and EUROPOL provide saturated data on the interception of specialized nuclear material including destination and organization in which the

nuclear material was intercepted from. This will provide the ability to code the analysis based on organization such as terrorist group or organized crime syndicate, that had acquired the nuclear material. Newspaper articles of collected nuclear material and primary research sources will be charted to provide quantitative information on unknown recovered special nuclear material will provide an additional correlation to the unaccounted nuclear material giving a larger outlook on the nuclear proliferation potential by illegal entities.

Procedures

Data will be collected from organizations including the Arms Control Organization, Federation of American Scientists, and the International Tracking Database, Federal Bureau of Investigation, Central Intelligence Agency, Department of Homeland Security, Department of Energy, International Atomic Energy Agency, and EUROPOL. In addition, data will be collected from primary research conducted on nuclear proliferation. A code index will be inserted into the MAXQDA Software system to extract nuclear proliferation by organized crime groups and terrorist organizations. An additional code will be provided to display the threat these groups pose to the United States and the probability and impact level to United States assets.

Researchers Role

The researcher currently works in the realm of Nuclear Security. This could have the potential to cause bias in the research study, with knowledge that lacking nuclear security parameters are in dire need of being addressed and better security protocols being set. Advantages to the researcher include empirical knowledge of the nuclear security realm that will allow the researcher to assure that the data provided is true and accurate to its best capability.

To prevent bias, the role of the researcher in this study will be to conduct a strict analysis on the documents provided by the coded resources in order to extract meaning, gain

understanding, and add to the knowledge base surrounding the risks of nuclear proliferation. The goal of the researcher will be to open discussion on steps forward to address issues surrounding nuclear proliferation by illegal entities in a goal to solidify a strategic plan to address the homeland and international risk and push forward discussion on possible Homeland Security protocols and initiatives into the nuclear security setting.

Data Collection and Analysis

The data collection method will rely strictly on document analysis through the utilization of MAXQDA Software. This type of collection will be utilized to attempt to extract meaning, gain understanding, and develop empirical knowledge on the bases of nuclear proliferation and the global movement of nuclear material (Bowen, 2009). MAXQDA Software will be used to extract, and code specified information from Arms Control Organization, Federation of American Scientists, and the International Tracking Database in addition to primary sources provided by nuclear proliferation studies. Sources will be coded via key words of organized crime, terrorist organizations, American asset, high=impact probability, and low-impact probability. The software will then use the extracted data to create an appendix of graphics including, bar charts, line charts, and pie charts as visual references to the results of the study.

The document analysis includes, but is not limited to, data collected from government industries that has been cleared as declassified information. This includes in-depth reports provided by the Federal Bureau of Investigation, Central Intelligence Agency, Department of Homeland Security, Department of Energy, International Atomic Energy Agency, and EUROPOL. These documents will allow an in-depth assessment of nuclear material and the movement of nuclear material around the globe that pose a threat to American interests (Bowen, 2009).

Graphics and charts to supplement the document analysis will be collected and analyzed primarily from the Arms Control Organization, Federation of American Scientists, and the International Tracking Database. The utilization of line charts, bar charts, and pie charts will assist in providing context and insight into nuclear proliferation trends from 1994 through the current 2021 fiscal year by terrorist organizations, organized crime groups, and rogue nations (Bowen, 2009). In addition, these line charts, bar charts, and pie charts will provide a contextual outlook to the illegal acquisition of nuclear material and its movement around the globe (Bowen, 2009). Lastly, line charts, bar charts, and pie charts will provide direct insight into the amount of nuclear material intercepted and the threat the nuclear material posed to American interests. This will create a more rounded data analysis that will guide recommendations to strategic nuclear policy change and discussion of Homeland Security oversight of the nuclear regime (Bowen, 2009).

Trustworthiness

The data collected in the following research has been meticulously collected and systemized into an overall view of the movement of nuclear material to provide a correlation between illegal nuclear proliferation strategies and their threats to Homeland Security and American interests (Gochua & Zedelashvili, 2020; Miller, 2020; Nowell et al., 2017). Personal insights from the researcher are not provided, limiting personal biases in the research collection methods (Nowell et al., 2021). In addition, the research data and analysis provided is easily followed and remains credible, confirmable, and dependable to future research strategies.

Credibility

The data provided in this study is compiled of all information that has been declassified by participating government agencies around the world. Analyzing the resources from these

primary data resources will allow for a deeper insight into the proliferation of nuclear material and the movement of that material through vertical and horizontal proliferation methods of organized crime syndicates and terrorist organizations that pose a threat to United States assets. In addition, the data will provide an insight into the criminal world and the interest these interties have in acquiring nuclear material for both profit and use. The credibility of this data strictly relies on the honor and integrity of government reporting of each participating nation. As such, biases between governments is unavoidable which may provide a slight skew in the correlative analysis (Noble & Smith, 2015). However, through use of MAXQDA software, the research attempts to filter the skewed data through meticulous collection and coding techniques. The various resources previously discussed provides the research with the ability to seek out similarities and differences in each database and filter inter-data bias from collected data (Noble & Smith, 2015). This will be accredited through triangular data collection techniques provided by the meticulous coding efforts through the MAXQDA software system (Noble & Smith, 2015). Limitations to the credibility of the study may include inaccurate reporting of information and or the progress of declassifying key information from the most recent years.

Transferability

To analyze the data properly, MAXQDA software will be utilized to organize and link data from the different nuclear databases as well as peer-reviewed research. Data codes will be utilized to highlight the movement of nuclear material through organized crime groups and terrorist organizations in direct association to United States CIKR interests. The data codes will link the charts and traffics as provided by several nuclear security databases previously discussed and existing nuclear literature to make a more cohesive and accurate data set. The combination of this data in the MAXQDA software will provide a visual and analytical analysis on the

correlative relationship of the illegal movement of this nuclear material to assist in stimulating discussion on future Homeland Security initiatives.

Dependability and Confirmability

All data provided is publicly accessible and attainable. All information of nuclear material movement and confiscation have been declassified and utilized in various research parameters. The MAXQDA software system will be utilized to separate information into a strategic analysis of nuclear material. This data will show both the individual acquisition of nuclear material by each individual group of terrorist organizations, organized crime syndicates, and the relationship between the two groups as well as the threat that each group poses to United States CIKR's.

Ethical Considerations

There exist no direct participants in this study. This is an exploratory document analysis strictly focused on unclassified material provided by global government agencies. The data provided is available to public knowledge and there exists no manipulative culpabilities by the researcher. The researcher holds no affiliations or conflicts of interest.

Summary

The movement of nuclear material is a long, arduous process to compile and understand. Data collection on such a sensitive nature proves difficult as components of national trade secrets and confidentiality become factors in the international information sharing process. To provide a strategic outlook on the nuclear threat, this study looks to utilize a qualitative document analysis study that looks deeper into the illegal proliferation of nuclear material by organized crime and terrorist entities, correlate their relationship, and show the direct threat level to United States assets. To do so, the study will be comprised of internationally shared data that is comprised of

current nuclear stockpiles, recovered unaccounted for nuclear material, and the interceptions of illegally proliferated nuclear material with an attempt to summarize enough data to provide strategic insight to open discussion on future Homeland Security protocols to oversee the nuclear regime.

CHAPTER 4: DATA AND RESULTS

Overview

The following data was collected from declassified information provided by participating government agencies around the world. This includes, but is not limited to, Arms Control Organization, Federation of American Scientists, International Tracking Database, Federal Bureau of Investigation, Central Intelligence Agency, Department of Homeland Security, Department of Energy, International Atomic Energy Agency, and EUROPOL. Beginning with the nuclear power struggle during the 1950's and ending with limited, but provided data, within the year 2022, the data set will begin with a display of vertical proliferation efforts that has afforded the growth of multiple nuclear power states and formulated the horizontal proliferation efforts by rogue entities including but not limited to, rogue nuclear states, organized criminal organizations, and terrorist groups. This includes assessing estimated nuclear state stockpiles, the economic productivity of these nuclear-powered states, the loss and recovery of nuclear weapon or weaponized material control, and the status of missing and recovered nuclear material.

In addition to assessing the nuclear material crisis, the data provides an opportunity for a quality risk assessment of terrorist organizations and their capacity to utilize a nuclear weapon on a specified target. The results of the study will show that a deployable nuclear weapon, though low risk, will have devastating impacts as terrorist groups are more inclined to target vital United States critical infrastructure. In addition, the study will show that terrorist organizations, though low risk for a deployable weapon, will have a greater chance of success in certain critical infrastructures using easily collected source material rather than a full-scale nuclear attack. This data, however, puts into question whether source material should be constituted as a nuclear

attack or if it belongs under biological or chemical attacks and should thus be reported more efficiently and taken to the next level of Homeland Security concern.

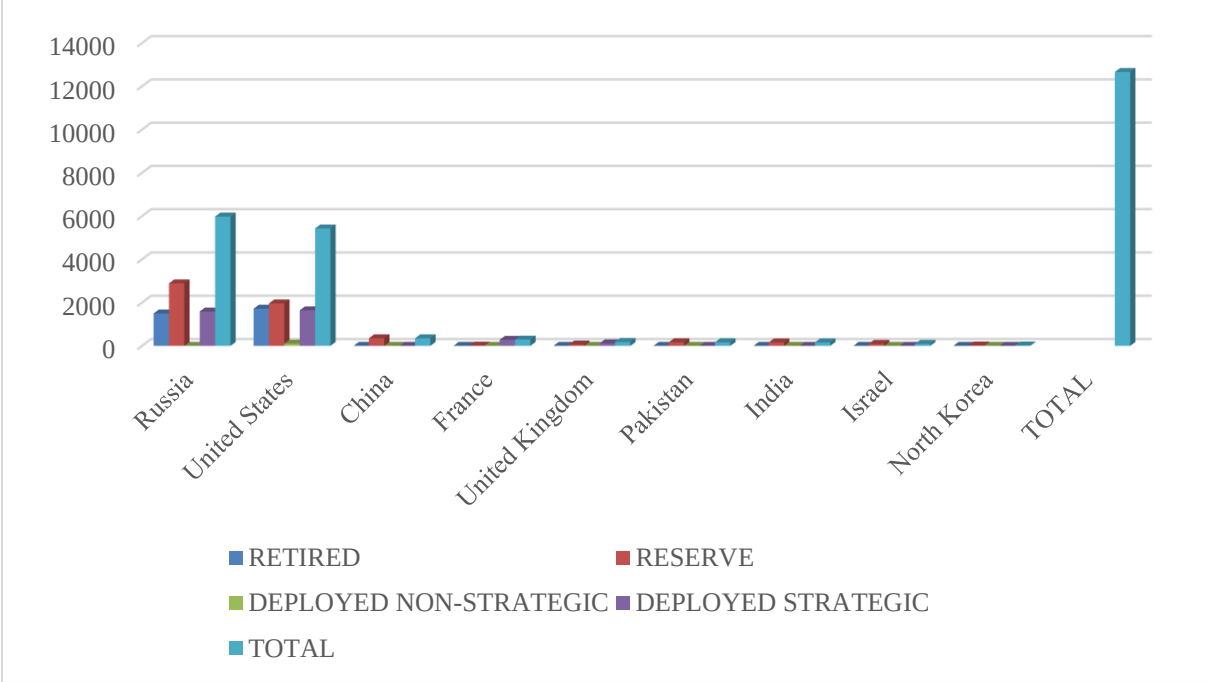
Results

Nuclear Weapons At A Glance

Figure 1 displays the estimated 2022 nuclear stockpiles reported to the Federation of American Scientists (2022) and the Arms control Organization (2022) by the currently recognized nuclear power states as part of the signed nuclear non-proliferation agreement. The following chart represents deployed strategic warheads currently residing on bomber bases, deployed non-strategic warheads defined as short=range delivery systems, and reserve non-deployed warheads currently in storage ready to be prepped for deployment culpabilities (Federation of American Scientists, 2022).

