University of the Western Cape

Faculty of Economic and Management Sciences

Department of Political Studies

Student Name: **Thembela Krelekrele**

Student no.: **3334825**

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Supervisor: Professor Joelien Pretorius

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Abbreviations

AEB	Atomic Energy Board
AGOA	Africa's Growth and Opportunity Act
ANC	African National Congress
ARMSCOR	Armaments Corporation of South Africa
CIA	Central Intelligent Agency
CTBT	Comprehensive Test Ban Treaty
CPPNM	Convention on the Physical Protection of Nuclear Materials
DIRCO	Department of International Relations and Cooperation
DRC	Democratic Republic of Congo
HEU	Highly Enriched Uranium
IAEA	International Atomic Energy Agency
ICC	International Criminal Court
ICSANT	International Convention on the Suppression of Acts of Nuclear Terrorism
INFCIRC/549	International Atomic Energy Agency Information Circular 549
ISS	Institute of Security Studies
LEU	Low Enriched Uranium
NAM	Non-Aligned Movement
NGO	Non- Governmental Organisation
NNWS	Non-Nuclear Weapon State
NP	National Party
NPT	Treaty on the Non-Proliferation of Nuclear Weapons
NSS	Nuclear Security Summit
NWS	Nuclear weapon states
NWFZ	Nuclear Weapon Free Zone
OAU	Organisation of African Union
P5	Five permanent members of the UNSC

PBMR	Pebble Bed Modular Reactor
RE IPPPP	Renewable Energy Independent Power Producers' Programme
SA	South Africa
SADF	South African Defence Force
SAII	South African Institute of International Affairs
SALW	Small Arms and Light Weapons
SWAPO	South West Africa People's Organisation
TC-99M	Technetium-99m
UANI	United Against a Nuclear Iran
UN	United Nations
UNSC	United Nations Security Council
US	United States

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Abstract

Highly enriched uranium (HEU) is one of the most dangerous materials in the world, because it is a key ingredient in making a nuclear bomb. If a terrorist organisation can get HEU, it would be close to making a nuclear bomb. After South Africa disarmed its nuclear weapons, it kept HEU that was extracted from the nuclear bombs. The US tried to persuade South Africa to blend down its HEU into low enriched uranium (LEU) or give it up for safekeeping. However, South Africa refused to give it up. After a breach at Pelindaba, a national key point facility where South Africa stores its HEU, the US intensified its efforts to pressure South Africa to give its HEU up. It even promised incentives to South Africa should they agree to give it up, but South Africa refused. The US used the nuclear terrorism narrative to justify its initiative to eliminate vulnerable materials in the world. However, South Africa is yet to be swayed. This is odd since South Africa's refusal can negatively affect its credentials as a nuclear non-proliferation and disarmament champion and its image as a norm entrepreneur. The objective of the study was to understand the role played by HEU in South Africa's nuclear diplomacy. It was to explore HEU as a factor in the state's nuclear diplomacy and to understand the power of having HEU in nuclear negotiations, as well as what SA intends to do with its HEU. The study is framed theoretically by drawing on foreign policy theory, namely middle-power theory, and revisionism. It juxtaposed middle power, reformist, and revisionist positions with status quo foreign policy to analyse the role of HEU in South Africa's nuclear diplomacy. As a middle power with a moral high ground, South Africa hoped that it can affect change in the nuclear regime. However, when this did not occur its foreign policy shifted to a revisionist character that is discontent with the status quo in the nuclear regime. SA is dissatisfied with the current nuclear order and wants it revised towards liberal values such as equality and non-discrimination. It views the current nuclear order as nuclear apartheid. Therefore, South Africa uses HEU as leverage against nuclear weapon states in nuclear diplomacy. It is using HEU as an act of defiance against nuclear weapon states (such as the US) that are yet to disarm their nuclear weapons.

Keywords: Highly Enriched Uranium (HEU); Treaty on the Non Proliferation of Nuclear Weapons (NPT); Nuclear Diplomacy; Middle power; Revisionism; *Status quo;* reformism

1. Chapter 1: Introduction and background to the study

1.1 Introduction

In the 1970s, the apartheid government built six and a half nuclear bombs and dismantled them in the early 1990s. After the release of political prisoners negotiations for a democratic dispensation soon commenced. In these negotiations, the African National Congress (ANC) made it clear that its government did not intend to continue with the nuclear weapons program. Thus, after 1994 the ANC government did not rebuild the nuclear weapons program; however, they did not give up highly enriched uranium (HEU) from these bombs either. The US has been persistent in trying to persuade South Africa to give up its HEU but has failed. The South African government argues that it has a right to possess nuclear technologies. The study looks at the role played by HEU in South Africa's nuclear diplomacy. The sections below outline the historical background of the situation that triggers interest in SA's HEU, introduces the research problem, the rationale for the study, explains why it is important that the problem be investigated, and gives details about the gap that this project wants to explore. Additionally, there is a definition of concepts, an outline of the research design, a research methodology and a structure of the thesis.

1.2 Historical background

The genesis of South Africa's nuclear program is in the 1960s. The South African government withdrew from participating in several international organisations. In 1961 South Africa withdrew from the British Commonwealth, and by 1972 it had withdrawn from forty international organisations down to two (Purkitt, Burgess, & Liberman, 2002, p. 3). In 1964, former Prime Minister Hendrick Verwoerd decided against South Africa from participating in negotiations of Treaty on the Non Proliferation of Nuclear Weapons (NPT) in Geneva (Purkitt, Burgess, & Liberman, 2002, p. 3). Likewise, in 1970, B.J Vorster rejected the NPT, announced the creation of the South African Enrichment process, and invited non-Communists states such as the US and Israel to help develop it (Purkitt, Burgess, & Liberman, 2002, p. 3). In the 1960s, liberation movements were on the rise and gaining momentum. From 1961 to 1968, the apartheid government cited the increasing threats from the black guerrilla movements supported by China and the Soviet Union as justification for increasing the defence expenditure (Purkitt & Burgess, 2002, p. 4). This was the psychology - a political belief and a perception of threat from the black guerrilla movement - of the apartheid government leaders who wanted a justification for building nuclear weapons. Thus, in the 1960s the apartheid regime became

ever more militarised. According to Purkitt, Burgess, & Liberman (2002), the US sanctions regime of the late 1970s contributed to South Africa's pursuit of a clandestine nuclear weapons program. After consultations with the chief of the Atomic Energy Board (AEB) in SA, the chief of the South African Defence Force (SADF), head of the cabinet, and after a series of technical successes and proof of sufficient "homegrown" expertise Vorster decided to develop such a program (Purkitt, Burgess, & Liberman, 2002, p. 4).

At first, it was understood that South Africa was developing a nuclear program for commercial use; however, they shifted focus and developed nuclear weapons. Vorster kept the nuclear weapons programme secret to preserve relations between South Africa and the west and to make sure that he does not jeopardise SA's ability to acquire HEU. In the 1970s, South Africa increased its covert relationship with Israel. South Africa built nuclear bombs at a time where it had dramatically increased its cooperation and coordination with Israel, particularly on a secret nuclear and missile-related programme (Purkitt, Burgess, & Liberman, 2002, p. 5).

South Africa built six and a half nuclear bombs. It was isolated from the world community and needed to rely on itself militarily. Therefore, South Africa was not afraid to disobey international law since it was isolated and facing sanctions already (Kornberg, 2017, p. 1). Nevertheless, it is very difficult to pinpoint one reason for the building of the nuclear weapons program. According to F. W. De Klerk (former President), the South African government built these weapons to prevent Soviet expansion. As a result, after the collapse of the Soviet Union, the government dismantled its nuclear weapons (Kornberg, 2017, p. 1). Kornberg argues that South Africa's disarmament was due to the weakening and collapse of the Soviet Union, the removal of Cuban soldiers from Angola, and softening of the global tensions affected the decommissioning of the nuclear weapons program (Kornberg, 2017, p. 3).

In the late 1980s, there was a shift in government leadership, from Botha to F. W. De Klerk. Purkitt & Burgess (2002) argues that in 1986 the US foresaw the effects of the sanctions on the South African government would lead to a rapid change in South African politics. Thus, Washington intensified its pressure on Botha to relinquish the nuclear weapons program. According to Renfrew Christie (2000) on Purkit, Burgess, and Liberman (2002), an expert on the nuclear weapons program, the US "threatened to treat South Africa as a 'hostile nation' to induce disarmament."

In 1989, South Africa dismantled its nuclear weapons program. Thereafter the government released political prisoners in the early 1990s, and negotiations for a democratic South Africa

soon commenced led by Nelson Mandela and F. W. De Klerk. At this time, Afrikaner elites were concerned about the ANC take-over and the uncertainty that will be brought by the transition government (Purkitt, Burgess, & Liberman 2002, p. 5). From 1987 to 1989, the United States exerted pressure on the De Klerk government based on the fear of proliferation that might come with the transitional government and later the ANC led government (Purkitt, Burgess, & Liberman 2002, p. 3). Nevertheless, the ANC made it clear in the negotiations, as it was in their policy, that they have no desire of continuing with the nuclear weapons program.

There were suspicions that the dismantling of South Africa's nuclear weapons programme was due to the distrust of the transitional government (Friedman, 2017, p. 4). People speculated that the apartheid government decided to relinquish its nuclear weapons because it was preventing these atomic weapons from falling into the hands of the black government (Friedman, 2017, p. 4). In 1993, *The New York Times* wrote that the government dismantled the nuclear weapons because it was afraid that they were going to end up in the hands of a black government (Friedman, 2017, p. 5). Conversely, when the former South African President F. W. De Klerk was asked by Uri Friedman about the truthfulness of these speculations and suspicions, he said; "no, that was not part of my motivation—that I wanted to keep the weapons out of their hands" (Friedman, 2017, p. 5). In 2013, former President F. W. De Klerk wrote in *The Los Angeles Times* that: "South Africa has illustrated that long-term security can be far better assured by the abrogation of nuclear weapons than by their retention." Thus, South Africa prides itself as the only state to have developed nuclear weapons and of their own accord scraped them. However, South Africa still possesses HEU. Although it operates peaceful nuclear facilities, these do not require weapon-grade HEU.

1.3 Research problem, rationale, and objective

The US has always been concerned about nuclear weapons proliferation. As a member of the NPT and the Security Council, it has been at the forefront in trying to make sure that other states do not join the nuclear club. It was at the forefront in convincing Ukraine, Kazakhstan, Belarus, and South Africa to dismantle their nuclear weapons. The US is still persistent in trying to convince South Africa to give up its HEU. The main problem is that the US wants South Africa to give up its nuclear materials, but South Africa does not want to do so. The US has used the nuclear terrorism narratives as a justification to convince South Africa to give up its HEU.

The US is concerned about the selling of small arms and light weapons (SALW) to terrorist organisations and other non-state actors. After the 9/11 terrorist attack, this concerned heightened. Trade in 'dual-use' items, such as enriched uranium that can be converted into an atomic bomb, poses a great concern for the US (Hartung, 2018, p. 478). The US has directed these concerns at South Africa's HEU. It has been persistent in trying to persuade South Africa to give up its HEU. After a break-in at the Pelindaba Nuclear Research Centre, the US intensified its efforts in persuading South Africa to give up HEU.