Figure 1.

Estimated Nuclear Stockpiles

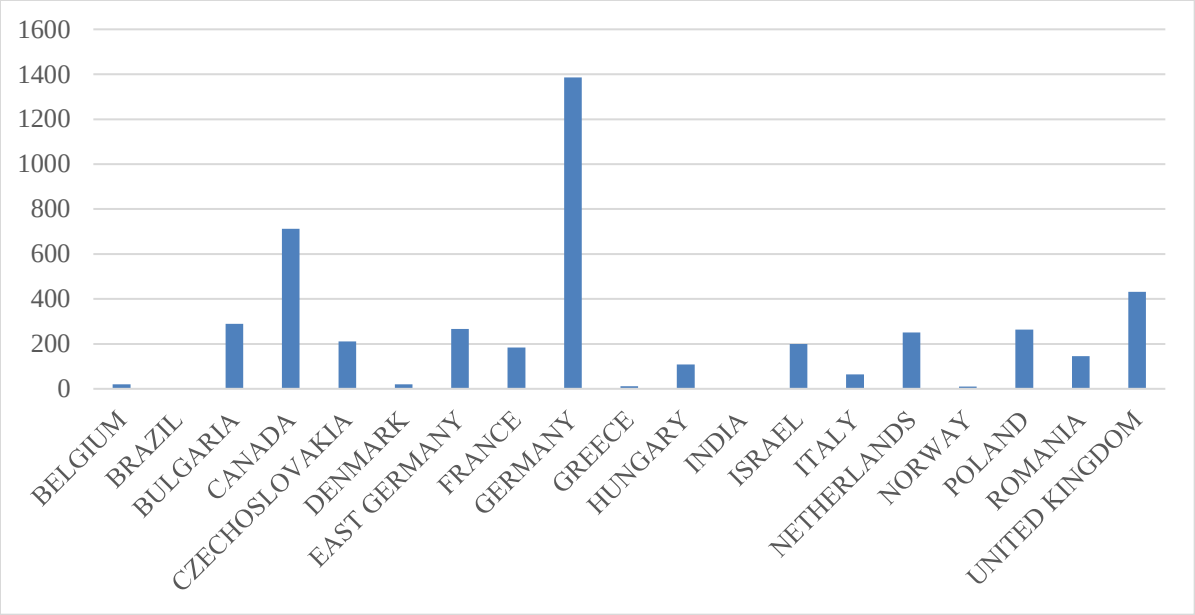


Currently, Russia and the United States hold the most reported stockpile estimates of nuclear weapons at 90% of the nuclear states reported nuclear weapon capabilities. However, it is important to note that previous world nuclear agreements following the Cold War only required Russia and the United States to report nuclear arsenals by the numbers as part of the reduction in nuclear weapons. As such, France, China, United Kingdom, Israel, Pakistan, India, and North Korea have not reported any deployed nonstrategic nuclear weapon possibilities.

Weapons and Arms control has plagued the world for centuries. Today, that battle continues as Weapons of Mass Destruction has become of great concern (Kassab, 2018). Not unlike the requirement to report nuclear stockpiles, a limited number of countries have also reported selling nuclear weapons as part of strategic and economic gains in the nuclear power game (Stockholm International Peace Research Institute, 2022). This process of horizontal proliferation was provided by the Supplier Trade Registry database provided by the Stockholm International Peace Research Institute (2022). The following results in Figure 2 shows the spread of nuclear weapons around the world from 1950-2021. It is important to note here that the Soviet Union was responsible for nuclear transactions from 1950 until its collapse in 1991and was responsible for the 47 of the 48 transactions reported by Russian authorities. Additionally, Figure 2 displays transactions to East Germany until the collapse of the Berlin Wall in 1989.

Figure 2.

Nuclear Weapons Transfers 1950-2021



The data provided in Figure 2 shows Germany received the majority of weapons sales totaling 1,386 total nuclear weapons provided strictly by the United States. Of the 1386, 30 of those transactions included a F/A-18A Super Hornet FGA Aircraft Nuclear Bomber provided in the year 2020. The remainder occurred between 1958 and 1978 in response to the Russia and United States nuclear race. It is important to note that many of these countries provided nuclear weapons under these transactions are not considered nuclear states. Rather, the transaction is completed on the ideology that the country will host the nuclear weapon, but the weapon will remain under control of the selling entity (Stockholm International Peace Research Institute, 2022).

Table 1 affirms the connections between the seller and buyer, displaying the number of transactions completed and those responsible for the buying and selling of weaponized material.

Table 1.

Buyers and Sellers of Weaponizable Nuclear Material

BUYER/SELLER	**# TRANSACTIONS**
BELGIUM	**3**
UNITED STATES	3
BRAZIL	**2**
FRANCE	2

BULGARIA	**9**
SOVIET UNION	9
CANADA	**2**
UNITED STATES	2
CZECHOSLOVAKIA	**7**
SOVIET UNION	7
DENMARK	**2**
UNITED STATES	2
EAST GERMANY	**11**
SOVIET UNION	11
FRANCE	**2**
UNITED STATES	2
GERMANY	**8**
UNITED STATES	8
GREECE	**2**
UNITED STATES	2
HUNGARY	**7**
SOVIET UNION	7
INDIA	**3**
RUSSIA	2
SOVIET UNION	1
ISRAEL	**2**
FRANCE	2
ITALY	**3**
UNITED STATES	3
NETHERLANDS	**4**
UNITED STATES	4
NORWAY	**2**
UNITED STATES	2
POLAND	**7**
SOVIET UNION	7
ROMANIA	**6**
SOVIET UNION	6
UNITED KINGDOM	**8**
UNITED STATES	8
Grand Total	**90**

In total, 90 transactions of nuclear weapons between 1950 and 2021 have been reported. Even though the United States has provided the largest quantity of these weapons, the Soviet Union before its collapse in 1991 was responsible for approximately 52% of total transactions completed. Since 1988, Russian authorities have only reported 2 transactions, both singular sales of nuclear submarines provided to India in 2004 and 2019.

What is lacking in Figure 2 and Table 1 however, is a strategic effort at solidified reporting requirements on a global scale. In essence, this data supports Arbatov's 2017 assertions

that the United States and the Soviet Union became an extreme focal point, establishing policies to guide these countries through a dangerous nuclear power struggle. This included reporting requirements not only of certain transactions, but placement of these nuclear arsenals around the globe (Arbatov, 2017). This is shown in Table 2 provided by data collected from the Nuclear Threat Initiative Database (2022) where we see an exponential growth in nuclear power states. As previously discussed, a nuclear power state is one who has not only created a nuclear weapon but has also tested and made known their nuclear weapon power and intentions (Morgan & Williams, 2018; Zartner, 2010).

Table 2.

Succession of Nuclear Power States

COUNTRY	YEAR	WEAPONS PROGRAM	GAINED ABILITY FROM CRIMINAL SOURCES	TYPE OF CRIMINAL ACTIVITY
GERMANY	1940	YES	NO	NONE
GREAT BRITAIN	1940	YES	NO	NONE
UNITED STATES	1942	YES	NO	NONE
RUSSIA	1946	YES	YES	CLASSIFIED DOCUMENT EXCHANGE
FRANCE	1960	YES	NO	NONE
CHINA	1964	YES	NO	NONE
SOUTH AFRICA	1969	YES	NO	NONE
PAKISTAN	1972	YES	NO	NONE
INDIA	1974	YES	NO	NONE
IRAQ	1982	YES	NO	NONE
NORTH KOREA	2002	YES	YES	PAKISTAN BLACK MARKET
LIBIYA	2002	ATTEMPTED	YES	PAKISTAN BLACK MARKET
IRAN	2003	YES	YES	PAKISTAN BLACK MARKET
EGYPT	2005	URANIUM EXPERIMENTS	NO	NONE
SYRIA	2006	ATTEMPTED	UNKNOWN	PAKISTAN BLACK MARKET SUSPECTED

Table 2 shows a succession of nuclear power states in four nuclear shifts. From 1940-1945, Germany, Great Britain, and the United States all advanced technology in the realms of nuclear weapons as the struggle to win World War II was at its peak and Germany's desire for world domination became the focal point of many strategic decisions. In response to the United States dropping the nuclear bombs on Japan, Russia steamed ahead to create a nuclear arsenal to assure the balance of power, stealing confidential documents from the United States to set up its own nuclear weapons program. France, China, South Africa, Pakistan, India, and Iraq founded nuclear weapons programs during the United States and Russia (former Soviet Union) Cold War that lasted from 1947-1991. North Korea, Libya, Iran, Egypt, and Syria founded their weapons program following the September 11, 2001 Terrorist Attacks and the initiation of the global War on Terror with the first airstrike conducted on Afghanistan on October 7, 2001. In short, Table 2 shows that global destabilization is an important key in the growth of nuclear arsenals and nuclear power states. In addition, Table 2 shows that black market organized crime became a large component for nations looking to gain a foothold in the nuclear power regime in the fourth succession beginning in 2002, displaying a movement towards vertical proliferation efforts of weaponized nuclear power.

Exploiting Global Destabilization

In support of the Stockholm International Peace Research Institute (2022), the National Atomic Archive (2022) provides well-rounded insights into the dangers of transporting nuclear weapons and nuclear material around the world. According to the National Atomic Archive (2022), these incidents are known as Broken Arrows and are comprised of missing, recovered, destroyed, and unrecoverable nuclear weapons and material including plutonium and uranium sources that are not yet placed in weapons, however enough material would give a holder the

ability to weaponize. Regarding this data set, unrecoverable means that the source and or weapon has been located and is being monitored until increase in technology efforts can allow for a safe recovery.

Figure 3.

Broken Arrows 1950-2003

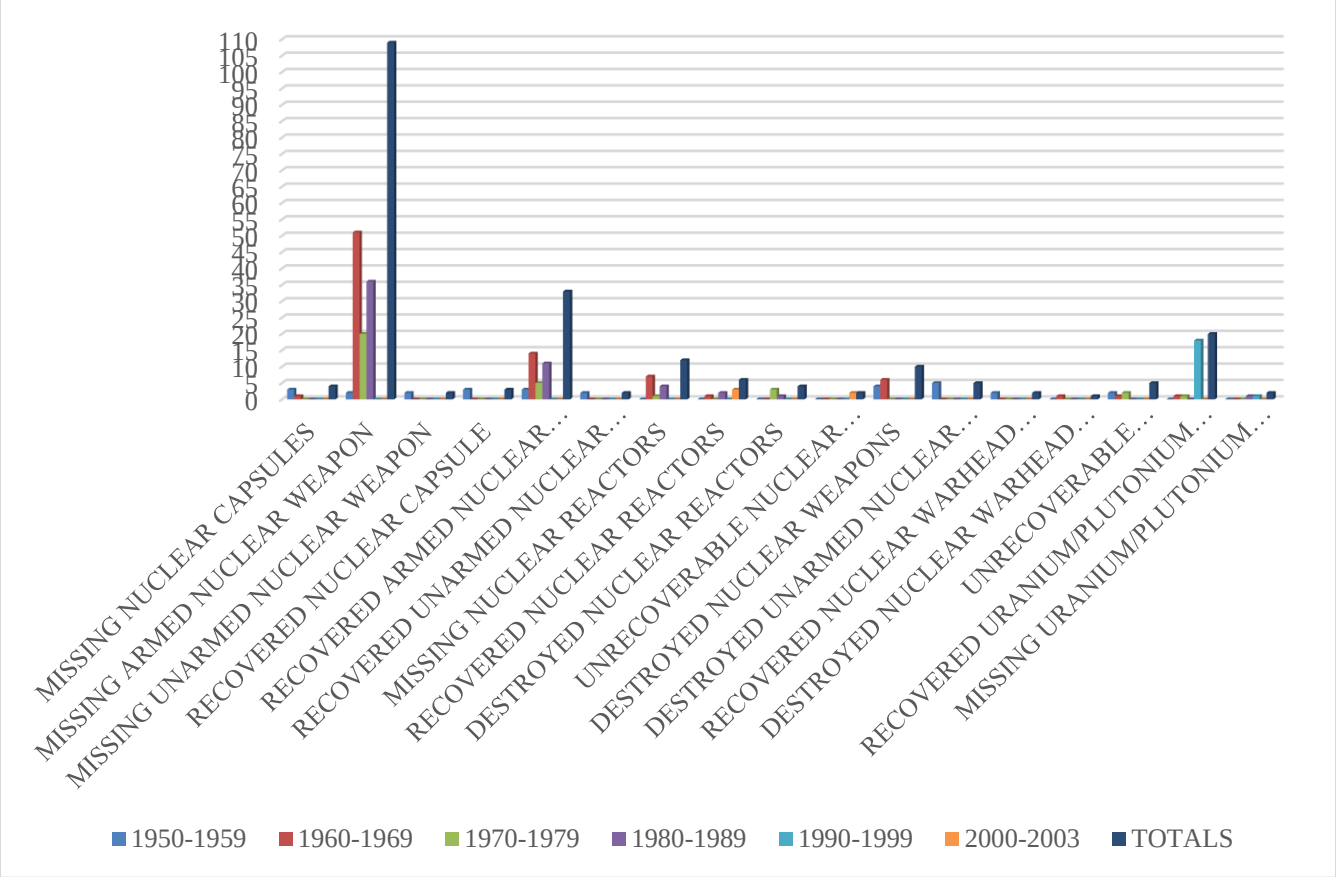


Figure 3 shows support that only 30% of missing nuclear weapons from these nuclear accidents have been recovered and 9% were destroyed on impact during the Broken Arrow incidents between 1950 and 2003. The majority of nuclear weapons, components, and material went missing from 1960-1969, a direct correlation to the growth of France, China, and South Africa nuclear weapons programs as displayed in Table 2. 1980 showed the second most accounts of missing nuclear weapons, an alignment with the growth of the nuclear weapons program of Iraq,

and 1970-1979 came in third with the growth of Pakistan and India weapons program. In addition, from 1990-1999, Figure 3 shows Uranium and Plutonium Source Material recovered at 20 incidents despite only showing 2 incidents in which the sources were reported missing from 1980-1999. This suggests plutonium and uranium sources recovered were either unaccounted for at a nuclear facility or limited security allowed the material to be accessible.

Black Market Dealing

The International Atomic Energy Agency (IAEA) (2022) and the CNS Global Incidents and Trafficking Database (2022) provide opportunities for nuclear nations to report missing and found nuclear material, especially from criminal sources. The following table is a representation of the data provide by the IAEA explicit to Special Nuclear Material missing or found from 1990-2009. Amounts of the material are shown in kilograms (kg) except for low enriched uranium which is shown in the measure of pellets. All other numbers represent the number of incidents reported and NR is defined as none reported. Insider is defined as an employee of a nuclear plant whereas an outsider is defined as a non-employee. An individual is defined as a singular person looking for a buyer whereas group is defined as two or more. A criminal network is defined as a criminal organization trafficking the special nuclear material.

Table 3 shows the most incidents of special nuclear material being reported between 1990 and 1999. 6 known recoveries of nuclear material were stolen by an employee of a nuclear site with access to special nuclear material in which 2 of those individuals did not yet have a buyer or a way to move the product. The remaining 4 incidents involving an employee theft was connected to a criminal organization with a buyer in mind, but undetermined by the recovering agency.

Table 3.

Nuclear Smuggling Incidents (IAEA Database)

NUCLEAR SMUGGLING INCIDENTS IAEA	1990-1999	2000-2009	TOTAL
INDSIDER	6	1	7
OUTSIDER	4	3	7
INDIVIDUAL	2	NR	2
GROUP (UNKOWN CRIMINAL TIES)	4	3	7
UNKNOWN	NR	1	1
CRIMINAL NETWORK	3	NR	3
UNATHORIZED POSSESSION/INTENT UNKNOWN	1	4	5
AMOUNT ENRICHED UNRANIUM RECOVERED (KG)	9.6004	0.9	10.5004
AMOUNT LOW ENRICHED URANIUM RECOVERED (PELLET)	120	0.0008	120.0008
AMOUNT OF NATURAL URANIUM RECOVERED	NR	0.002	0.002
AMOUNT PLUTONIUM RECOVERED (KG)	16.26144	0.909201	17.17064
OTHER NUCLEAR SOURCE MATERIALS RECOVERED (KG)	3628.74	NR	3628.74
RECOVERED SNM AMOUNT NOT YET REPORTED	NR	1	1
KNOWN SOURCE PROVIDER	20	1	21
UNKNOWN SOURCE PROVIDER	6	6	12
RECOVERED MATERIAL REPORTED LIMITED INFO PROVIDED	15	5	20

According to the United States Nuclear Regulatory Commission (2022), in order to weaponize a nuclear bomb, a rogue entity must possess at least 20 kg of enriched uranium or 876 pellets of low enriched uranium to be processed into highly enriched uranium in order to be considered special nuclear material. In addition, 4 kilograms of plutonium or 9 kilograms of highly enriched plutonium would need to be acquired to weaponize a nuclear weapon (United States Department of Energy, 2022). According to Table 3, 1990-1999 showed enough plutonium collected from the smuggling incidents to make 2-4 nuclear weapons and half the amount collected of uranium

to provide the ability to make a fully capable nuclear weapon. In addition, the IAEA reported 3,628.74 kg of other nuclear source material, enough to make several “dirty bombs” in a coordinated radiological attack. Of this 3628.74 kg found, 20 incidents involved a determination of the originating facility of the source and 6 incidents could not determine a source owner. In addition, 15 incidents were reported to the IAEA failed to provide sufficient information on type, owner, or trafficker of the reported recovered material. Lastly, Table 2.0 shows a significant decrease in IAEA trafficking reports, suggesting a more productive nuclear security infrastructure.

The Center for Nuclear Security (CNS) Global Incidents and Trafficking Database (2022) provides similar information in Table 4 from 2013 to 2018. Some additional information included terrorism incidents, missing natural uranium, and incidents where the material was lost during transportation efforts (CNS Global Incidents and Trafficking Database, 2022).

Table 4

Nuclear Smuggling Incidents (CNS Database)

NUCLEAR SMUGGLING INCIDENTS (CNS)	2013	2014	2015	2016	2017	2018
INDSIDER	NR	NR	NR	NR	NR	NR
OUTSIDER	3	1	3	NR	NR	NR
INDIVIDUAL	1	NR	2	NR	NR	NR
GROUP (UNKOWN CRIMINAL TIES)	1	1	NR	NR	4	NR
UNKNOWN	NR	1	NR	1	3	3
CRIMINAL NETWORK	NR	NR	2	NR	NR	NR
TERRORISM	1	1	NR	NR	NR	NR
UNATHORIZED POSSESSION/INTENT UNKNOWN	1	NR	3	1	NR	3
AMOUNT ENRICHED UNRANIUM RECOVERED (KG)	NR	1.5	0.0997	NR	NR	NR
AMOUNT LOW ENRICHED URANIUM RECOVERED (PELLET)	NR	NR	NR	NR	NR	NR
AMOUNT OF NATURAL URANIUM RECOVERED (KG)	1.5	NR	NR	NR	NR	NR