In November 2007, there was a break-in at Pelindaba Nuclear Research Centre where South Africa keeps its HEU. The Pelindaba Nuclear Research Centre is located 25 kilometres west of Pretoria in South Africa. The apartheid government used this site to enrich uranium and to build nuclear bombs. After it disarmed its nuclear arsenal, the enriched uranium is used for peaceful purposes such as producing medical products. Today, it holds enough enriched uranium to build half a dozen atomic bombs. It is regarded as one of the most protected national key points, with security guards, and checkpoints surround this facility; it has 24-hour CCTV surveillance and is protected by electric fencing (Greyling, 2018, p. 1). Four gunmen bypassed a 10 000 volt electric fence, entered the premises unnoticed for more than half an hour, thereafter shot the emergency control manager in the chest (Greyling, 2018, p. 2). It is reported that these gunmen took a laptop from a control room (Greyling, 2018, p. 1). The head of SA Nuclear Energy Corporation and SA's representative at the International Atomic Energy Agency (IAEA) respectively downplayed the break-in as just a "piece of random criminality," and as just a "burglary attempt" (News 24, 2015, p. 1). Despite the reasons for the break-in, it is concerning that people can break-in to what is considered the most secure site.

Consequently, the US embarked on a discreet diplomatic campaign to convince the South African government to get rid of its nuclear material (Birch & Smith, 2015, p. 2). Yet, all the US efforts to convince South Africa to give up its HEU have been in vain. South Africa is still in possession of HEU and it does not want to give it up. It does not want to give it up despite the promise of financial incentives, the exchange of the HEU for more kilograms of Low Enriched Uranium (LEU), or after financial threats, such as losing benefits from Africa's Growth and Opportunity Act (AGOA) (Mail&Guardian, 2015, p. 3).

The decision to dismantle South Africa's nuclear weapons and the ANC government's decision not to retain them boosted South Africa's moral authority on the issue of disarmament and non-proliferation (Fraser, 2013, p. 1). This decision decorated South Africa's image and increased

its soft power. Soft power derives from non-materialistic capabilities such as influence; culture, reputation, and value appeal that can help achieve a state's objectives (International Relations. org, 2018, p. 1). It is the ability to attract others and get them to want the outcomes that you desire. Thus, it is in South Africa's best interest to keep its image, its soft power status, and its moral authority.

South Africa is a leading proponent of a global movement that has placed the potentially disastrous humanitarian consequences of any use of nuclear weapons on the global agenda (Brand South Africa, 2014, p. 1). Since 1994, South Africa's foreign policy has been dedicated to peace, human security, and disarmament (Brand South Africa, 2014, p. 1). It is important to understand all the reasons why South Africa is reluctant to give up its HEU. The role played by something that could potentially be a weapon of mass destruction is worth exploring. It is important to know why South Africa is so keen on holding on to it even after US pressure.

After re-joining the NPT, South Africa has been very influential in the nuclear non-proliferation regime. After disarming its nuclear weapons, its moral role made it punch above its weight and became more influential as a middle power. Accordingly, in 1995, South Africa played a big role in the nuclear regime by supporting the indefinite extension of the NPT (Pretorius & Sauer, 2014, p. 9). Moreover, South Africa has been at the forefront in negotiation with Nuclear Weapon States (NWS) to promote all pillars of the NPT including disarmament, not only nuclear non-proliferation. Its foreign policy interests – characterised by peace, non-violence, and human rights values - have an impact on international relations and that momentum must not be broken but should be encouraged. This thesis will develop the argument that the unique nuclear identity that South Africa possesses, as a former nuclear state and now a Non-Nuclear Weapon State (NNWS) and the possessor of a weapon's grade uranium have a huge influence on South Africa's nuclear diplomacy.

The objectives of this study were to investigate the role played by HEU in South Africa's nuclear diplomacy, to explore HEU as a factor impacting on states' nuclear diplomacy generally, and to determine the possible future intentions of SA for its HEU. Moreover, the study investigates the impact of South Africa's HEU on its identity as norm entrepreneur in international relations in the issue-area of nuclear non-proliferation and disarmament, to contextualize South Africa's HEU in the framework of the global nuclear order and to contribute to an understanding of the power of possessing HEU in negotiations in the issue-area of nuclear non-proliferation and disarmament.

1.4 Research questions

1.4.1 What is the role of Highly Enriched Uranium in South Africa's nuclear diplomacy?

1.4.2 Sub-questions:

- How does HEU affect states' nuclear diplomacy generally?
- What does HEU represent in international relations?
- What does SA intend to use its HEU for?
- How does SA's resistance to give up its HEU impact its credentials as a key player in the non-proliferation and disarmament regime?

1.5 Definition of concepts

1.5.1 Highly Enriched Uranium

There are three isotopes of uranium found on earth, and the number of neutrons differs (Zielinski, 2012, p. 1). "Uranium-238 (92 protons plus 146 neutrons) is the most abundant form, and about 99.3 percent of all uranium is U-238. The rest is U-235 (0.7 percent), with a trace amount of U-234" (Zielinski, 2012, p. 1). Furthermore, uranium is radioactive; however, U-238 can be safely handled as long as precautions are taken (Zielinski, 2012, p. 1). U-238 is not fissile, meaning it cannot start a nuclear reaction and sustain it (Zielinski, 2012, p. 1). U-235 is fissile; unlike U-238, it can start a nuclear reaction and sustain it. However, that 0.7% in naturally occurring uranium is not enough to make a nuclear bomb or even a nuclear reactor for a power plant (Zielinski, 2012, p. 1). "A power plant requires uranium with three to four percent U-235 (this is known as low-enriched or reactor-grade uranium), and a bomb needs uranium with a whopping 90 percent U-235 (highly enriched uranium)" (Zielinski, 2012, p. 1). Uranium enrichment, then, is the process by which a sample of uranium has its proportion of U-235 increased (Zielinski, 2012, p. 1). Therefore, highly enriched uranium is the uranium that has been enriched up to more than 20% and bomb-grade uranium is enriched up to 90%. This highly enriched uranium can be used to make a nuclear bomb.

The difference in mass between uranium U-238 and U-235 allows them to be separated and this makes it possible to increase the U-235 percentage (Global News, 2019). This process is done on a machine called a centrifuge. Uranium hexafluoride gas is put inside a rotating cylinder and is spun at a high speed, separating the molecules. The heavy U-238 molecules separate from U-235 molecules; they collect on the outside of the cylinder while the light U-

235 molecules move closer to the middle (Global News, 2019). The gas that no longer has U-235 is sent back to the previous stages, while the gas that is enriched move to the next stage. This is done in a cascade made of hundreds of thousands of centrifuges until it creates a gas that is highly enriched in U-235 about 90% (Global News, 2019). This is when the U-235 can be used to create a nuclear weapon.

In the late 1960s, South Africa received 33 kilograms (kg) of HEU from the US to fuel South Africa's nuclear research reactor SAFARI 1. This HEU came in a form of fuel elements (NTI, 2017, p. 1). In the 1990s, South Africa dismantled its nuclear weapons programs that had produced six nuclear bombs. South Africa now possesses several kilograms (kg) of highly enriched uranium (HEU) that was extracted from the six nuclear bombs. The exact amount of HEU that South Africa possesses is classified (NTI, 2017, p. 1). However, experts estimate that South Africa has about 800 kg of uranium (mostly unirradiated) that was declared to the International Atomic Energy Agency (IAEA) and placed under the IAEA safeguards (NTI, 2017, p. 1). Some of the HEU stockpiled is used to fuel a South African nuclear research reactor SAFARI-1 and it is also used to make medical isotopes.

According to NTI (2017), South Africa does not produce, export, nor import HEU, and it does not have enrichment capabilities. However, South Africa still manufactures targets for medical isotope production. According to NTI (2017), some sources argue that some of the HEU is blended down to low enriched uranium (LEU) to use in the 110 MW Pebble Bed Modular Reactor (PBMR) program.

1.5.2 Nuclear diplomacy

Before the creation of nuclear weapons, wars were fought only with conventional weapons that had limited destruction capacity. Nuclear weapons have unlimited destruction capability. Their use could mean the end of life on earth. Today there are nine nuclear weapon states, and a war between them would be disastrous. Thus, according to Rahul (2017), nuclear diplomacy refers to the use of diplomacy to prevent such a situation. Moreover, the word diplomacy refers to the process through which countries form relations with other countries and negotiate deals to protect or advance their national interest.

There is no universal definition of nuclear diplomacy; different scholars and state departments define nuclear diplomacy differently. To some nuclear states, diplomacy means to preserve their nuclear status while preventing nuclear proliferation from NNWS. To others, nuclear

diplomacy may mean efforts in getting access to nuclear materials for peaceful nuclear programmes and defending rights to possess nuclear technology. More to the point, nuclear diplomacy involves dialogue between states and non-state actors about the preservation of the *status quo* under the NPT, the elimination of nuclear weapons and nuclear disarmament, prevention of nuclear proliferation, prevention of nuclear use by a NWS, taking measures to prevent nuclear theft by a terrorist organisation, taking steps to reduce the risk of intentional or accidental use of nuclear weapons, and so on. According to US Department of State (2009), nuclear diplomacy refers to conversations and debates about nuclear.

Diplomacy is a way of resolving issues - such as nuclear warfare - without resorting to violence or conflict. It is negotiating and resolving something and trying to reach a decision that will benefit all sides (Ates, 2018, p. 2). Thus, nuclear diplomacy is the use of diplomacy to resolve issues related to nuclear weapons. Nuclear diplomacy is the use of diplomacy to negotiate and make decisions on issues related to nuclear proliferation, nuclear use, nuclear war, nuclear disarmament, and the prohibition of nuclear weapons. Therefore, South Africa's nuclear diplomacy is how they negotiate and make decisions to promote and advance their national interests regarding the issue of nuclear. Moreover, since South Africa's nuclear status is so unique, it is sometimes called “niche diplomacy” because of its uniqueness (Van Wyk, 2012, p. 1). Niche diplomacy is a unique kind of diplomacy. It is based on a state's diplomatic specialisation in a specific area and the concentration of resources to generate substantial returns (Henrikson, 2005, p. 67). Thus, dismantling nuclear weapons helped South Africa to construct an identity as a state that possesses a unique nuclear identity. It uses that identity by deliberately focusing and investing its diplomatic resources in the non-proliferation regime, allowing South Africa to play the role of a norm entrepreneur. It specialises and concentrate its resources on the non-proliferation regime in which it can generate results worth having instead of trying to cover the whole field (Henrikson, 2005, p. 67). Accordingly, South Africa's niche identity and its normative power continue to play a significant role in the country's nuclear diplomacy.

1.6 Research Design and Methodology

1.6.1 Qualitative research

This study seeks to understand the role played by HEU in South Africa’s nuclear diplomacy. Therefore, I employ qualitative research; I do not calculate or employ numeric data. Since I analyse documents, this study uses document analysis. I use sources such as South African

policy documents, analyse South Africa's nuclear diplomacy through IAEA documents, and documents published by the United Nations Security Council (UNSC), Institute of Security Studies (ISS), and South African Institute of International Affairs (SAII). Therefore, I look at themes and patterns within the data.

1.6.2 Document Analysis

I use document analysis as a research technique. The data is collected from documents and the study is therefore a desktop study as I did not go into field to do research. Document analysis's complexity allows it to be used widely across a range of research questions, such as that of this study. Documents are analysed to give voice and meaning to an assessment topic (Bowen, 2009, p. 6). When a researcher is analysing a document, he/she must evaluate the original purpose of the document, and consider the biasness, and subjectivity of the author or creator of the document. Moreover, when analysing a document, a researcher must determine whether the author was a first-hand witness or he used second-hand data sources, consider whether the document was edited, solicited, or anonymous.

1.6.3 Primary and secondary data

I use public statements by South African government officials, online articles (from the Institute of Security Studies), and other relevant sources, such as books, journal articles; think tank reports/analysis (such as that of Arms Control), and broadcasts. Additionally, I use information collected by government departments and organizational records such as that of the International Atomic Energy Agency (IAEA). It can be assumed that not all documents on this topic are accessible but may be classified. This is a limitation of the study; however, there are sufficient sources in the public domain to write a mini thesis on the research topic.

1.7 Structure of the thesis

Chapter one outlines the historical background of the situation that triggers interest in South Africa's HEU, introduces the research problem, rationale, and the objectives of the project. Chapter two is the theoretical framework that guides the analysis of the role of HEU in SA's foreign policy. This is done by outlining the core assumptions that underline the study. Chapter three outlines South Africa's case. It provides the context for the issue of HEU in South Africa. Chapter four provides an analysis of the role of HEU in South Africa's nuclear diplomacy using

middle-power revisionism juxtaposed with status quo foreign policy positions, and chapter five provides the overall summary of the study. It summarises all chapters and provides findings and recommendations.

1.8 Conclusion

SA still has a few hundred kilograms of HEU. HEU is weapons-grade uranium and can be used to make a nuclear weapon. There are security concerns that have been raised by members of the NPT over the safety of these vulnerable materials. Other proliferation risks include theft of its HEU by actors, such as terrorists or states that want to produce a nuclear weapon. The international community, in particular the United States, has put pressure on SA to give up or water down this HEU, but SA has refused (Birch & Smith, 2015, p. 2). This is puzzling given SA's credentials in this issue-area. The study wishes to find an answer to this puzzle by analysing the role of the HEU in SA's nuclear diplomacy. SA is not the only country with stocks of HEU and thus the study may contribute more broadly to an understanding of the role of HEU in states' foreign policies.

This introductory chapter outlined the historical background of the study. It outlined the genesis of the nuclear weapons program in South Africa, showing how the former Presidents in South Africa contributed to the development of the nuclear weapons program. This chapter also outlined how the US put pressure on the apartheid government to dismantle the nuclear weapons program by imposing sanctions. I explained the research problem and outlined how the Pelindaba break-in helped to intensify the research problem. In this chapter, I have defined the key concepts, given the research methodology in which I outlined that the study is qualitative and will use document analysis. Lastly, the following chapter discusses a theoretical framework that guides the analysis of the role of HEU in SA's foreign policy. The theoretical framework of the study centres on revisionism juxtaposed with a status quo foreign policy in middle power behaviour. These two do not naturally go together but I outline how this can be combined.

2. Chapter 2: Theoretical framework

2.1 Introduction

The purpose of this chapter is to discuss a theoretical framework that guides the analysis of the role of HEU in SA's foreign policy. This is done by clearly outlining the core assumptions that underline the study. I have chosen two theoretical paradigms, which I combined to build the framework: middle-power theory and revisionism. The theoretical framework of this study centres on revisionism juxtaposed with a *status quo* foreign policy in middle power behaviour. These two do not naturally go together but I outline how this can be combined. I start by conceptualising middle power theory, differentiate between traditional middle powers and emerging middle powers, I contextualise revisionism juxtaposed with *status quo,* and then combine them. Some emerging middle powers are considered revisionist countries, in that they challenge the *status quo*.

2.2 Middle power theory

In the 15th Century, Giovanni Botero, who was the Mayor of Milan (Italy) and a political thinker, defined a middle power as a country with enough strength and power to stand on its own without needing other countries for help (Shin, 2015, p. 1). Botero (1589) devised three types of states, *grandissine* (great power), *mezano* (middle power), and *piccioli* (small power) (Bireley, 2017, p. 3). The concept of middle power has been used in the field of international relations since then. The concept of power plays a significant role in the conceptualisation of middle power theory. According to Hans Morgenthau (1965), power is that which institutes and sustains the control of people over people, exclusive of other actors and relations with them. This dimension of the nature of power is necessary when considering middle power features.

A middle power is a state that is not a superpower; it is a sovereign state and has large or moderate influence in international relations (Bireley, 2017, p. 3). Shin (2015) argues that the concept of middle powers received a critical examination in the concluding stages of World War II concerning Canada and Australia. Middle powers are those that are not considered too big or too small, they have some considerable power and influence, but no single factor appears to dominate (Bireley, 2017, p. 3). According to Cooper, Higgott, Nossal, and their colleagues (1993), some of the typical middle-power features include seeking a multilateral resolution to

global issues, favouring concession positions in global disputes, and embracing the idea of a 'good citizen' in international politics. They are known to be politically and economically significant, internationally respected, and have refused nuclear proliferation. This position gives them international credibility. Moreover, middle powers help to maintain global order through coalition-building by being mediators (Jordaan, 2017, p. 3). According to Jordaan (2017), they take moral responsibility to protect the global order from states and non-state actors who would threaten it.

It is important to note that these definitions of middle power are not universal. There is a debate in International Relations about the definition and categorisation of states as middle powers. There have been contentions regarding what constitute features of middle powers in IR. Some scholars use "middle power" to show a state's position in terms of power (it is neither a major power nor a small power). For example, Schweller (2014) classifies middle powers according to their ranks in terms of power. He argues that a middle power ranks between major and small power. According to this categorisation, states are identified by what they are not more than what they are; they are not great powers, nor small powers. Wood, however, identifies middle powers by looking at the military strength, population size, 'prestige', and 'influence' as power sources (Jordaan, 2017, p. 3). Moreover, Cooper, Higgot, and Nossal categorise middle powers by their foreign policy behaviour (Jordaan, 2003, p. 3). Other scholars such as Lieth and Pretorius (2009) use the concept of middle power to show how some states carve a role for themselves in international relations – this role is one of a bridge-builder and problem solver to maintain international order. Among the latter scholars, some argue that emerging middle powers (as opposed to traditional middle powers) have more of a reformist inclination, namely, to reform the international order.

Among these middle powers, others are called emerging middle powers. They are in the "semi-periphery" between core and periphery states in terms of world system theory; they demonstrate regional influence and favour regional integration. According to Mbete (2018), they have an anti-imperialist normative angle. According to Shin (2015), these middle powers have restricted influence on determining the distribution of power but can deploy a variety of sources of power to change great powers' position and can defend their positions regarding national security or regional security affecting them (Shin, 2015, p. 3). Moreover, emerging middle powers influence their regions and their foreign policies are geared towards exerting

their influence in the regions they influence. It is argued that these emerging middle powers tend to rely on niche diplomacy to achieve their foreign policy goals (Yilmaz, 2017, p. 1).

2.3 Revisionism vs *Status quo*

Revisionism is a type of foreign policy that pursues fundamental change in the global order. Revisionism is part of power transition theory within a broader field of international relations. It is used to describe states. Influential and powerful states in international relations or countries that are better placed in the world order – such as the United States of America, and the United Kingdom- are likely categorised as *status quo* states, however, nations dissatisfied with their place in the world order are categorised as revisionist states (Theoharis, 2019, p. 1). Revisionism "implies efforts of a hard-line nature to transform a perceived power imbalance characterizing the world order" (Leith & Pretorius, 2009, p. 346).

Said *et al* (1995) quoted by Lieth and Pretorius (2009, p. 352) argues that "revisionism manifests as follows:

- Strategic offensiveness to modify the international environment to correspond with decision-makers' idea of a favourable order;
- Resistance toward measures that may inhibit freedom of action to seek change;
- Acceptance of tension and even pursuit of conflict (including war) to effect desired change; and
- A willingness to take risks and daring behaviour in the face of possible costs."

Revisionist states try to find ways to change the way things are in international relations. However, *status quo* states want to preserve things the way they are (Theoharis, 2019, p. 1).

The US is a good example of a *status quo* state that is content with the current nuclear order, which it tries to preserve it. It is one of the prominent leaders of the NPT; hence, it is at the forefront in preventing nuclear proliferation. However, other states in the NPT such as Iran and recently South Africa are not in favour of the current nuclear order. While the US would be classified as a *status quo* state, South Africa is – in this case- a revisionist state.

Status quo is a concept that is used to describe states that are satisfied with the way things are in the world order. The *status quo* has opposite assumptions as compared with revisionism. They see the international order comprised of its institutions, international laws, and even free-market economy as key components of the world order that should be preserved (Theoharis,

2019, p. 1). In a nutshell, *status quo* states want things to remain the way they are. They are not always content about everything, but they prefer the way things are rather than the alternative proposed by revisionists.

Influential and powerful states in international relations - or countries that are better placed in the world order, such as the United States of America- and the United Kingdom, are likely categorised as *status quo* states (Theoharis, 2019, p. 1). These states want to preserve the contemporary pattern of international relations (Said, Lorche Jr, & Lorche III, 1995, p. 35). In a nuclear field, the *status quo* states want to preserve the current nuclear order.

2.4 Middle-power revisionism

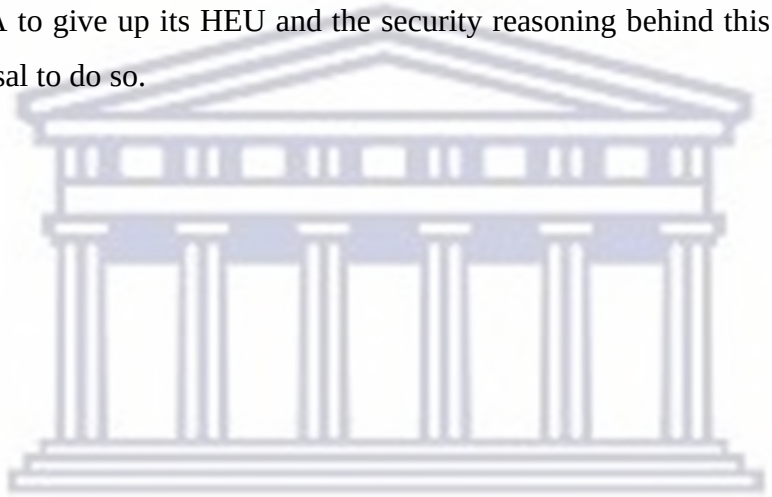
Traditionally middlepowers do not challenge big powers, at best; they try to reform the international system to align with liberal values, such as equality, disarmament, development, and peace. Traditionally revisionist powers, on the other hand, try to overthrow the current system even using violent means to resist the *status quo*. To bring the two theories together is controversial because they seem as if they are incommensurable.

A state's foreign policy behaviour can be described as middle-power revisionism if the state is 'positionally' a middle power; motivates its foreign policy actions by referring to liberal values in international relations; and pursues these values by actively resisting big power behaviour that contradicts these values. Active resistance includes a foreign policy that goes beyond traditional middle-power behaviour to reform the international order to, for example, voting against *status quo* powers in international forums and forming alliances to resist *status quo* behaviour. A middle-power revisionist state must strongly resist the *status quo*, but on middle power principles. For instance, it could pursue a fundamental change in the global order, display strategic offensiveness to modify the international environment to correspond with decision-makers' idea of a favourable order, concurrently favour concession positions in international disputes, seeking a multilateral resolution to global issues, and embracing the idea of being a good international citizen in global politics.

2.5 Conclusion

This chapter looked at the theoretical framework of the study. The purpose of this chapter was to develop a theoretical framework that will guide the analysis of the role of HEU in SA's foreign policy. This was done by clearly outlining the core assumptions that underline the study. I chose two theoretical paradigms, which I want to combine to build the framework:

middle-power theory and revisionism. The theoretical framework of this study centres on revisionism juxtaposed with a *status quo* foreign policy in middle power behaviour. These two do not naturally go together but I have outlined how this can be combined. I started by conceptualising middle power theory, differentiate between traditional middle powers and emerging middle powers, I contextualised revisionism juxtaposed with *status quo* then combine them. Some emerging middle powers are considered revisionist countries, in that they challenge the *status quo.* Nonetheless, the following chapter describes the case of South Africa. It begins with the historical context of the South African nuclear weapons programme, outlines how the ANC opposed the apartheid government's nuclear weapons programme, outline the ANC's policy on nuclear, and discusses the issue of SA's HEU. It outlines the pressure imposed by the US on SA to give up its HEU and the security reasoning behind this pressure. It also details SA's refusal to do so.