AMOUNT OF HIGHLY ENRICHED URANIUM MISSING	NR	0.0041	1.8	NR	0.014	NR
AMOUNT OF NATURAL URANIUM MISSING (KG)	NR	39.916	NR	NR	NR	NR
AMOUNT WEAPONIZABLE CAPABLE NOT SPECIFIED IN REPORT	1	NR	NR	1	NR	2
AMOUNT PLUTONIUM RECOVERED (KG)	NR	NR	0.007	NR	NR	NR
AMOUNT OF PLUTONIUM MISSING	NR	NR	NR	NR	0.0001	NR
OTHER NUCLEAR MATERIALS RECOVERED	0.18	NR	NR	NR	NR	NR
OTHER NUCLEAR MATERIALS MISSING	NR	NR	NR	1	1	1
RECOVERED SNM AMOUNT NOT YET REPORTED	NR	NR	1	NR	NR	1
MISSING SNM AMOUNT NOT YET REPORTED	NR	NR	NR	NR	NR	1
KNOWN SOURCE PROVIDER	NR	NR	1	1	1	2
UNKNOWN SOURCE PROVIDER	4	1	4	NR	1	1
AMOUNT OF RECOVERED URANIUM NOT SPECIFIED	NR	NR	NR	NR	NR	1
AMOUNT OF RECOVERED PLUTONIUM NOT SPECIFIED	NR	NR	NR	NR	1	1
LOST IN TRANSIT	NR	NR	NR	1	NR	2

According to Table 4, 2013 incorporated 3 incidents in which a non-employee attempted to remove nuclear material and 1 of those incidents involved a group of individuals attempting to acquire weaponizable material for a terrorist organization. However, the amount recovered was not specified (CNS Global Incidents and Nuclear Trafficking Database, 2022). A similar incident occurred in 2014 in which 1.5 kg of highly enriched uranium and 39.916 kg of natural uranium with the capability to be enriched to weaponized levels. Though not sufficient to produce a high velocity nuclear blast according to the United States Nuclear Regulatory Commission (2022), its acquisition supports assertions of terrorist interests brought forth by Zartner (2010), MacCalman (2016), Rezai (2017), Ackerman and Jacome (2018), and Naseer and Ameen (2020). Additionally, singular incidents in 2013 and 2014 where special nuclear material was either recovered or being sold to a terrorist organization further reaffirm the terrorist interest (CNS Global Incidents and Nuclear Trafficking Database, 2022). Furthermore, the CNS Global

Incidents and Nuclear Trafficking Database (2022) reported the year 2015 included two incidents in which an organized criminal network was involved in the trafficking of nuclear material including both uranium and plutonium sources up for sale to an unknown candidate, supporting conclusions made by MacCalman 2016), Zaitsivia (2017), and Mallard (2018) that a fragile, but evident connection between organized crime and the proliferation of nuclear material exists. Furthermore, 2016 to 2018 showed no reports of thefts from nuclear facilities, however the CNS Global Incidents and Nuclear Trafficking Database (2022) report indicates that 3 incidents within this time frame involved losing small amounts of special nuclear material while in transit. Two of those reports failed to acknowledge a figure amount of special nuclear material lost. Unfortunately, there is no determination on whether this lost special nuclear material was linked to an organized criminal group or terrorist organization and remains missing (CNS Global Nuclear Trafficking Database, 2022).

United States Criminal Reporting

Currently, the United States does not retain an active publicly available database on the sabotage, theft, and recovery of special nuclear material. According to the United States Nuclear Regulatory Commission (2022), the International Atomic Energy Agency (2022), and the CNS Global Incidents and Trafficking Database (2022), requirements for reporting missing or found nuclear material is optional on the public sector level. With that said, Table 3 was drawn from court cases published by the United States Department of Justice (2022) and provides an overlook of special nuclear material related cases divided by city and state within the United States. In addition, Table 5 shows the destination in an effort to connect organized crime to state sponsors and terrorism incidents as addressed by Drame et al (2016), Stephenson (2016) MacCalman (2016), Zaitsivia (2017), and Mallard (2018). Furthermore, the chart has been

highlighted green showing the use of Front Companies to export material to a designated nuclear power country (United States Department of Justice, 2022). Lastly, orange represents a highly linked Russian Organized Crime group linked under the same case that additionally utilized Russian Front Companies to launder money to purchase and move United States and Canadian Uranium for the growth of the Russian nuclear weapons program (United States Department of Justice, 2022). Lastly, yellow represents a case in which an American Financial Investor was prosecuted for the teaching and set up of cryptocurrency black market to Northern Korea officials that has allotted for their continued growth in the nuclear weapons regime (United States Department of Justice, 2022).

Table 5.

Criminal Efforts in Nuclear Proliferation Since 2009

YEAR	CITY	STATE	DESTINATION	BLACK MARKET	ORGANIZED CRIME	TERRORISM	CRIMINAL CHARGE
2009	OAK RIDGE	TN	FOREIGN GOVERNMENT	Yes	NO	NO	SELLING OF SNM RESTRICTED DATA
2010	MIAMI	FL	IRAN	YES	NO	NO	SELLING OF SNM RELATED MATERIAL
2010	LOS ALAMOS	NM	VENEZUALA	YES	NO	NO	SELLING OF SNM RESTRICTED DATA
2015	CHEVY CHASE	MD	RUSSIA	YES	YES	NO	WIRE FRAUD MONEY LAUNDERING FOR SNM MATERIAL
2015	YORKTOWN	VA	EGYPT	YES	NO	NO	SELLING OF SNM RESTRICTED DATA
2016	ARLINGTON	VM	UNDER INVESTIGATIO N	UK	UK	UK	STORED CLASSIFIED DOCUMENTS W/O AUTHORIZATION
2017	EASTERN	TN	CHINA	YES	YES	NO	CONSPIRACY TO UNLAWFULLY PRODUCE AND DEVELOP SNM OUTSIDE US

2017	WOODSIDE	NY	IRAN	YES	YES	NO	EXPORT OF SPECIALY METALS AND SNM PRODUCTION MATERIAL
2017	CLOSTER	NJ	RUSSIA	YES	YES	NO	MONEY LAUNDERING FOR SNM MATERIALS
2019	MOUNT AIRY	MD	RUSSIA	YES	YES	NO	WIRE FRAUD MONEY LAUNDERING FOR SNM MATERIAL
2020	CHICAGO	IL	PAKISTAN	YES	NO	NO	SELLING OF EQUIPMENT FOR GROWTH OF NUCLEAR WEAPONS PROGRAM
2020	LOS ANGELES	CA	CHINA	YES	YES	NO	TRANSFER OF US SNM SOFTWARE
2020	UNITED STATES	N	PAKISTAN	YES	YES	NO	SELLING OF SNM RESTRICTED DATA/EQUIPMENT FOR GROWTH OF NUCLEAR WEAPONS PROGRAM
2021	HAWAIIAN ISLANDS	HW	NOT APPLICABLE	NO	NO	NO	BANK FRAUD FALSE ACCOUNTABILITY STATEMENTS LOSS OF NUCLEAR MATERIAL
2021	JEFFERSON COUNTY	WV	FOREIGN GOVERNMENT	YES	NO	NO	SELLING OF SNM RESTRICTED DATA
2022	SOUTHERN	NY	NORTH KOREA	YES	YES	NO	PROVIDING BLACK MARKET CULPABILITY FOR GROWTH OF NUCLEAR WEAPONS PROGRAM

According to Table 5, 87.5% of individuals charged by the Department of Justice were involved in the selling of special nuclear material resources including, but not limited to restricted data, SNM specified equipment, plans, and United States specified SNM development procedures through the form of the black market (United States Department of Justice, 2022). It is important to note here that table 3.0 shows no current support to terrorist organizations and favors a heavy black market between individual and international government sponsored initiatives. In addition, Table 5 supports findings brought forth by Drame et al (2016), Stephenson (2016) MacCalman (2016), Zaitsivia (2017), and Mallard (2018), all claiming that the black market for special

nuclear material is very much alive, and precautions and initiatives should be addressed to counter such proliferation actions between state sponsored and individual groups and or people.

The Terrorist Interest

To this date, there is no record of a nuclear attack conducted by a terrorist organization (Federal Bureau of Investigation, 2022). Despite this fact, the ability for a terrorist group to acquire such weapons has been of keen interest, stimulating annual risk assessments conducted by the Federal Bureau of Investigation (2022), the National Counterterrorism Center (2022), and several Universities assisting the Department of Homeland Security and the Federal Bureau of Investigation in data collection (University of Maryland, 2022). In addition, the CNS Global Incidents and Trafficking Database (2022) reported military efforts had recovered SNM documents from the homes of leaders of the Al Qaeda terrorist organization that included instructions and blueprints on how to make a devastating nuclear bomb as shown in Table 4.

To assess for the risk of potential terrorist nuclear weapon acquisition data was collected from the University of Maryland Terrorism Database (2022) that was created to assist United States government officials in the tracking and prevention of terrorism and is represented in Table 6 and Figure 4.

Table 6

Terrorist Attack Preferences from 1970-2020

TERRORIST ATTACK	**1970-2020**
Insurgency/Guerilla Action	28803
Other Crime Type	4026
Intra/Inter-group Conflict	1436
Lack of Intentionality	506

State Actors	478
Unknown Actor	1
Grand Total	**35250**

Figure 4.