3. Chapter 3: South Africa, its nuclear weapons and highly enriched uranium

3.1 Introduction

This chapter outlines South Africa's case. It provides the context for the issue of HEU in South Africa. The issue begins with the genesis of the apartheid nuclear weapons programme. That is why the chapter firstly outlines the historical context of the issue. It sketches the reasons for building a nuclear weapons programme, the pressure imposed by the international community, particularly the US, the use of the nuclear weapons programme, and focuses on the reasons why it was disarmed. It has been alleged that the apartheid government disarmed nuclear weapons, because it did not want nuclear weapons in the hands of the ANC. This chapter outlines the external and internal reasons for its disarmament, including the ANC policy on nuclear matters and the movement against nuclear imperialism, and the democratic government's decision not to retain nuclear weapons but to keep HEU. Sections 2, 3 and 4 provide the historical context; section 5 and 6 describes the contemporary or post-apartheid context of SA nuclear position.

3.2 Apartheid South Africa's nuclear weapons programme

After the US dropped the nuclear bomb in Hiroshima and Nagasaki, the nuclear race began with the Soviet Union and the US accumulating and stockpiling nuclear technology (Fig, 2006, p. 5). This race is where South Africa became relevant. In the 1940s, it became apparent to the US that the Witwatersrand was rich in uranium reserves. The Witwatersrand gold mines had been producing the uranium as the by-product of gold mining, however, because there was no use for it at the time it was placed on mine dumps around Johannesburg (Fig, 2006, p. 5). The US and Britain saw South African as their source of uranium supply to augment the insufficient supplies they received in the (then Belgian) Congo (Fig, 2006, p. 5). Consequently, the former South African Prime Minister, Jan Smuts was approached in this regard. For over a decade uranium stocks were sold to the US and Britain. Thus, South Africa was involved and connected into the nuclear arms race (Fig, 2006, p. 5). In 1948, Dr. D - F. Malan took power from Jan Smuts and wanted to pass a bill that will manage the exportation and use of uranium. Thereafter, in 1949, legislation to set up the Atomic Energy Board (AEB) was passed, and its

offices were established in Pretoria. Soon after, the process of scientific collaboration with the United Kingdom, West Germany, and the US commenced (Fig, 2006, p. 5). Under the Atoms for Peace programme, the US assisted South Africa to manufacture its first nuclear reactor and trained scientists to operate it with the US' weapons-grade uranium fuel (Birch and Smith, 2015, p. 1). However, according to Birch & Smith (2015), the US cut ties with South Africa's nuclear programme and stopped supplying HEU after they discovered that the apartheid government was secretly building a nuclear weapons programme with the US' HEU.

3.3 The decision to go nuclear

The 1980s were dominated by the cold war and the arms race. Even though the nuclear arms race between the US and the Soviet Union was centre stage, efforts to advance nuclear weapon ambitions by other states carried on on the side. That is where South Africa, and North Korea, clandestinely built their nuclear weapon programmes.

The apartheid government was insecure, fearing that the West might not help it against the armed liberation movement supported by the Soviets and Chinese. The government at the time felt threatened by the communist and considered themselves as a state under siege. They believed that its main threat to national security came from the Soviets or Chinese domination (Chari, 1976, p. 5). The apartheid government claimed that it did not intend to explode the nuclear bombs; rather it wanted to use them as a political strategy to persuade western countries to come to its aid against communist invasion. It hoped that the west would not abandon South Africa, but because of its apartheid policies, it feared that the west might abandon South Africa, therefore it needed leverage.

There was no clear strategy for using these nuclear bombs, but apartheid South Africa built them anyway. A nuclear bomb would not be useful to combat guerrilla fighters and South Africa was militarily more advanced than southern African states and had military relations with western countries (Van Wyk, 2019). South Africa could counter any conventional attack by any Sub-Saharan African state. From this perspective, there was no need for South Africa to consider using a nuclear weapon. If nuclear weapons were to be used by the South African government, they were going to destroy the same area and population the government was trying to protect (Van Wyk, 2019). Radioactive contamination would affect everyone. It is very difficult to imagine South Africa using nuclear weapons against the guerrilla movement that

was supported by South African citizens. Moreover, it would not be possible for South Africa to use these weapons against other African states because of international repercussions and the unification of the global community including the west against South Africa (Van Wyk, 2019). These scenarios show that it was going to be very difficult for South Africa to use nuclear weapons. According to deterrence theory, nuclear weapons are not intended for offensive use rather than dissuading other actors from attacking. However, for nuclear weapons to serve the need for deterrence there must be a credible possibility of their use, or else deterrence fails (Chari, 1976, p. 16). Drawing from the above scenarios, tactically and strategically, South Africa would not use its nuclear weapons. Therefore, there was no tactical purpose for the use of nuclear bombs.

According to Purkitt and Burgess (2012), the apartheid government built nuclear weapons before formulating fully rational ideas of using them. Only after they have developed nuclear weapons did they search for strategies. One of those strategies was a strategy of blackmail (Purkitt & Burgess, 2012, p. 1). As was pointed out earlier, South Africa was going to blackmail big powers into helping it if it came under attack from anti-apartheid forces. The apartheid government developed this strategy to blackmail the US in case the Soviet Bloc, the ANC, and its African allies threaten to bring an end to its regime (Purkitt & Burgess, 2012, p. 1). South Africa was going to threaten to conduct a nuclear test, which would compel the US to come to South Africa's aid (Purkitt & Burgess, 2012, p. 2). This was because South Africa's former allies treated it as a pariah state and its leaders felt isolated and abandoned (Purkitt & Burgess, 2012, p. 2). Therefore, South African leaders wanted to use the strategy of blackmail to induce the west to support it.

3.4 Building the bomb

In the 1960s, South African government leaders at the time expressed views that suggest they were thinking of building nuclear weapons. In 1965, Mr. Vorster stressed the fact that South Africa did not sign the NPT and emphasised the "military uses" of nuclear material (Chari, 1976, p. 11). In 1970, the South African Prime Minister, P. W. Botha, announced that they are developing a technology for isotope separation and announced the construction of the pilot plant (CIA, 1971). In May 1974, India's peaceful nuclear explosion took place and later in July Dr Roberts, Vice-Chairman of the AEB said: "our technology and science have advanced sufficiently for us to produce it [the atom bomb] if we have to... May I say that our nuclear

programme is more advanced than that of India" (Chari, 1976, p. 11). In 1978, Prime Minister Vorster gave a green light to the use of enriched uranium produced at Valindaba in Pretoria to be used for the fabrication of fuel for the Koeberg power station in Cape Town and the weapons programme (Fig, 2006, p. 7). The first two nuclear devices were finished in 1978 and 1979; none of the two was deliverable by aircraft. In 1982, AMSCOR finished the first bomber-deliverable nuclear weapon, however, more enhancement in delivery design, safety, and reliability delayed the production of another device until 1987 (Liberman, 2001, p. 11). After that, the production of nuclear weapons accelerated to the completion of six and a half by 1989.

The six nuclear weapons built were in a gun-type form, the firing of one part of the bomb into another part would trigger the nuclear reaction (Fig, 2006, p. 7). This type of nuclear bomb was similar to the one dropped on Hiroshima. According to Fig (2006), each bomb built by the apartheid government used about 55 kg of enriched uranium.

3.5 External help

South Africa did not build its nuclear weapons from scratch; it had a civilian nuclear industry as a foundation of its nuclear weapons program though. In 1949, the South African government established an Atomic Energy Board. One of the objectives of this board was the mining of radioactive and prescribed minerals and the production of atomic energy (CIA, 1956, p. 10). South Africa is one of the world's biggest producers of uranium. In the 1950s, the apartheid government had contracts with the United Kingdom's and the United States' agencies for the purchase of uranium (CIA, 1956, p. 10). In 1948, the United Kingdom invited South African scientists the collaboration on the peaceful application of atomic energy (CIA, 1956, p. 10). The first two scientists trained with the British atomic program (CIA, 1956, p. 10). According to Albright, president of the Institute for Science and International Security, the US helped South Africa to build its first nuclear reactor (Montgomery, 2008, p. 2). In 1965, Chalmers Corporation, a US company 'delivered' the 20MW SAFARI-1 nuclear reactor and provided 100 kg of HEU for the period of ten years.

In 1975, Israel offered to sell nuclear warheads to the apartheid government after P. W. Botha asked for them (Bidwai, 2010, p. 1). According to Pulakow-Suransky, who released the book *The Unspoken Alliance: Israel's Secret Relationship with Apartheid South Africa*, Israel offered to sell the Jericho missiles to the apartheid government (Bidwai, 2010, p. 2). Lieutenant

General RF Armstrong, a former South African chief of staff, agreed to the purchase of the Jericho missiles and drew a memo where he outlined how these nuclear-capable Jericho missiles would benefit South Africa if they were fitted with nuclear weapons (McGreal, 2010, p. 2). Although the nuclear payloads were not sold to SA in the end, these two states traded other nuclear materials. According to Bidwai (2010), South Africa sold about 450 tonnes of yellowcake to Israel, and Israel sold tritium to the South African government. The relations between these states were founded on shared beliefs that they were facing a hostile environment as they struggled to defend 'their land' and identity (Bidwai, 2010, p. 2). They also had common alliances in the west and had their self-assigned role as a regional barricade against communism.

3.6 The programme is exposed

South Africa built its nuclear weapons in secret. The weapons production was moved from Building 500 at Pelindaba to Magaliesberg Mountains closer to Pretoria after Armscor, a parastatal arms manufacturing and procurement company took control (Fig, 2006, p. 7). The production occurred at the Advena factory, not far from the township of Atteridgeville. Even though Armscor deemed Advena secure from prying satellites, Valstrap in the Kalahari Desert was not. From 1975 to 1976, it constructed two nuclear test sites 250 meters underground at the Vastrap military based in the Kalahari Desert (Horton, 1999, p. 16). Strangely, South Africa did not hide the infrastructure equipment and facilities of the test (Horton, 1999, p. 16). After India tested their nuclear weapons in 1974, the apartheid government leaders hoped that there would be no long-term global outrage over an overt "declaration by detonation" of South Africa's ability to manufacture nuclear weapons (Horton, 1999, p. 16). By 1977, South Africa had finished completing the nuclear test site. The government used Vastrap to test its nuclear weapons. However, in August 1977, a Soviet surveillance satellite detected the preparations for a test (Fig, 2006, p. 7). The Soviet Union's head of state, President Brezhneve consulted with the US' head of state, President Jimmy Carter, who put pressure on the South African government to close the facility.

In 1979, two years later after a Soviet surveillance satellite detected the preparations for a test, a US surveillance satellite spotted a short, but powerful double flash that is believed to be a light of a nuclear test coming from the South Atlantic Ocean (Horton, 1999, p. 17). This brought more attention to South Africa and revealed the extent of its relations with Israel as it was

believed to be a joint test (Horton, 1999, p. 17). Even though the South African government and Israeli government denied a nuclear weapons test in the South Atlantic, the rumours of a nuclear test are still persistent. After this, the international community imposed anti-proliferation sanctions on the government.