Terrorism Attacks 1970-2020

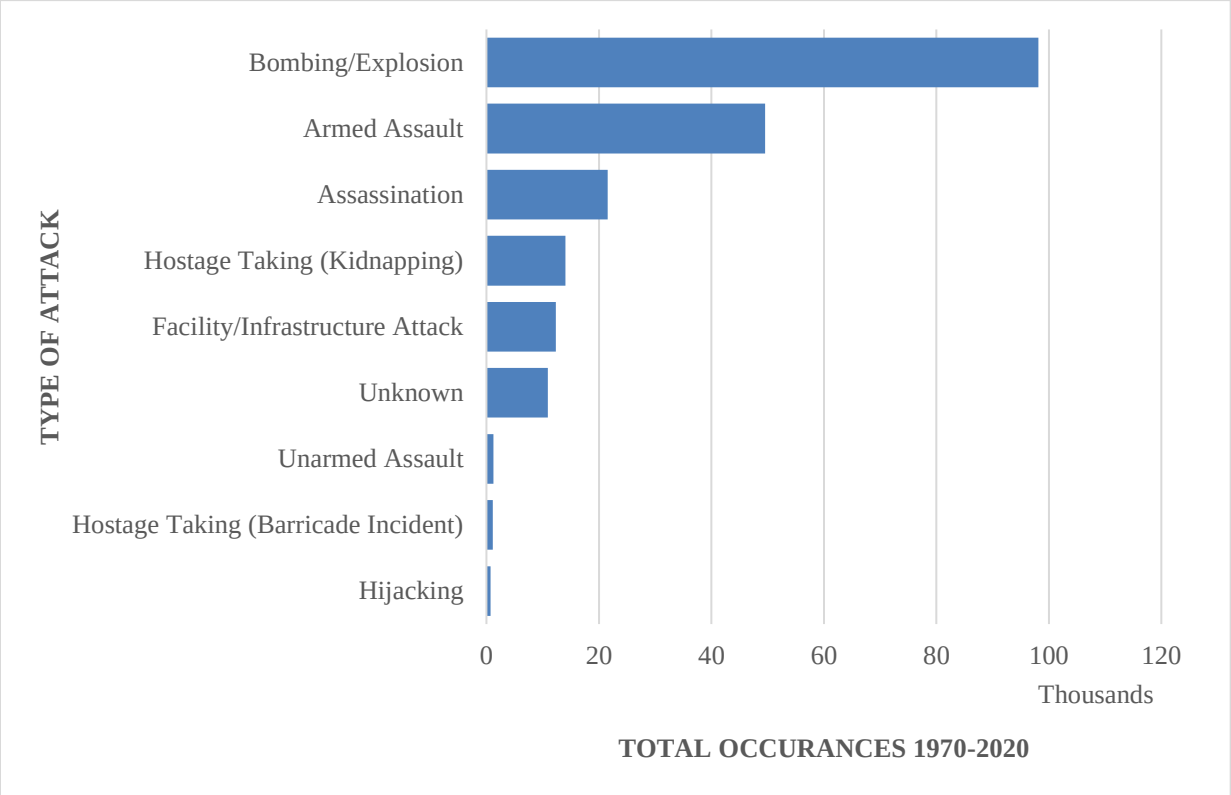
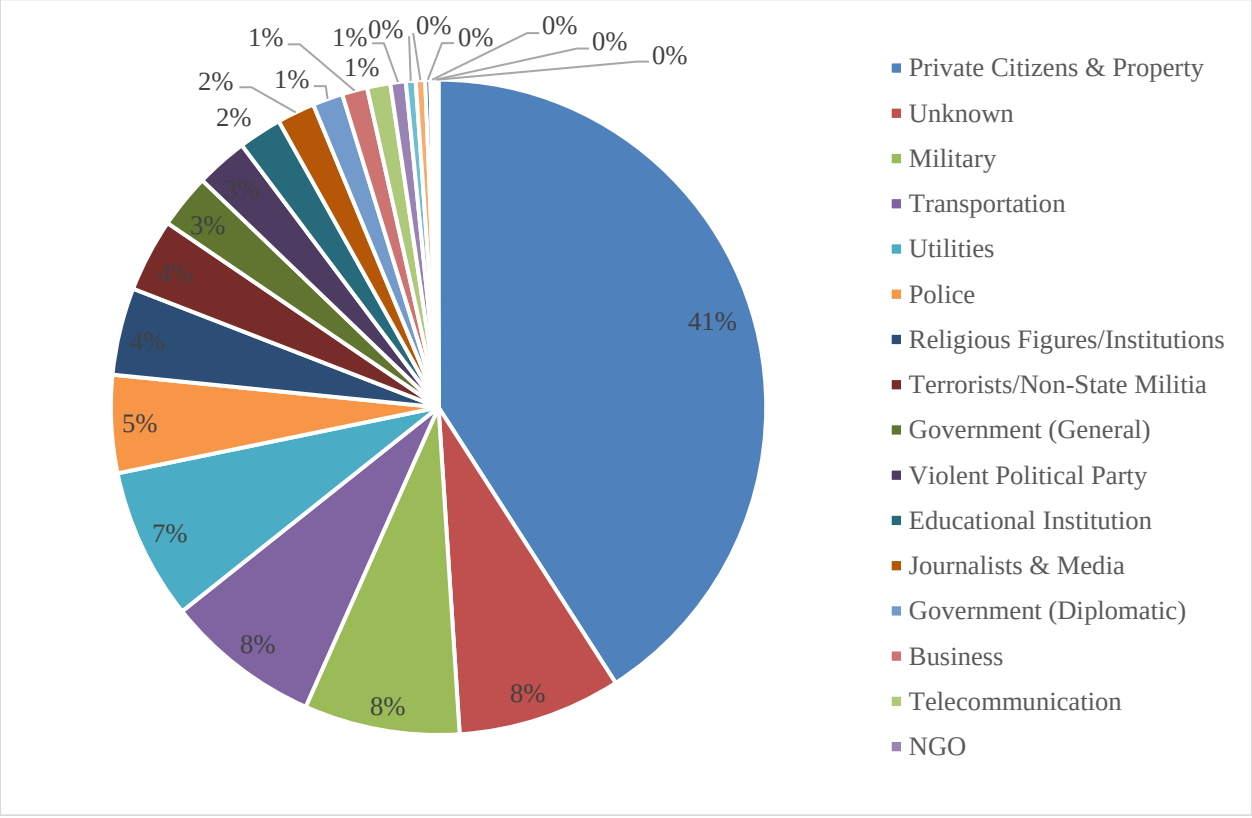


Table 6 and Figure 4 show 81.7% of terrorist attacks are conducted through insurgent and guerilla action in which 47% of terrorist missions incorporate bombings and other explosive devices, supporting the theory that terrorist groups would have a keen interest in implementing a nuclear bomb attack. As previously discussed however, current data shows very little interest by these groups to acquire the material. Yet, Table 6 shows that 1.3% of terrorist attacks from 1970-2020 was conducted by State Actors. This correlates to Table 3.0 where 75% of criminal charges

were connected to the sale of special nuclear material, its components, restricted data, and software to outside nations. This not only shows the ability for a terrorist organization to acquire special nuclear material, but the ability and opportunity for the group to deploy such a weaponized material. In addition, it is important to note that from 1970-2020, 5.8% of terrorist attacks have been conducted on critical infrastructure. This is supported in the following Figure 5 where the public, military, and transportation sectors show the highest amount of confirmed terrorist action.

Figure 5.

Critical Infrastructure and Terrorist Attacks



Although the data only supports a 1.3% chance that a terrorist organization would gain hold of a weaponized nuclear weapon from its governing body, that 1.3% chance has a 41% chance of

striking the private citizens and their individual property of the United States. In addition, an 8% chance to strike the military and transportation sector and a 7% chance to strike a utility sector would cause sever debilitating effects around the nation.

Summary

Long has the data on nuclear proliferation been stuck in an armament vs disarmament argumentative stage. In retrospect, this gives individuals a sense of ease knowing that nuclear bombs are being taken out of their backyard and destroyed. However, as seen with the data presented here, nuclear proliferation is inevitable. State organized buying and selling of material for economic gain and a strategic foothold has opened many doors to the movement of special nuclear material. The data supports that the true number of nuclear materials that may be weaponized is simply unknown. As such, there exists a positive correlation between global destabilization and the growth of nuclear power states. This in turn causes movement of nuclear material and, at times, unavoidable Broken Arrow Nuclear Accidents in which 70% of special nuclear material is unaccounted for to this day. This opened the Black-Market commodity special, allowing for large amounts of nuclear material to be moved globally. Data supports the key interest of these actors to steal material and find a buyer. Though there currently is not a high terrorist connection involved, the sale to foreign government agencies and state actors puts the nation at risk for a localized and devastating terrorist attack on a key critical infrastructure.

CHAPTER FIVE: CONCLUSION

Overview

The purpose of this study was to establish a comprehensive qualitative analysis of the proliferation capabilities of organized crime groups and terrorist organizations explicit to that of nuclear material and establish an impact threat assessment to United States critical infrastructures. Using a qualitative exploratory design model, the study attempted to combine this information and provide a strategic analysis on the relationship between organized crime groups and terrorist organizations and the nuclear threat they pose to the United States to open discussion to a legitimate Homeland Security initiative that will be able to address such threats strategically and effectively.

RQ 1: What are the relationships, if any, between the black market, terrorist groups, organized crime syndicates, and the illegal distribution of nuclear material?

RQ 2: What impact, if any, does the distribution of nuclear material from these illegal organizations have on United States Critical Infrastructure and Key Resources?

Summary of Findings

Long has the data on nuclear proliferation been stuck in an armament vs disarmament argumentative stage. In retrospect, this gives individuals a sense of ease knowing that nuclear bombs are being taken out of their backyard and destroyed. However, as seen with the data presented here, nuclear proliferation is inevitable. State organized buying and selling of material for economic gain and a strategic foothold has opened many doors to the movement of special nuclear material. The data supports that the true number of nuclear materials that may be weaponized is simply unknown. As such, there exists a positive correlation between global destabilization and the growth of nuclear power states. This in turn causes movement of nuclear

material and, at times, unavoidable Broken Arrow Nuclear Accidents in which 70% of special nuclear material is unaccounted for to this day. This opened the Black-Market commodity special, allowing for large amounts of nuclear material to be moved globally. Data supports the key interest of these actors to steal material and find a buyer. Though there currently is not a high terrorist connection involved, the sale to foreign government agencies and state actors puts the nation at risk for a localized and devastating terrorist attack on a key critical infrastructure.

Discussion

Status of Nuclear Arsenals

When addressing anything nuclear, it is important to address the status of nuclear arsenals on the global scale. With that said, it is important to note that world nuclear agreements do not necessarily require a nation to report its stockpile levels. Following the Cold War, Russia and the United States were under this strict reporting requirements whilst countries such as France, China, United Kingdom, Israel, Pakistan, India, and North Korea have yet to report any deployed nonstrategic nuclear weapon possibilities as shown in the data above. With that said, the data has a certain skew, showing that 90% of the nuclear states arsenals simply belong to Russia and the United States. With that said, the data supports a skew in the horizontal proliferation efforts of nuclear nations. As previously defined, horizontal proliferation is understood as the ambition of a particular party to possess a nuclear arsenal through indigenous efforts which occurs in three phases: exploration, pursuit, and acquisition (Larres & Wittlinger, 2020; Schofield, 2014). The misconception of true nuclear arsenal numbers due to the no-need to report requirement of other nuclear states is responsible for the skew in nuclear transactions. This is exemplified by the data provided in nuclear sales from 1950-2021, displaying Russia as a prime contractor of nuclear weapons sales, totaling 52% of all global nuclear sales. However, this number of sales were all

prior to 1991 before the Soviet Union collapse and since, Russia has only been responsible for two known nuclear weapons sales. In addition, the data shows the United States overall has been labeled as the highest selling nation over the 71-year period. However, without the true intake and out-sale numbers of other Nuclear States, a true formation of data regarding the movement of special nuclear material in a horizontal proliferation capacity cannot truly be understood. Currently, the data supports a growth in vertical proliferation efforts, especially since the global War on Terror was announced following the September 11, 2001 Terrorist Attacks. As previously defined, vertical proliferation is understood as the selling and redistribution of Nuclear material via Nuclear States to illegal entities or illegal entities to Nuclear States in order to increase local stockpiles, improve a weapons technical sophistication and reliability, and develop new weapons (Sidel & Levy, 2007). In retrospect, the data supports the growth of the nuclear weapons programs located in North Korea, Libya, Iran, Egypt, and Syria during this time of global destabilization using the black market and criminal enterprise.