3.7 Responses to SA's nuclear weapons programme

3.7.1 Superpower pressure

As a leading member of the NPT, the US was against more states acquiring nuclear weapons. While they were focusing on preventing North Korea from acquiring nuclear weapons, they did not see South Africa going nuclear. Even though the US helped South Africa with its nuclear programme for peaceful purposes, South Africa had to conceal its intentions for a nuclear weapons program and built its nuclear weapons secretly from the US. Former Prime Minister John Vorster kept the nuclear weapons program secret so that the South African government did not alienate the US and put at risk the ability to acquire HEU (Purkitt, Burgess & Liberman, 2002, p. 4). However, the US and European powers already feared nuclear proliferation before it was known that South Africa was building nuclear weapons. In August 1977, South Africa's nuclear weapon test site was discovered, thereafter, the US imposed anti-proliferation sanctions to deter South Africa from acquiring nuclear weapons (Purkitt, Burgess & Liberman, 2002, p. 9).

In the late 1980s, it was clear from the US that the imposition of sanctions on the apartheid government and the resistance movement would produce rapid change in South African politics. As a result, the US applied pressure on Botha to abolish the nuclear weapons program (Purkitt, Burgess & Liberman, 2002, p. 6). In 1989, after the election of de Klerk, Washington imposed more pressure on De Klerk's government to disarm nuclear weapons. In the second half of 1989, de Klerk initiated the democratic transition from white minority rule to majority rule (Purkitt, Burgess & Liberman, 2002, p. 6). Thereafter, the US threatened to treat SA as a "hostile nation" to encourage disarmament (Purkitt, Burgess & Liberman, 2002, p. 6). According to Purkitt, Burgess and Liberman (2002), de Klerk understood that the ANC would take power and would be in control of nuclear weapons. Thus, his government decided to dismantle the nuclear weapons program to appease the US.

3.7.2 African and NAM response

The Non-Aligned Movement (NAM) was established in 1961 during the Cold war. This was an initiative of former Yugoslav President Josip Broz Tito. He wanted to establish an organisation consisting of states that did not want to align themselves with either the Soviet Union or the US (NTI, 2018, p. 2). These states wanted to remain neutral. The objective of the Non-Aligned Movement was to create an autonomous/ a self-directed path in international politics that would not end in member states being used as pawns in the clash between the major powers (NTI, 2018, p. 2). The NAM has been advocating for nuclear disarmament since it was established. It wanted to put an end to the nuclear arms race and eradicate the nuclear threat. The NAM envisions a world free of nuclear weapons.

The NAM is anti-colonial, anti-imperialist, and anti-racial, and it believes that nuclear proliferation is a threat to the survival of humanity. According to Monyae (1999), South Africa's possession of nuclear weapons in the 1970s and 80s posed the greatest security risk in Africa. There was a debate among scholars over South Africa acquiring nuclear weapons. Aforka Nweke (quoted in Monyae, 1999, p. 77) argues that "by acquiring the technical capability to make nuclear weapons and necessary means to deliver them, South Africa has not only shattered the raison d'etre of the 'Declaration on the Denuclearization of Africa', but has also greatly tipped the balance of power in the continent?"

The NAM held a meeting soon after India's underground nuclear test, the meeting called for an establishment of an ad hoc committee to negotiate for the total abolition of nuclear weapons (Monyae, 1999, p. 85). After this conference, NAM countries called for action to be taken for the ban of nuclear weapon use and the threat of use, the prohibition of nuclear testing, nuclear development, acquisition, nuclear stockpiling, and transfer of nuclear weapons (Monyae, 1999, p. 85). On the 12th summit of the Non-Aligned Movement in South Africa, nuclear disarmament was high on its agenda.

South Africa's nuclear proliferation received huge criticism from Nkwame Nkrumah and Ghana's movement against nuclear imperialism. This movement was at the heart of the Pan-African struggle for peace and freedom, and it countered the narrative of "afro-pessimism" – "meaning nothing good ever comes out of Africa" (Allman, 2008, p. 2). This idea of anti-colonialism, anti-nuclear proliferation, peace, and non-alignment echoed during the First Conference of Independent African States in Accra, Ghana 1958. President Nkrumah made

clear the conference's agenda in his opening address. He said the delegates had come to the conference in Accra "first to discuss and plan future action to prevent further use of African soil as a testing ground for nuclear weapons; secondly to consider effective means to prevent further brutalities against our defenceless brothers and sisters in South Africa, brutalities which are the result of the South African Government's racial policy of apartheid" (Allman, 2008, p. 12).

The conference demanded the end of nuclear testing, particularly the test that was going to take place in the Sahara, and the end of nuclear and thermo-nuclear production (Allman, 2008, p. 5). The connection between colonialism and nuclear proliferation became a priority for African nationalists and Pan-Africanists and it took more urgency after France made clear their intentions of testing a nuclear weapon in the Sahara.

3.7.3 ANC response

Before 1994, the ANC was against South Africa's nuclear weapons program. When South Africa was suspected of building nuclear weapons, the ANC intensified its efforts to get the international community to put pressure on the apartheid government. Although there is no indication that the apartheid government would have used nuclear weapons against black South Africans, the ANC remained convinced that the apartheid government wanted to use these nuclear weapons on black South Africans (Van Wyk, 2019).

The ANC promoted the idea of an African nuclear-weapon-free zone before taking reign in 1994. It was the first and only liberation movement that was able to sit in various United Nations committees and explain to the international community what the apartheid government was doing and campaigned against its nuclear weapons programme (Van Wyk, 2019). In the early 1990s, the ANC increased its efforts to pressure the apartheid government. In 1992, it used the negotiations for democratic transition as a stage to put more pressure on the government to be open about the nuclear weapons programme. It demanded that the National Party (NP) government disclose all the nuclear weapons programme past and present activities and that the government admit openly the full extent of the programme and the amount of its HEU stockpile (Harris, Hatang & Liberman, 2004, p. 3). Although dismantling the nuclear weapons programme was done in secret, in 1993, President F. W. de Klerk admitted that the

apartheid government built a top-secret nuclear weapons programme with six atomic devices and announced that his government dismantled it.

3.8 Dismantling SA's nuclear weapons programme

3.8.1 Decision to dismantle

By the late 1980s, many events that became the preconditions of democratic transition, including denuclearization, occurred. These events including the Geneva Protocol that was followed by the withdrawal of Cuban soldiers in Angola, the withdrawal of South African soldiers from Namibia, SWAPO winning the elections, the collapse of the Berlin wall, former Soviet President Mikhail Gorbachev convincing the South African government that Moscow was not behind the imperialist ventures in Southern Africa, therefore not a threat to South African security, and other domestic events such as the election of F. W. de Klerk demonstrated that major change could happen without disastrous consequences (Albright & Stricker, 2016, p. 184). These events created hope and expectation that South Africa might change its hostile relations with the global community to one of cooperation and development.

In 1990, the apartheid government under the leadership of F. W. de Klerk released Nelson Mandela and opened negotiations with the ANC for a democratic transition. Around the same time, De Klerk's government signed the NPT, however, did not announce the suspected nuclear weapons program (NPR, 2017, p. 2). The year 1993 was marked by widespread violence in South Africa as the country was moving towards a democratic government. In 1993, the former South African President F. W. de Klerk and Nelson Mandela received the Nobel Peace prize for negotiating an end to the apartheid regime (NPR, 2017, p. 1). Earlier that year, former President F. W. de Klerk publicly announced that South Africa developed a secret nuclear weapons program that produced 6 nuclear devices and that his government had dismantled the nuclear weapons program. This made South Africa be the first nation to dismantle a domestic nuclear weapons program. Today South Africa is known for the first nuclear rollback, a state that voluntarily disarmed its nuclear weapons. South Africa made history when the former President F.W. de Klerk announced in parliament that South Africa developed nuclear weapons, but his government decided to dismantle and destroy the devices (De Villiers, Jardine, & Reiss, 1993, p. 2). The announcement was the first confirmation of what had been suspected for a very long time.

3.8.2 Details of dismantling

After South Africa disarmed its nuclear weapons, it joined the NPT. Subsequently, South Africa subjected its nuclear materials to the IAEA safeguards. The IAEA investigated to determine whether South Africa disclosed its HEU inventory completely (Albright, 2015, p. 1). The IAEA concluded its investigation and declared that it is satisfied with South African declared HEU inventory. According to David Albright (2015), these are the details of what happened to the declared HEU:

Table 1: HEU production in the Y Plant, in kilograms

HEU produced in Y plant	HEU	U 235	% 235 (average)
Shipped as uranium hexafluoride for further processing	515	437	85%
Shipped in the form of uranium-bearing process filters for recovery	144	60	42%
Shipped in the form of uranium-bearing powder for recovery	93	39	42%
Used for upgrading (blending) imported low enriched uranium (LEU)	92	83	90%
Used for upgrading (blending) domestic LEU	77	28	36%
Other (a)	72	30	42%
Total	993	677	68%

"(a) This category includes HEU in additional scrap, cold traps, powders, and filters, and recalculated or re-estimated HEU quantities not included in the initial declaration given to the IAEA in 1991 but added before 1994 or 1995. A fraction of this HEU is difficult to recover economically into a usable form and is likely considered waste. Adjustments in the total HEU stock made after 1994 or 1995 are not included" (Albright, 2015, p. 9).

Table 2: Assignment of HEU to major programs by September 1991, in kilograms (a)

Major Programs	HEU	U 235	%U 235 (average)
Nuclear weapons program	478	418	87.4%(b)
Safari Reactor Fuel Program			
Sent to Safari	83	38	46%
Stored elsewhere	130	60	46%
Subtotal	213	98	46%
Protea (zero power reactor)	5	2.5	46%
Blending	169	111	66%
Total	865	629	73%

"(a) The difference between the amount of HEU produced by the Y Plant and the quantity assigned to major programs is 128 kilograms. Most of this material was never assigned to a program and was stored. Small amounts of HEU in this category were used in other programs and about 10 kilograms were classified as lost during processing. South Africa stated in 1991 that the Y plant produced and used about 921 kilograms of HEU, which implies that about 55

kilograms of usable or recoverable HEU were not assigned to major programs. The other 70 kilograms of HEU were recovered, identified, or measured after the Y plant closed.
(b) The HEU assigned to the nuclear weapons program was either about 90 percent or about 80 percent enriched, with most being 90 percent enriched" (Albright, 2015, p. 10).

Table 3: Estimated HEU inventory and its fate, reflecting the use of domestically produced HEU in the Safari-1 Reactor, as of the end of 2014, in kilograms, initial mass(a)

Category	HEU inventory (the early 1990s)	HEU Fate (initial mass) as of the end of 2014
1. About 90% enriched(b)	354	225, irradiated; 129, fresh
2. About 80% enriched(b)	124	90-124, fresh(d)
3. About 45% enriched		
(a) Assigned to Safari, pre-1991	213	75, irradiated in fuel 185-315, irradiated in targets(d)
(b) Other(c)	123	
Subtotal	336	260-390, irradiated 0-76, fresh
Total (initial mass)	814	814-836(d)

(Albright, 2015, p. 11).

3.8.3 Joining the non-proliferation regime

In 1991, South Africa joined the NPT and became a State Party to the NPT. It signed a "Comprehensive Safeguards Agreement with the IAEA" that expresses South Africa's desire to abide by its global obligations to prevent nuclear proliferation (DIRCO, 2006, p. 1). There are periodic on-site technical inspections and verifications to make sure that nuclear materials and installations are applied only for peaceful purposes. Since 1994, after the first democratic elections, South Africa has committed itself to a policy of disarmament, non-proliferation, and arms control that cover all Weapons of Mass Destruction (WMDs) (DIRCO, 2006, p. 1). The democratic government committed itself to the total elimination or disarmament of nuclear weapons; therefore, support all agreements pertaining to the prevention of the proliferation and development of nuclear weapons.

South Africa is one of the Eight-Nation Negotiating Group that helped establish the IAEA. It holds a seat on the Board of Governors (the principal policy-making organ of the Agency) that is designated for Africa based on its advanced nuclear infrastructure (DIRCO, 2006, p. 1). The IAEA reports every year to the UN General Assembly, and when member states do not comply with safeguards and security obligations, it reports to the UNSC (NTI, 2019, p. 2). There has never been a case where South Africa was reported in the UNSC for failing to meet its obligations under the IAEA Safeguards Agreements, especially when it comes to nuclear safety and nuclear security. Under Safeguards Agreements, the IAEA inspectors inspect nuclear facilities regularly to verify the accuracy of records hold by a particular member state on the whereabouts of the nuclear materials (NTI, 2019, p. 2). They check the IAEA's installed surveillance equipment and verify physical records of nuclear material (NTI, 2019, p. 2).

3.8.4 The ANC’s position on nuclear disarmament

The ANC, while in exile made efforts to expose South Africa's nuclear weapons program. It exposed the role played by other foreign governments in collaborating with the apartheid government's nuclear weapons program (Fig, 2006, p. 10). After De Klerk announced South Africa's nuclear weapons program, the ANC was convinced that that was not the whole story. Roger Jardine, an ANC official who was a science adviser at the time called the announcement by De Klerk "neither lie nor full truth" (Harris, Hatang & Liberman, 2004, p. 3). Roger Jardine was not the only ANC official who criticised former President De Klerk's speech - Abdul Minty the former Director of the World Campaign against Military and

Nuclear Collaboration with South Africa criticised the speech claiming that it denied foreign assistance from other countries like Israel. The ANC was against nuclear proliferation, which is why they advocated for disarmament and supported the call for Africa as a nuclear weapon free zone.

The ANC shared the perception of the Palme Commission on Disarmament and Security Issues concerning common security (University of Pennsylvania, 1994, p. 13). This commission argues that states have become interdependent and security issues transcend national borders. Countries cannot protect their citizens through unilateral military means (University of Pennsylvania, 1994, p. 13). Therefore, states share a common interest in joint survival and should shape their security policies in co-operation with other states. The ANC's security policy argued that regional security should be pursued by adhering to international law, peaceful settlement of disputes, "common security arrangements and region-wide disarmament" (University of Pennsylvania, 1994, p. 13). It promoted the implementation of confidence and security-building proceedings and the formal approval of a non-aggression treaty in the Southern African region. Thus, disarmament was the focus of the ANC's security policies, and it welcomed the abolition of nuclear weapons in SA. However, it wanted the government to disclose more information about the nuclear weapons program.

3.9 The ANC government's nuclear diplomacy

The release of Nelson Mandela from prison and other political prisoners marked the dawn of a new era in South Africa. A series of democratic negotiations were initiated. However, these negotiations were also disrupted by the "morbid symptoms" of the occurring oppression and assassinations during the transition era (Fig, 2006, p. 9). A referendum was made in which the majority of white people supported the democratic change. Thereafter, 27 April 1994 was scheduled to hold the first democratic election. The ANC won by the majority and Mandela became the first black president in South Africa. The most concerning part of the transition (racial conflict) was avoided, and the democratic transition was peaceful. The ANC government wasted no time. Its Science and Technology desk in the Western Cape together with an NGO called Environmental Monitoring Group undertook a conference on the future of the nuclear industry (Fig, 2006, p. 9). Trevor Manuel addressed the conference (Fig, 2006, p. 9). Fig (2006) argues that even though the ANC made no announcements, but the tenor of the conference challenged the nuclear industry to change to socially useful science.

Likewise, in 1993, Nelson Mandela wrote a paper that details the future of South Africa's foreign policy. In that paper, one of the pillars upon which South Africa's foreign policy will rest is that: “peace is the goal for which all nations should strive, and where this breaks down, internationally agreed and nonviolent mechanisms, including effective arms-control regimes, must be employed” (Mandela, 1993, p. 2). He further argues that "human rights will be the light that guides our foreign affairs" (Mandela, 1993, p. 3). Consequently, the ANC government did not retain the nuclear weapons programme, committed itself fully to the NPT, committed itself to make Africa a nuclear-weapon-free zone, and used its moral high ground to promote nuclear disarmament.

The ANC government had long supported global arms control, non-proliferation, and disarmament. This has been one of their prominent goals in South Africa’s foreign policy since the wake of democracy. It committed itself to influence African states and NAM member-states to endorse non-proliferation; it became an active member in the non-proliferation regime and suppliers’ groups while advocating for developing states not to be denied access to advanced technologies (Harris, Hatang & Liberman, 2004, p. 14). Moreover, the government committed to the NPT, emphasised its intentions to play a leading role in disarmament and non-proliferation regime, and stressed its desires to promote regional and global peace and security and to safeguard South Africa’s sovereignty (Harris, Hatang & Liberman, 2004, p. 14).

Having the moral high ground after disarming the nuclear weapons programme and the new democratic government not retaining it, South Africa capitalised on its niche nuclear status. However, the government decided to keep HEU and continue not to disclose the amount of its HEU stock that was extracted from the bombs. The government had declared that it is keeping its options open with regards to restarting a uranium enrichment programme. It declared its uranium deposit a strategic mineral resource that falls within the policy of making commercial products domestically rather than exporting raw material and then imports them as final products with expensive prices from foreign countries (Pretorius & Sauer, 2014, p. 9). Albeit South Africa has been under pressure from the US to blend down its HEU to LEU or to give HEU up, it is committed to exercise its rights under Article IV of the NPT to possess peaceful nuclear technology, produce it, and export nuclear materials as long it follows export guidelines (Pretorius & Sauer, 2014, p. 9). Contrarily, according to Pretorius & Sauer (2014) this desire

to possibly restart its enrichment process is not in line with the US nuclear security agenda and its post-Cold War non-proliferation policy.

3.10 South Africa's moral high-ground and "Punching above its weight"

South Africa did not have a good image under the apartheid regime. It was famous for its racist policies, discrimination, violence, and the brutal treatment of its (black) citizens. It disobeyed international law, and as a result, it was isolated from the international community. However, dismantling nuclear weapons decorated its image. The decision to dismantle nuclear weapons and the ANC government's decision not to retain them boosted South Africa's moral authority and increased its influence on the non-proliferation regime. South Africa signalled by its deeds that it stands for peace and non-violence. The abolition of nuclear weapons outlined a road map in improving global human security and offers NWS useful insight on disarmament or how to dismantle nuclear weapons. Now, South Africa occupies a strategic position in the world, it has a unique identity, the one of a norm entrepreneur.

South Africa used this niche identity to punch above its weight on the non-proliferation regime. In the 1995 Non-Proliferation of Nuclear Weapons (NPT) conference, South Africa used its identity to its advantage. It showed parallelism by partnering with NNWS and NWS alike, and also showed confrontation especially with NWS (Van Wyk, 2015, p. 5). Its behaviour was in-between accommodative and combative against NWS's lack of action on disarmament (Van Wyk, 2015, p. 5). In that conference, South Africa supported the indefinite extension of the NPT. South Africa played the role of being a mediator, facilitator, catalyst, and a bridge-builder (Van Wyk, 2015, p. 5). Another diplomatic moment where SA played a big role in nuclear diplomacy is the Pelindaba Treaty. South African nuclear program was a threat to African security and a big obstacle to the realisation of the Organisation of African Union (OAU) goal of an African Nuclear-Weapon-Free Zone (Adeniji, 2002, p. 32). This objective of the OAU could only be achieved if all African states participate, particularly those with nuclear programmes. Without the participation of South Africa, the Declaration on the Demilitarization of Africa was meaningless. However, as the result of the new democratic government, South Africa signed the treaty in 1996 a year after it influenced the indefinite extension of the NPT.

3.11 “Principled” nuclear diplomacy

South Africa is one of the countries that are contending to be a permanent member of the UNSC. Considering South Africa's niche identity, its efforts in peace-making and leadership position in Africa, this call does not seem unreasonable. Besides, the country's foreign policy position focused on human rights, global peace, and being a good global citizen (Onderco, 2016, p. 3). However, South Africa's post-apartheid foreign policy appears to be diverging from the US position. It has voted against the US in the UNSC on several occasions. South Africa's relation with Iran revealed its "principled" nuclear diplomacy or what other view as a contradictory position. As the issue of Iran's nuclear ambition heated, it becomes difficult for South Africa to position itself (Onderco, 2016, p. 3). Regardless of what was expected from South Africa because of its non-proliferation credentials, it could not choose to side with the west because this would appear as a betrayal of a fellow non-aligned country, nor could it side with Iran either. Additionally, in 2003, South Africa offered to dispatch a team of nuclear scientists/ experts to visit Iraq and to eradicate nuclear weapons under international supervision. This initiative was to prevent the US-led invasion of Iraq. According to the former South African President Thabo Mbeki, the team was going to deal with all matters relating to nuclear, chemical, and disarmament. The former South African President Thabo Mbeki met the former United Kingdom Prime Minister Tony Blair and sent a team in Washington to explain the findings after their inspections in Iraq (The Guardian, 2015, p. 4). All these efforts were to advise against the war in Iraq.

South Africa has displayed "principled" nuclear diplomacy when it chooses to vote based on principle when dealing with matters that involve non-nuclear-weapon states or small states. Moreover, this behaviour is also visible outside of the nuclear realm. South Africa has voted against the US and sided with Russia and China on matters such as the DRC's contested election results and supporting the Venezuelan President Nicolas Maduro (ISS, 2019, p. 1). The US ambassador to the United Nations, Nikki Haley, argued that South Africa's consistency of voting against the US in the United Nations will jeopardise bilateral relations between the two countries (Campbell, 2018, p. 1). This comes after the publication of the UN Voting Report. South Africa voted against the US' decision to move the US embassy from Tel Aviv to Jerusalem (Campbell, 2018, p. 1). Before the voting happened, Ambassador Haley warned that she would be "taking names" of those countries that vote against the US.

3.12 The issue of SA's HEU

After the conversion of the Safari 1 reactor, interests from the US and other states to know the amount and form of the remaining South African HEU stocks increased. The US made it a priority to convince South Africa to give the remaining HEU to the US (Albright, 2015, p. 4). However, according to Albright (2015), South Africa is not part of the International Atomic Energy Agency Information Circular 549 (INFCIRC/549) declaration process. Under this declaration, states declare their civil HEU holdings. Therefore, South Africa is not obligated to declare its civil HEU holdings.

The former US President Barack Obama launched a nuclear security summit with fanfare in 2010 to secure 'vulnerable' nuclear material. Over 175 tons of HEU – enough to build 7000 nuclear bombs has been secured or converted to Low Enriched Uranium (LEU) (SAIIA, 2016, p. 1). Around the world, including South Africa, 329 international border crossings, airports, and seaports have installed radiation detection equipment to detect and prevent trafficking of nuclear and other radioactive material, and about 30 states have eliminated their HEU (SAIIA, 2016, p. 1). Moreover, South Africa has signed the International Convention on the Suppression of Acts of Nuclear Terrorism (ICSANT). Likewise, the Convention on the Physical Protection of Nuclear Materials (CPPNM) received ratifications and support from other states; it entered into force in 2016.