Nuclear Accidents and Missing Material

Broken Arrow incidents found through the National Atomic Archive (2022) account for 61% of missing special nuclear material. From 1960-1969, the data supports a correlation between this missing nuclear material and the exponential growth of the nuclear weapons programs in France, China, and South Africa, putting into question the legality of these Nuclear States acquisition of such material (National Atomic Archive, 2022). In addition, from 1970-1979, India and Pakistan made it onto the nuclear power states scale and in 1980, the data shows a growth of the Iraqi nuclear weapons program (National Atomic Archive, 2022). This correlates directly with incidents in which Uranium and Plutonium Source Material were discovered in 20 international sting operations despite only having two incidents in which this material was

reported missing, suggesting plutonium and uranium sources recovered were either unaccounted for at a nuclear facility or limited security allowed the material to be easily reached (International Atomic Energy Agency, 2022). Overall, this data supports Unal (2019) and Drame et al's., (2016) assertions that the nuclear security infrastructure is highly subject to weakness exploited by those who want to gain control of special nuclear material.

It is of great concern when the ease of the availability of special nuclear material with the culpability to be weaponized is brought into the light. As previously discussed, the United States Nuclear Regulatory Commission (2022) has provided substantiated numbers of necessary material to create a weaponized nuclear bomb that includes the requirement of at least 20 kg of enriched uranium or 876 pellets of low enriched uranium to be processed into highly enriched uranium to be considered special nuclear material. In addition, four kilograms of plutonium or nine kilograms of highly enriched plutonium would need to be acquired to weaponize a nuclear weapon (United States Department of Energy, 2022). With that said, from 1990-1999, the data collected through this research reported that international sting operations recovered enough Plutonium to make two to four small nuclear weapons. Although this data does not agree with Stuveve and Fetter's (2017) assertions that there is enough plutonium and uranium missing to build up to ten nuclear weapons, it is vital to note that data does support that half the amount of Uranium that can be utilized to make a full-scale nuclear bomb with the impact rate of the Hiroshima and Nagasaki nuclear strikes is unaccounted for (International Atomic Energy Agency, 2022). In addition, the IAEA (2022), CNS (2022), and the United States Federal Nuclear Regulatory Commission (2022) reported enough nuclear source material recovered and or missing globally that add up enough to make several "dirty bombs" with a capability to be utilized in several coordinated radiological attacks. Of the 3628.74 kg found, twenty incidents

involved a determination of the originating facility of the source and six incidents could not determine a source owner. In addition, fifteen incidents were reported to the IAEA (2022) failed to provide sufficient information on type, owner, or trafficker of the reported recovered material, showing a severe negligence within the nuclear security infrastructure.

The Risk of Negligence

When attempting to determine the impact of nuclear proliferation within the United States itself, the data supported a specialized link between an individual employee either by themselves or as part of a group stealing material from an employer in the hopes to find a buyer (CNS Global Nuclear Trafficking Database, 2022). Of the incidents reported that included a non-employee, three incidents involved a group attempting to steal and sell special nuclear material to a terrorist organization (CNS Global Nuclear Trafficking Database, 2022). In addition, the data shows two incidents in which an organized criminal network was involved in the trafficking of special nuclear material in which the buyer was determined as unknown (CNS Global Nuclear Trafficking Database, 2022). Currently, three incidents in which special nuclear material has been reported as lost in transit and fail to report an amount that cannot be utilized to assess the risk of the loss (CNS Global Nuclear Trafficking Database, 2022). In addition, 87.5% of individuals charged with theft and or sabotage of special nuclear material by the United States Department of Justice (2022) were strictly involved in the selling of special nuclear material resources including, but not limited to restricted data, SNM specified equipment, plans, and US specified SNM development procedures through the form of the black market and front companies, supporting researchers assertions that the black-market commodity trade of special nuclear material is most definitely alive (Drame et al., 2016; Stuneve & Fetter, 2017).

Nuclear Proliferation Concerns

As suggested by Sidel and Levy (2007) and Jo and Garkte (2007) and supported by Volpe's (2017) conclusions, nuclear proliferation and special nuclear material need to be addressed on the scale of a global commodity. As presented by Jo and Gartke (2007) and Volpe (2017), an intricate supply and demand for nuclear materials and even nuclear weapons exist from the most desperate economy to the most prosperous. Paul Avey (2021) supported this matter with his strategy defined as Mutually Assured Destruction (MAD) protocol that allows countries to continue to address and secure their economic and political footholds on the global market. As such, it was no surprise to find that the former Soviet Union was responsible for approximately 52% of all recorded sales of special nuclear material and the United States holds the most transactions as demonstrated by Figure 2 and Table 1. However, as previously discussed, the necessity for the commodity of nuclear material and or nuclear weapons must exist to have power over the economic atmosphere (Arbatrov, 2017; Jo & Gartke, 2007; Terziev et al., 2017, Volpe, 2017). Table 2 supported these assertions, showing a succession of nuclear power in four nuclear shifts: 1940-1945, 1947-1991, 2001, and 2002 (Arms control Organization 2022; Federation of American Scientists, 2022; Stockholm International Peace Research Institute, 2022). The familiarity between these nuclear shifts stands with global destabilization through Warring conflicts and brought rise to the nuclear weapons programs of Russia (former Soviet Union), France, China, South Africa, Pakistan, India, Iraq, North Korea, Libya, Iran Egypt, and Syria as displayed in Table 2, supporting Leverett and Leverette's (2010) and Garlick and Havlova's (2019) assertions that with country and global destabilization, comes the desire to protect a nations remaining economy. In this case, the growth of nuclear power to assure Avey's (2021) MAD protocol to protect the country from the "bigger dog's" that was solidified under the Russian nuclear strategy posed after the United States dropped bombs on Hiroshima and

Nagasaki (Colby, 2020; Countryman & Zagorski, 2018;Kroenig, 2009; Lee, 2020; Selth, 2020; Volpe, 2017). This concept establishes a nuclear weapons power regime, giving a nation a voice in global political and economic stakes that assures that nations long-term success (Arbatrov, 2017; Avey, 2021; Colby, 2020; Lee, 2020).

A countries willingness to assure its' long-term success does not always mean that a legal and contractual path through agreements and policies has been followed (Hill, 2019; Kahn, 2020; Zaitsiva, 2017). As shown in Table 2, Russia (former Soviet Union) gained its ability through stolen classified document exchanges from the United States nuclear weapons program whereas countries such as North Korea, Libiya, Iran, Egypt, and Syria all gained a program through the Pakistan Black Market (Stockholm International Peace Research Institute, 2022). It is vital to remember that this black market was not local to Pakistan, nor was it solely tied to these areas (Mallard, 2018). Other areas of concern of this thriving market that still pushes product today exists in places such as Malaysia, South Africa, Germany, and Switzerland (Mallard, 2018). With that said, Figure 2 which displays the Nuclear Weapons Transfers from 1950-2021 may not show the true amount of special nuclear material and or deployable nuclear weapons within these specified regions (Stockholm International Peace Research Institute, 2022). It is important to note here that within these transactions, it does not mean that a deployable weapon was the primary sale, but a possible delivery system such as the F/A-18A Super Hornet FGA Aircraft Nuclear Bomber, leaving open the door for a black-market weapon to be utilized within the paid for delivery system (Stockholm International Peace Research Institute, 2022). This however, is not the only concern with the black-market group, but rather a part of a combination between underreported missing nuclear material, nuclear accidents resulting in an unknown quantity of special nuclear material available, and a prosperous black-market that looks to prosper through a

high-end sale of special nuclear material, its components, and instructions on how to make and utilize such dangerous weapons (Hill, 2019; Kahn, 2020; Mallard, 2018; Zaitsiva, 2017).

Nuclear Smuggling and the Criminal Enterprise

Figure 3 was created from information provided by the National Atomic Archive (2022) and provides insight into Broken Arrows, nuclear accidents comprised of missing, recovered, destroyed, or unrecoverable special nuclear material from 1950-2003. Most intriguingly, Broken Arrows were found to be in direct correlation to the growth of nuclear power states including France, China, South Africa, Pakistan, India, and Iraq (National Atomic Archive, 2022). In addition, the Atomic Archive (2022) reported 20 incidents connected to a Broken Arrow accident that resulted in the recovery of Uranium and Plutonium Source Material, despite only showing 2 incidents in which the material was missing from 1990-1999. In retrospect, this supports Zaitsiva (2017) and Finckenauer and Voronin's (2016) assertions that the fall of the Soviet Union in 1991 opened the globe up to organized criminal activity and black-market enterprise of special nuclear material. Not only does this show a destabilization of a nuclear powerholder, but also a destabilization of nuclear material control, affirming Zartner (2010), MacCalman (2016) and Novacoff's (2016) concerns of free movement along the global black-market of special nuclear material. Furthermore, this is supported by Table 3 which shows 3 recoveries of nuclear material from an organized criminal network from 1990-1999 in addition to recovering enough special nuclear material to make two to four nuclear weapons and half the amount of Uranium that can be utilized to make a fully capable nuclear weapon (International Atomic Energy Agency, 2022; United States Nuclear Regulatory Commission, 2022). With that said, it is important to note that not only must one have the opportunity to steal and move such material, but the means in which to support the sale of such items (Anderson et al., 2019; Novacoff, 2016; Unal, 2019).

Unal (2019) and Drame et al., (2016) concluded in their studies that organized crime networks are highly adept at identifying security weaknesses in borders and ports and exploiting those weaknesses to smuggle radioactive and nuclear materials. These networks, moreover, have direct connections with local authorities such as government officials, police departments, judiciaries, and intelligence units and use the aspects of corruption as their primary tool to gain access to all sorts of nuclear material (Unal, 2019). This ideology is supported in Table 4 where the CNS Global Incidents and Trafficking Database (2022) in which 2015 showed two incidents in which an organized criminal network was utilized to attempt to smuggle special nuclear material to a prospective buyer. In addition, Table 5 created from court cases provided by the United States Department of Justice (2022) show continued support organized crime concerns as incidents in 2015, 2017, and 2019, show the use of front companies, a strategic way to provide proliferation financing efforts, a major component to terrorism groups weapons acquisitions (Drame et al., 2016).