At the beginning of the NSS meeting, South Africa led by example and became one of the first states to change its nuclear reactor that produces molybdenum-99 (medical radioisotope) from HEU to LEU (SAIIA, 2016, p. 1). Furthermore, in 2011 South Africa removed 6.3 kg of US-origin spent HEU fuel from its research facility as part of a bilateral agreement with the United States (SAIIA, 2016, p. 1).

3.13 SA's post-apartheid nuclear industry and exports

There are renewable energy developments in South Africa. These developments boost the desire to have clean energy. The South African energy industry is currently in a transition towards clean energy; however, energy poverty and socio-economic challenges is the biggest obstacle towards clean energy transition. The South African population is increasing, and the economy is growing and so is the need for electricity. Most of South Africa's electricity is

generated through coal, making it one of the world's top twenty carbon emitters (Fig, 2006, p. 3). Nuclear energy generates only 1,930 MW out of South Africa's generating capacity of 39,154 MW (Fig, 2006, p. 3). There has been a series of power cuts due to lack of electricity supply. The South African government has resolved to invest in nuclear energy rather than depend on coal that contributes to carbon emission and unreliable hydroelectricity because of low dam levels. In 2011, South Africa launched the country's Renewable Energy Independent Power Producers' Programme (RE IPPPP) (Baker, 2016, p. 1). Since then, nearly 6.327 MW and ninety-two projects have been permitted, nearly a quarter of those were connected to the grid by October 2015. This constitutes roughly 2% of the overall capacity (Baker, 2016, p. 1). The figures below illustrate reactors operating in SA.

Table 4: Reactors operating in South Africa

Reactor Name	Model	Reactor Type	Net Capacity (MWe)	Construction Start	First Grid Connection
Koeberg 1	CP1	PWR	930	1976-7	1984 - 4
Koeberg 2	CP1	PWR	930	1976-7	1985 - 7

Source: World Nuclear Association

Table 5: Koeberg Operating parameters

Type	Pressurized reactors
Number of reactors	2
Rate station output	1840 MW
Nuclear island contractor	Framatome
Cooling	Seawater

Source: International Atomic Energy Agency, 2020, p. 5.

Nuclear Power Plants in South Africa

- 1 Operating = Cape Town
- 2 Planned = Johannesburg and Thyspunt (in Port Elizabeth)

(World Nuclear Association, 2020, p. 2).

3.14 Nuclear safety and security

The safety and security of South Africa's HEU have come under intense scrutiny and pressure from the United States, especially after the 2007 Pelindaba break-in. As was pointed out earlier, armed intruders break-in at Pelindaba nuclear facilities which is considered to be a national key point. They break a 10 000 volts electric fence, sneaked silently inside the facilities, gained access to the emergency control centre, took a laptop, and after they were found they shot an employee on the chest (SAIIA, 2016, p. 2). It was believed that they were after South Africa's HEU. However, South African government officials dismissed the incident as a random burglary. Since then, Washington increased its efforts to get South Africa to give up its HEU. President Obama tried to convince South Africa's former President Jacob Zuma to down blend the HEU to LEU, but South Africa refused to accept Obama's request. Instead, the South African government vowed to keep working with the global community to increase nuclear security, emphasised the need to install radiation portal monitors and nuclear facility (Pelindaba) audits by the UN Nuclear Regulatory Commission (SAIIA, 2016, p. 2).

South Africa’s possession of dual-use nuclear material and its nuclear expertise makes it a possible exporter of nuclear technology and knowledge to other states and non-state actors. For example, an organisation from the US called United Against Nuclear Iran (UANI) has accused South Africa of being the main exporter of nuclear technology and knowledge in Iran (Asia by Africa, 2018, p. 5). They argue that without South Africa, Iran's nuclear program would have not been successful (Asia by Africa, 2018, p. 5).

There is a concern about the selling of small arms and light weapons (SALW) to terrorist organisations and other non-state actors. There is a fear of the consequences of transnational actors such as al-Qa'ida or the Islamic State stealing nuclear materials and building a nuclear bomb. Trade-in 'dual-use' items such as enriched uranium that can be converted into an atomic bomb; pose a concern to states that are often targeted by terrorist groups (Hurtung, 2018, p. 468). However, South Africans feel that these concerns are directed to its HEU. Also, the US uses this concern to persuade South Africa to give-up its HEU. The 2007 breach at Pelindaba nuclear facilities has been used as the pillar of the US' argument that South Africa is not capable of safely keeping nuclear material and that it should give up HEU for safekeeping. This breach regenerated the US concerns and its claim that South Africa's corrupt state, porous borders, and high level of crime make it a "staging ground for an episode of nuclear terrorism" (Birch and

Smith, 2015, p. 2). Likewise, there are suspicions of an inside job that speaks to corruption as one of South Africa's challenges that can lead to an "episode of nuclear terrorism." It is alleged that the content in the copy of the 98-page report on the breach paints a terrifying picture of the incident that occurred during the breach. It describes the skills and expertise of the intruders and detailed knowledge of the security systems of Pelindaba (Birch and Smith, 2015, p. 3). American officials did not accept the view of the breach as burglary. According to Birch and Smith (2015), Matthew Bunn, a White House nuclear security official dismissed the view that the breach was the work of common criminals and called this view "utterly nonsensical."

3.15 Pressure on SA to give up HEU

As noted above, after becoming the ruling party in South Africa, the ANC took a pro-nuclear industry stance, committed to the peaceful application of nuclear technology. However, Washington saw the same ANC that wanted to sabotage nuclear facilities by planting a bomb at Koeberg during the construction of the Koeberg nuclear reactor. As a result, some of the ANC leaders were classified as terrorists in South Africa and other western countries such as the United States. Now in democratic South Africa, the same leaders who were classified as terrorists are in control of dual-use material such as the HEU. This was the ANC led government, the same ANC that was supported by the Chinese and Soviets during the resistance movement.

South Africa's decisions have been measured within two contexts that prompted 'proliferation concern' (Pretorius & Sauer, 2014, p. 10). Firstly, the connection in the A. Q. Khan network, and the Pelindaba break-in (Pretorius & Sauer, 2014, p. 10). Concerning the involvement in the A. Q. Khan network, there has been a concern that scientists who previously worked in the South African nuclear weapons programme might be recruited by foreign states or organisations to work on another illicit programme. More to the point, Iran admitted that it once wanted to recruit South African nuclear scientists (Pretorius & Sauer, 2014, p. 10). However, up until now, there has been no identified or known South African nuclear scientist that worked on the apartheid government nuclear weapons programme that was successfully recruited to work on illicit programmes (Pretorius & Sauer, 2014, p. 10). Johan Meyer, a native South African, who was actively involved with the illegal trafficking of nuclear materials to foreign clients such as A. Q. Khan Network in Pakistan, was arrested and turned state witness

and testified against Gerhard Wisser (a German national) and Daniel Geiges (a Swiss national) who worked in South Africa (Schapiro, 2008, p. 6). South Africa is one of the few countries that successfully prosecuted cases like this and presented a report to the IAEA on this subject (Pretorius & Sauer, 2014, p. 10). However, despite these efforts, it seems that South Africa is still regarded as a proliferation concern (Pretorius & Sauer, 2014, p. 10). The South African government finds it odd that over 40 countries were involved in the A. Q. Khan network including developed nations, but there has been no prosecution by these states, yet SA remains a proliferation 'concern'.

With regards to the second 'concern', the security breach at Pelindaba nuclear facilities have been used by the US to justify nuclear terrorism narratives and claim that nuclear materials are not safe in South Africa. The Pelindaba nuclear research facilities are considered a national key-point. South Africa used them to keep nuclear materials, yet armed intruders successfully breach the facilities. The US remains convinced that it was terrorists after HEU stock. The US government has offered to secure the facilities, however, South Africa refused, instead opted to work with the IAEA (Pretorius & Sauer, 2014, p. 10). In 2008, after its visit to Pelindaba, the IAEA declared that HEU was not under any threat from the armed intruders, instead the 2006 security upgrade provided an apt basis for the physical protection of the materials (Pretorius & Sauer, 2014, p. 9). Therefore, as far as South Africa is concerned, it is in good standing with its non-proliferation obligations under the NPT. It is not pleased by the US efforts to sell the idea of nuclear terrorism at the expense of developing nations' rights to possess and sell nuclear technology. It argues that the US should not deny its rights to nuclear technology under the guise of nuclear terrorism narratives (Harris, Hatang & Liberman, 2004, p. 14).

South Africa has signalled that it is using the enriched uranium for peaceful purposes. Even so, the possibility that a terrorist group may steal nuclear material from Pelindaba nuclear facility makes some countries feel insecure. Additionally, SA's relations with other states and non-state actors make the US unsure if South Africa may sell enriched uranium to rogue states, transnational non-state actors, or states that are known for sponsoring terrorism like Iran (Booth & Wheeler, 2018, p. 133). The uncertainty of not knowing who might get their hands on South Africa's enriched uranium makes them feel insecure. The US has been arguing that South Africa is not careful enough to keep dual-use material, its security is not tight, and therefore it cannot keep such material.

3.16 Conclusion

This chapter described the case of South Africa. The chapter began with the historical context of the South African nuclear weapons programme, outlined how the ANC opposed the apartheid government's nuclear weapons programme, outlined the ANC's policy on nuclear, and discussed the issue of SA's HEU. It outlined the pressure imposed by the US on SA to give up its HEU and the security reasoning behind this pressure. It also details SA's refusal to do so. In the next chapter, the thesis aims to better understand SA's motivation for this refusal through the lens of the theoretical framework provided in chapter 2. The following chapter provides an analysis of the role of HEU in South Africa's nuclear diplomacy using middle-power revisionism juxtaposed with the status quo.

4. Chapter 4: The role of HEU in SA's nuclear diplomacy

4.1 Introduction

The chapter provides an analysis of the role of HEU in South Africa's nuclear diplomacy using middle-power revisionism juxtaposed with *status quo* foreign policy positions. HEU is one of the most dangerous substances in the world. It is the key ingredient in making a nuclear weapon. South Africa's HEU has been the centre of contention between the US and South Africa for quite some time. I will answer the research question, which asks the role of HEU is in South Africa's nuclear diplomacy. This will happen by first outlining 'good' and 'bad' applications of HEU, and then answer the following questions: How does HEU affect states' nuclear diplomacy generally? What does HEU represent in international relations? Why is SA resistant to giving its HEU up? How does SA's resistance to give up its HEU impact its credentials as a key player in the non-proliferation and disarmament regime? What does SA intend to use its HEU for? These questions will help determine the role of HEU in SA's nuclear diplomacy.

4.2 HEU and nuclear diplomacy

4.2.1 Peaceful application of HEU

HEU is used to power commercial electricity-generating reactors to produce electricity. It is also used as a fuel for research and naval reactors, breeder reactors, and HEU as targets that are irradiated by neutrons for making medical isotopes (Schaper, 2013, p. 8). HEU is used as a fuel for naval reactors to power submarines, non-military icebreakers, and aircraft carriers (Schaper, 2013, p. 26). The reason for using nuclear reactors in submarines is because submarines travel underwater for a long time, they must produce energy while underwater, and they must be quiet (Schaper, 2013, p. 26). Medical isotopes production helps to treat cancer patients in the hospital. The cancer patient is injected with a radioactive isotope, the radioactive isotope gives a picture of the body, and this image is called the scintigraphy cancer test and is used for the detection of different forms of tumours (Schaper, 2013, p. 23). After the use of an isotope that has radiation that produces an image of the body, it must decay fast so that it can allow the radioactivity in the body to fade (Schaper, 2013, p. 23). This means that the isotope must be stored for a short time. The isotope that is used for this procedure is the technetium-

99m (TC-99M) (Schaper, 2013, p. 23). This isotope decays very fast in the body and it leaves sufficient time for diagnostics (Schaper, 2013, p. 23). Most scintigraphic cancer tests are done with Tc-99m.