Addressing the Terrorism Threat

Following the January 2018 Ballistic Missile Threat towards Hawaii, the United States Department of Homeland Security (2021) was given a strict new direction to establish peace, prosperity, and economic growth under Homeland Security Presidential Directive 14 and the SAFE Port Act of 2006. The mandates charged the Department of Homeland Security with the directive to detect and counter a domestic nuclear event. To do so, the Department of Homeland Security (2021) has initiated response protocols under three specific goals; (1) Anticipate, identify, and assess current and emerging WMD threats; (2) Strengthen detection and disruption of Chemical, Biological, Radiological, and Nuclear Event (CBRNE); (3) Synchronize homeland counter-WMD and health security planning and execution. Currently, risk assessments

associated with nuclear devices are closely linked to CBRNE response matrixes as each has the potential to be considered a weapon of mass destruction (Department of Homeland Security, 2021). In addition to this initiative, President Donald Trump signed the Countering Weapons of Mass Destruction Act in 2018, charging the Department of Homeland Security to oversee the detection, forensic, and response to a full-scale nuclear attack on United States soil and oversea assets (U.S. Department of Homeland Security, 2022). To accomplish this mission, the United States Department of Homeland Security established the Countering Weapons of Mass Destruction (CWMD) Office to pull interagency efforts, both nationally and internationally, to adjust and reconstruct today's Global Nuclear Detection Architecture (GNDA) (U.S. Department of Homeland Security, 2021). This includes, but is not limited to, purchasing radiological scanning equipment to be placed at ports and country border lines, funding training to both city and outer city response efforts, and funding and providing radiological and nuclear threat detection equipment and training to United States military branches (Department of Homeland Security, 2021).

To this date, there is no record of a nuclear attack conducted by a terrorist organization (Federal Bureau of Investigation, 2022). However, the CNS Global Incidents and Trafficking Database (2022) reported military efforts recovered SNM documents from the homes of leaders of the Al Qaeda terrorist organization that included instructions and blueprints on how to make a devastating nuclear bomb. As such, an appropriate risk analysis on the terrorist interest was conducted and the data solidified that 81.7% of terrorist attacks are handled through insurgent and guerilla action in which 47% of terrorist missions incorporate bombings and other explosive devices (University of Maryland Terrorism Database, 2022). This in itself supports the theory that terrorist groups would have a keen interest in implementing a nuclear bomb attack if such

materials are provided and determined as an asset to their particular goal (Drame et al 2016; MacCalman, 2016; Mallard, 2018; Stephenson 2016; Zaitsivia, 2017;). Although the data, does not support a terrorist organization gaining control of a devastating nuclear bomb, the amount of special nuclear material missing reported by the United States Nuclear Regulatory Commission (2022), the CNS Database (2022), and the IAEA (2022) support a terrorist ability to supply "dirty bomb" usages in their coordinated attacks. This supports the terrorism concerns of CBRNE use during an attack as advised by Mallard (2018), Stuneve and Fetter (2017), Zaitsivia (2017), Stephenson (2016), and MacCalman (2016).

Although there is very little data in this research analysis showing that terrorist organizations can acquire enough special nuclear material to create a devastating nuclear bomb, it is important to note that the data shows a deep connection between such organizations and State Actors in which 1.3% of terrorist attacks from 1970-2020 was conducted either by State Actors or a terrorist group funded by State Actors (University of Maryland Terrorism Database 2022). This is a direct correlation to 75% of criminal charges within the United States in which the sale of special nuclear material, its components, restricted data, and software to outside nations is of great concern (CNS Global Incidents and Trafficking Database, 2022; United States Department of Justice, 2022; University of Maryland Terrorism Database, 2022). Furthermore, the data shows that 5.8% of terrorist attacks have been conducted on critical infrastructure, showing a high risk to the American public, military, and transportation sectors (University of Maryland Terrorism Database, 2022). Although the data only supports a 1.3% chance that a terrorist organization would gain hold of a weaponized nuclear weapon from its governing body, that 1.3% chance has a 41% chance of striking the private citizens and their individual property of the United States (University of Maryland Terrorism Database; 2022). In addition, an 8%

chance to strike the military and transportation sector and a 7% chance to strike a utility sector would cause sever debilitating effects around the nation (University of Maryland Terrorism Database, 2022).

It is important to reaffirm that a nuclear event is considered a low-probability, high-impact event (Pomper & Tarini, 2017; Zweglinski & Smolarkiewicz, 2019). However, it is also important to note that this complacency allows the United States to be severely underprepared for the low-probability high impact CBRNE events (Chaudry et al., 2020). Gale and Armitage (2018) study reaffirm this concern assuring other researchers that even the smallest nuclear event would have a devastating fallout that would affect over 200,000 people either through death or suffering the effects of nuclear fallout. This simple ill-prepared construct is what leaves the doors open to the plausible 1.3% attack associated with the possibility of nuclear terrorism on a United States Critical Infrastructure found within the current data set (Chaudry et al., 2020; Gale & Armitage, 2018). In addition, it is vital to recognize there will be no fair warning of a nuclear strike from a terrorist organization (Moe et al., 2018). In other words, whether or not a crude nuclear device or even a legitimate nuclear weapon would be caught by the current standards exercised by the Department of Homeland Security remain in question (Mueller, 2010; Rehman, 2012; Volder & Suaer 2016). With 47% of all terrorist activities involving an explosive and or bombing of an area as found by the University of Maryland (2022), scenario specific events regarding a nuclear event need to be taken more seriously and new policies and initiatives need to be established within the Department of Homeland Security framework (Pomper & Tarini, 2017; Zweglinski & Smolarkiewicz, 2019).

Implications

Empirical Implications

Currently, the research supports that the United States nuclear security infrastructure is at high risk for nuclear proliferation efforts through organized criminal exploits as suggested by researchers such as Countryman and Zagorski (2018) and Arbatrov (2017). The United States slow adaptation to addressing the holes within the nuclear security infrastructure has allotted for heavy nuclear proliferation efforts of not only individuals, but also organized criminal networks looking to exploit the money market demand for special nuclear material (Drame et al., 2016; Unal, 2019; Volpe, 2017). Although the Department of Homeland Security (2022) has developed and addressed certain security risks at integral entrances to the country such as ports and airports, this has not stopped the capability of the black-market trade of special nuclear material within the United States boundaries, nor has it deterred the efforts and, at times, the successful divergence of special nuclear material beyond its borders (Mueller, 2010; Pomper & Tarini, 2017; Rehman, 2012; Volder & Suaer 2016; Zweglinski & Smolarkiewicz, 2019).

The current data suggests a unique relationship with state actors and criminal groups explicit to a country's growth in the nuclear regime as suggested by Aldrich and Fraser (2017) and Cho (2021). The flexibility these nuclear states are allotted support Gill (2019) and Holloway's (2019) concerns that nuclear proliferation will continue to rise despite the best efforts put forth to prevent such actions. However, it is important to note that Gill (2019) and Holloway (2019) had limited their scope to that of Russia and the United States, whereas the data supports many more state actors such as Iran, Korea, and China that have unlimited capability to allow for non-state actors to engage with State control of nuclear material as suggested by Kristensen and Norris (2018), Garlick and Havlova (2019), and Mabon (2019). With that said, the Department of Homeland Security needs to create initiatives specific to the state sponsored criminal organizations and terrorist groups under the Global Nuclear Detection Architecture

framework and expand the architecture from just port and border nuclear control to a more advanced strategic global strategy (Department of Homeland Security, 2022; Kitano, 2017; Rezai, 2017; Ruzika; 2017). This strategic effort supports Hill (2017) and Kahn (2020) suggestions to focus nuclear non-proliferation strategies as a balance of hard and soft power strategies and would help to solidify a definition of "risk", a concept shown through to the data to be virtually non-existent as demonstrated by lack of missing nuclear material reporting requirements. In addition, this effort would support Unal (2017) and Drame et al. (2016) concerns in available global weaknesses associated with initiatives under the Global Nuclear Detection Architecture often exploited by strategic organized criminal groups and associated front companies that place American critical infrastructures at high risk to nuclear proliferation efforts by these criminal groups.

Theoretical Implications

Economic and political globalization has continually represented a major challenge to the nature of security and infrastructure for nations around the world (Department of Homeland Security, 2022). The installation of international organized criminal groups that either purchase, steal, or sell commodities associated with unique power holders to destabilized institutions continues to be of utmost concern to a nation's security initiatives (Department of Homeland Security, 2022). For the United States, the concern runs deep with the current insurgence of Russia into Ukraine, upsetting strategic supply chances for food, energy and industrial products, and interrupting the global stock market (Rai & Lane, 2022). In addition, tensions have continued to rise between the United States and China, the United States and North Korea, and the United States and Iran, strategic global trade partners responsible for global critical infrastructure abilities (Acton, 2018; Kimball, 2022; Rai & Lane, 2022). When a government can

no longer rise to the challenge of supporting the population in which it protects, the door swings open to criminal enterprises where the general civilian relies on illegal means to gain security and protection (Gagliano, 2020; Suser, 2017). According to the Federal Bureau of Investigation (2022), this is generally conducted through the illegal trafficking of weapons systems to unstable radicalized groups.

It is important to remember that since 1970, nuclear installations have plagued several bordering countries within the European Union stimulating a battle for nuclear control not only by large government, but also smaller radicalized groups utilizing social media to attempt to establish their prominence on the nuclear power scale (Demirovski, 2018; Kaijser & Meyer, 2018; Sudirman, 2018; Webber & Parthemore, 2019). The simple destabilization of Russia and Ukraine has caused a global domino effect that has placed the world to the closest possible nuclear exchange since the Cold War Missile Crisis (Martin, 2016; Wesley, 2018). In addition, the takeover of the Taliban Terrorist Organization of the country of Afghanistan opens the Middle East nuclear power holders to jihadist organizations with the potential to cause mass destruction to its primary enemy, the United States (Dupee,2018; Joshi, 2020; Verma, 2021). The Department of Homeland Security (2022) has been charged with the initiative to prevent opportunities of terrorist organizations and rogue nations to utilize a weapon of mass destruction on American soil. Through anticipation, identification, and assessment of current and emerging weapons of mass destruction threats, the Department of Homeland Security attempts to strengthen its detection and disruption techniques and to synchronize security protocols and execution to protects its' citizens (Department of Homeland Security, 2022). The data provided in this research has supported such initiative, showing holes in the nuclear security infrastructure both locally and on a global scale, demonstrating organized international criminal efforts and

terrorist organization interests that could give a buying entity the means to either establish or utilize the most dangerous weapons of mass destruction, a nuclear bomb. In addition, the data supports that a rogue entity such as a rogue nation or terrorist group would have extreme intrigue to not follow rules of war, hitting an unpopulated target such as the Russian Nuclear Strategy, but rather having a devastating impact on American critical infrastructure systems that would leave millions of Americans stranded without resources. As such, it is vital for the Department of Homeland Security to speed up and expand beyond just American Soil protection, and identify, assess, and respond to the international global network as a proactive maneuver of prevention.

Practical Implications

Nuclear material poses a significant threat to homeland security, international security, and modes of public safety (Iverson, 2018; Martin & Wesley, 2016). The growth of nuclear stockpiles not only by government agencies, but black-market philanthropists, organized crime syndicates, and terrorist organizations has placed both political and civil strain on a very sensitive global infrastructure (Ackerman & Jacome, 2016; Evans, 2002). The current data explored the qualitative and quantitative data of the illegal movement of nuclear material via organized crime groups and terrorist organizations. These two organizations work in tandem, supporting one another through proliferation financing efforts to establish a small foothold in the nuclear world (MacCalman, 2016; Weber & Parthemore, 2019; Zartner, 2010).

Currently, the United States does not retain an active publicly available database on the sabotage, theft, and recovery of special nuclear material. According to the United States Nuclear Regulatory Commission (2022), the International Atomic Energy Agency (2022), and the CNS Global Incidents and Trafficking Database (2022), requirements for reporting missing or found nuclear material is optional on the public sector level. The data supports that the true number of

missing nuclear material that may be weaponized is simply unknown. As such, there exists a positive correlation between global destabilization and the growth of nuclear power states. This in turn causes movement of nuclear material and, at times, unavoidable Broken Arrow Nuclear Accidents in which 70% of special nuclear material is unaccounted for to this day. With that said, the Department of Homeland Security would benefit from the dissemination and restructuring of nuclear policy that would solidify extreme reporting requirements for all nuclear material. In addition, the reporting requirements parameters should be extensive requiring exact amounts of nuclear material missing and recovered and be captured into a singular nuclear material database with defined parameters of nuclear material concern. Since other nations around the globe are participating in the limited reporting requirements under the NATO agreement, the Department of Homeland Security will be able to increase global communication that may assist in the deflation of international and national nuclear tensions.

Delimitations and Limitations

The boundaries of the study were created around the basis of the definition of special nuclear material. The Atomic Energy Act of 1954 defines special nuclear material (SNM) as plutonium, uranium-233, enriched uranium-233, uranium-235, or any other special nuclear material the Nuclear Regulatory Commission determines to include (USNRC, 2021). In the case of this study, the data was supported strictly by missing and or recovered plutonium, uranium-233, and unranium-235. Sourced material reported missing within the associated documents were ignored as these are defined as material that contains thorium and natural or depleted uranium or the combination of these materials (USNRC, 2021).

Sourced nuclear material in the physical or chemical form includes any portion of these materials at one-twentieth of one percent (.05) or more chemical weight, which does not have the

potential to be weaponized (USNRC, 2021). Since source material does not have the potential to be weaponized, it is not recognized as a potential economic good to an organized criminal group or potential for rogue nation or terrorist group to utilize in a manner to do harm. In addition, it cannot be utilized as any part of a weapon of mass destruction.

The sale of strategic nuclear weapons from country to country were assessed. According to the North Atlantic Treaty Organization (NATO) (2021), the definition of Strategic Nuclear Weapons depends on what country the term is being used. The general rule of thumb is the weapons are intermediate-range weapons with a capability to cover 5500 kilometers. However, the definition is currently undergoing reconstruction to cover air-delivered weapons for NATO's dual-capable aircraft and a small number of United Kingdom Trident warheads in a sub-strategic role (NATO, 2021). Although the sale of the weapon itself does not necessarily include the special nuclear material within, the attraction of one of these items to an organized criminal group to exploit and sell to a competing entity would be of high value.

The manner of the theft of special nuclear material was collected and analyzed from case studies and databases provided by the Public Administration Office (2022), Federal Bureau of Investigation (2022), International Atomic Energy Agency (2022), and the Nuclear Threat Initiative (2022). These documents provided insight into activity composed of either a singular actor or criminal organization, In addition, this information provided vital information in the dissemination purposes of the individuals or criminal groups such as attempted or successful sales of special nuclear material to rogue nations. In addition, these documents gave strategic insight into the proliferation financing culpabilities associated with the proliferation of nuclear material and the connection to transnational organized crime syndicates that practice a highly organized structure that utilizes corruption, violence, and international commerce to maintain

and protect themselves from persecution (United States Department of Justice, 2021). Although weapons sales and recoveries were provided by the Central Intelligence Agency (2022), Federal Bureau of Investigation (2022), and the Department of Homeland Security (2022), these tracks were ignored as they only provided sales of weapons not associated with CBRNE, WMD, or SNM.

Special nuclear material dissemination to terrorist organizations was additionally explored and showed little promise for nuclear material to be associated with such a group other than keen interest. However, due to keen interest, the risk associated with special nuclear material and or a nuclear weapon in the hands of a terrorist organization was explored. Section 2331 of the United States Federal Criminal Code defines terrorism as "the premeditated, politically motivated violence against non-combatant targets by sub-national groups or clandestine agents" either internationally or domestically (Doyle, 2019). The University of Maryland (2022) has developed a unique database tracking all terrorist attacks around the globe since the inception of the concept of terrorism. This database was analyzed concluding that a terrorist organization that gains control of a nuclear device would explicitly target United States Critical Infrastructure and Key Resources (CIKR), posing devastating effects. Critical Infrastructure and Key Resource and is defined as the inventory of the assets, systems, and networks, including those located outside the United States, that make up the Nation’s critical infrastructure network (Knight et al, 2018). In other words, a CIKR is the vital components protected by the Department of Homeland Security (2022) security initiative. National and International business not defined by the Department of Homeland Security (2022) CIKR initiative were ignored to prevent any outliers.

All data provided is publicly accessible and attainable. All information of nuclear material movement and confiscation have been declassified and utilized in various research parameters. However, this has caused limitations in the ability to ascertain a true number of special nuclear material missing within the last three to five years and before 1990. In addition, several documents included inaccurate reporting of information and the ability to ascertain whether the reported material in the incident was source material or special nuclear material could not be ascertained. To balance this limitation, missing source material such as natural uranium was explored in amounts that would be appropriate to eventually enrich and utilize in a weapon of mass destruction system. Though this process is difficult, the data showed a link between this natural sourced material to the growth of nuclear power nations and those interested in developing their own nuclear weapons programs.

Recommendations for Future Research

As suggested by Demorovski, (2018) and supported by Anderson et al., (2018) the data collected in this research study suggests a severe lack of understanding the true threat behind the allowance of free movement of special nuclear material and its weaponizable components. Currently, the world struggles with the resurfacing of nuclear arms as Russia and Ukraine battle for political influence in the NATO world and China continues to increase its nuclear arsenal (Federation of American Scientists, 2022). In addition, the continuation of technological advances has played a significant role in increasing the effectiveness of high violent terrorist organizations and organized criminal groups utilize easy recruitment strategies through the global social media stream that include highly educated individuals within the nuclear engineering and science realm (Anderson et al., 2018; Demorovski, 2018). As terrorist organizations look to become more dominant and recognized through the nuclear atmosphere,

illegal imports and exports and illegal buying and selling of nuclear goods via criminal actions become of great concern (Anderson et al., 2018). The exponential growth of nuclear stockpiles by government agencies, black-market philanthropists, organized crime syndicates, and terrorist organizations has established a true risk to United States critical infrastructure and global assets (Ackerman & Jacome, 2016; Evans, 2002; MacCalman, 2016; Weber & Parthemore, 2019; Zartner, 2010).

Future research needs to move beyond the disarmament and armament stage and focus more strategically on the prevention of future nuclear installations that can create these weapons systems. This includes research involved in the tracking and assessment of nuclear material through a solidified, required reporting database for all institutions involved in handling nuclear material such as nuclear weapons Sites such as Oak Ridge and Pantex, as well as the smallest hospital clinic. In essence, this will allow the Department of Homeland Security to prevent threats to United States CIKR's both nationally and internationally.

Additional research needs to focus on proactive strategies at nuclear proliferation research instead of reactive. This includes research into nuclear security strategies or lack thereof that allow the free movement of special nuclear material that has been found through this research to be a strategic opportunity for the growth of nuclear power states. In addition, this research needs to include solid definitions of criminal organizations and terrorism as well as State-sponsored nuclear growth that was shown to be key to the uptick of the nuclear weapons programs of Pakistan and North Korea.

Summary

Nuclear proliferation is inevitable. Concepts surrounding State organized buying and selling of material for economic gain and a strategic foothold has opened many doors to the

movement of special nuclear material both legally and illegally. The current data brought forth by this study supports that the true amount of nuclear material with the potential to be weaponized is simply unknown. As such, there exists a positive correlation between global destabilization and the growth of nuclear power states. This in turn causes movement of nuclear material and, at times, unavoidable Broken Arrow Nuclear Accidents in which 70% of special nuclear material is unaccounted for to this day.

The Department of Homeland Security (2022) has been charged with the initiative to prevent opportunities of terrorist organizations and rogue nations to utilize a weapon of mass destruction on American soil. The data provided in this research has supported such initiative, showing holes in the nuclear security infrastructure both locally and on a global scale, demonstrating organized international criminal efforts and terrorist organization interests that could give a buying entity the means to either establish or utilize the most dangerous weapons of mass destruction, a nuclear bomb. From a theoretical standpoint, it is vital for the Department of Homeland Security to speed up and expand beyond just American soil protection, and identify, assess, and respond to the international global network as a proactive maneuver of prevention.

The most important implication brought forth through this study is the practical application of special nuclear material tracking. The lack of tracking and solidifying information on this nuclear material suggest the Department of Homeland Security would benefit from the dissemination and restructuring of nuclear policy that would solidify extreme reporting requirements for all nuclear material. In addition, the reporting requirements parameters should be extensive requiring exact amounts of nuclear material missing and recovered and be captured into a singular nuclear material database with defined parameters of nuclear material concern. Since other nations around the globe are participating in the limited reporting requirements under

the NATO agreement, the Department of Homeland Security will be able to increase global communication that may assist in the deflation of international and national nuclear tensions. This will stimulate future research into a strategic nuclear material tracking database and new nuclear local and international government policy that would allow for the strategic tracking and accountability of nuclear material around the globe.

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