4.2.2 HEU as a dangerous material

The initial reason for the invention of HEU was for military purposes. The destructive power of a bomb made out of HEU was demonstrated during World War II, bringing a long war to a quick end (World Nuclear Association, 2018, p. 1). The power of an atom was displayed in Hiroshima and Nagasaki. The US was the first country to harness the power of HEU. Therefore, the US understands the importance and value of HEU. The US foreign policy on HEU has influenced other states' HEU policies around the world. It has been leading the initiative to eliminate and reduce HEU all around the world. However, this US initiative has shown some contradictions. Under the Atoms for Peace plan, the US assisted countries around the world with the application of peaceful nuclear technology, spreading research and knowledge, test reactors, LEU, and HEU to power them (Loukianova & Hansell, 2008, p. 2). On the other hand, the US' fear of nuclear proliferation prevents the spread of peaceful nuclear technology. Moreover, this global HEU elimination initiative is undermined by the fact that the US still possesses a large amount of HEU military stockpile (Loukianova & Hansell, 2008, p. 3).

The 9/11 terrorist attacks reinvigorate the US' need for the elimination of vulnerable nuclear materials all around the globe. According to the US, the elimination of these vulnerable materials or down blending the HEU to LEU ensures greater security (Loukianova & Hansell, 2008, p. 16).

HEU is dangerous because it can be used to make weapons of mass destruction. It is the most dangerous material in the world because it is a key ingredient in making a nuclear bomb (Pomper, Bieniawski & Sokova, 2015, P. 1). That is why there have been efforts to eliminate this material. The quantities that countries possess are estimated at 1,300 tons, while the quantities needed to make a nuclear bomb are tens of kilograms (Schaper, 2013, p. 7). The HEU's explosive properties do not change for hundreds of years because of its slow radioactive decay and the slow accumulation of decay products (Schaper, 2013, p. 12). However, plutonium's explosive property can change over a period of decades (Schaper, 2013, p. 7). A country that can get hold of HEU or a terrorist group with HEU would be able to make a nuclear bomb. There is the possibility that the possessors of these vulnerable materials can use them to build nuclear weapons. Therefore, non-proliferation efforts try to prevent the conversion of

HEU into a nuclear weapon by applying international controls, disincentives for misuse and apply technical measures by diluting HEU into LEU (Schaper, 2013, p. 7).

4.3 HEU in international relations

Any uranium enriched above 20% can be used to make a bomb. It is very difficult to ensure that states do not convert their civilian HEU into a nuclear weapon program. For example, Brazil has launched a nuclear submarine program that has raised concerns about the "loophole" in the IAEA's Comprehensive Safeguards Agreement with non-nuclear weapon states (Hippel, 2016, p. 17). The "loophole" means that under paragraph fourteen of the IAEA's Comprehensive Safeguard Agreement with non-nuclear weapon states, a country can withdraw from safeguards material for use in non-prescribed "non-peaceful activities" (Hippel, 2016, p. 17). This "loophole" was introduced by the Netherland and Italy that were interested in building submarines and nuclear-powered ships and had concerns that international inspectors might have access to classified naval design information (Hippel, 2016, p. 17). Brazil's nuclear submarine raises concerns with the five declared nuclear powers under the NPT (P5), because if the submarines use HEU then that means the fuel will be directly weapon usable. Similarly, in 2013, Iran suggested that it might need HEU enriched up-to 45% and 56% for its nuclear submarine program (Hippel, 2016, p. 17). This shows the vulnerability of the non-proliferation regime to the non-peaceful activities loophole. This is why the US calls for the elimination of HEU production. The ban on HEU production and use would close this loophole.

South Africa possesses weapons-grade uranium. Its HEU raises concerns of theft by terrorists since a gun-type HEU bomb similar to that of Hiroshima is within reach of non-state actors such as terrorist groups (Hippel, 2016, p. 17). Moreover, even though South Africa's uranium is under IAEA nuclear safeguards, but because of the non-peaceful activities loophole, it has a theoretical capability to convert its HEU to nuclear bombs.

Some nuclear states and former nuclear states began their nuclear weapons program under the guise of peaceful application of HEU with HEU meant for a civilian nuclear program. This means that possessing HEU and with the “loophole” in the IAEA’s Comprehensive Safeguards Agreement, a state can convert its HEU into a weapon of mass destruction. This creates discomfort and uncertainty over the intentions of a state with HEU. This is what Booth and Wheeler (2018) call the unresolvable uncertainty when foreign policy analysts and other government officials can never be sure of the future intentions of those who can harm them. The cause of this unresolvable uncertainty is due to material and psychological drivers (Booth

& Wheeler, 2018, p. 132). At the base of the material driver is what they call ambiguous symbolism, the struggle of safely distinguishing whether the materials are for 'offensive' (military use) or 'defensive' use (Booth & Wheeler, 2018, p. 132). Of course, these two refer to nuclear weapons, but because HEU is the key ingredient for a nuclear weapon and because states have before converted their civilian HEU to build nuclear weapons, it causes uncertainty about the future intentions of states. The World Nuclear Association (2018) writes that the biggest risk for nuclear proliferation comes from the countries that have not joined the NPT, those who have unsafeguarded nuclear activities, and those who are part of the NPT, but disregard their commitment under the NPT. Pomper, Bieniawski, and Sokova (2015) propose the creation of HEU- Free Zones to strengthen a global norm against HEU. These HEU - Free Zones would operate similarly to the Nuclear Weapon Free Zones. Efforts to remove HEU have been made with progress, 26 countries plus Taiwan have agreed to remove HEU. These countries include Brazil, Mexico, South Korea, Turkey, Sweden, and many more (Pomper, Bieniawski & Sokova, 2015, P. 1). This global norm on the elimination of HEU stigmatises the possession of HEU. Conversely, many states (such as South Africa) that are under the NPT and possess a significant amount of HEU argue that it is their right under the NPT to have access to nuclear technology.

4.4 South Africa's resistance to give up its HEU

As already noted, according to the SAIIA (2016), SA is believed to own several hundred kilograms of HEU at the Pelindaba Nuclear Research Centre, more than that of India, Pakistan, and Israel. The US has policies dedicated to South Africa's nuclear materials as part of its effort to strengthen world security against nuclear terrorism (Stott, 2011, p. 1). It had great influence on South Africa's nuclear disarmament, and it has been relentless in trying to persuade South Africa to give up its HEU (Albright, 2015, p. 4). The former US President Barack Obama made countless efforts to convince South Africa to give up HEU, however, South Africa are yet to be swayed. This section explores the reasons for the South African government's resistance to give up its HEU.

4.4.1 Hypocrisy and the nuclear order

In a world without a world government, states enter treaties hoping for the best; however, things do not always happen the way they hope. When entering these treaties there is always the possibility of states cheating. After South Africa disarmed its nuclear weapons and entered the NPT, it hoped that the five-original nuclear-weapon states (US, Britain, France, Russia, and

China) will honour their pledge to eliminate nuclear weapons. However, they did not. In 1995, 123 non-nuclear weapons states reiterate their rejection of nuclear weapons in return for the reaffirmed promise by the five nuclear weapon powers to eventually abolish their nuclear weapons (Cirincione, 2005, p. 1). They entered the treaty knowing that it is not perfect but cooperation among member states made them a bit safer. The five officially recognised nuclear-weapon states pledged to eventually disarm their nuclear weapons as part of their general disarmament agreement (Economist, 2005, p. 1). According to Pretorius & Sauer (2014), years after the end of the Cold War, many countries feel that the nuclear-weapon states will not fulfil their NPT pledge to disarm their nuclear weapons. South Africa notices this too. Ambassador Jerry Matjila (2020), a permanent representative of South Africa to the UN, said the pillar of nuclear non-proliferation in the NPT has been strengthened, but similar efforts to eliminate all nuclear weapons, in an irreversible and verifiable manner are yet to be realised (Matjila, 2020, p. 1). He said "we [South Africa] likewise remain seriously concerned about the apparent lack of urgency and seriousness with which the solemn undertakings, particularly in respect to nuclear disarmament, continue to be approached. Still more concerning the attempt to negate or reinterpret the nuclear disarmament undertakings made since the 1995 Review and Extension Conference" (Matjila, 2020, p. 1). Thus, South Africa believes that the US wants to maintain the *status quo* and protect the current nuclear order.

4.4.2 A shift in South Africa's nuclear diplomacy

There has been a shift in post-apartheid South Africa's foreign policy. Firstly, after 1994, South Africa exhibited the characteristic of a reformist state using its moral high ground. Reformism is a political doctrine that campaigns for reforms in an existing system (Collins, 2019, 1). Reformists believe that gradual changes through current and active institutions can bring about fundamental changes in the international system. After 1994, some of South Africa's foreign policy actions showed a reformist posture. However, overtime its foreign policy shifted to middle-power revisionism.

After South Africa disarmed its nuclear weapons, the post-apartheid government used that moral high ground to play the role of a middle power in nuclear diplomacy. This moral position allowed South Africa to be influential in nuclear diplomacy. As a result, in the Nuclear Non-proliferation Treaty (NPT) Review Conference in 1995, South Africa called for the indefinite extension of the NPT (Leith & Pretorius, 2009, p. 345). Van Wyk and Onderco (2019) points out that South Africa was the main intellectual driver that attracted the support of NAM and

help bring the conference towards a successful conclusion, the adoption of the resolutions on Principles and Objectives, as well as the resolution on a strengthened review process. Moreover, in 2003 South Africa sent a team of diplomats and former weapons officials to assist with verification and advise Iraq on verifiable disarmament (Harris, Hatang & Liberman, 2004, p. 2). This exhibits the fact that middle power diplomacy has played a vital role in the establishment and maintenance of the NPT and other different arms diminution treaties (Leith & Pretorius, 2009, p. 346).

The post-1994 South Africa's foreign policy shows that it considered itself as a bridge-builder between nuclear states and non-nuclear states. South Africa took an activist role in nuclear non-proliferation diplomacy. It desired to open a space for dialogue and interaction between the developed North and also address the concern of the developing South that they are denied access and possession of nuclear technology which is crucial in their development (Leith & Pretorius, 2009, p. 350). In 2003, South Africa deployed a team of weapons experts in Iraq for nuclear weapon inspections and to share South Africa's disarmament experience. However, its report that Iraq is not building nuclear weapons was not enough to stop the US from going to war with Iraq. South Africa was against the invasion of Iraq. However, despite its efforts and the UNSC resolution, the US continued with its invasion. South Africa believed that it could affect change in world affairs, however, the invasion of Iraq, and lack of progress in nuclear disarmament by the nuclear-weapon states, prompted a revisionist posture in South Africa's nuclear diplomacy. It increased its activism and adopted a more hostile tone towards nuclear-weapon states. Over the years, South Africa's foreign policy appeared to be shifting to a position that is discontented with the world order that favours the developed North and called for deeper reforms. South Africa's foreign policy shifted from a reformist character to a revisionist character. This behaviour became more visible when South Africa occupied a non-permanent seat in the UNSC in 2007 and 2008. It voted against the Western powers in many issues such as Myanmar/Burma (UN Doc/2007/14) resolution and others (Leith & Pretorius, 2009, p. 353). Over the years, South Africa continued with this revisionist behaviour. It started to criticise international bodies such as the International Criminal Court (ICC) and the UNSC for being bias and for their discriminative application of international law against African leaders (Leith & Pretorius, 2009, p. 355).

South Africa's behaviour display signs that suggest it has realised that nuclear-weapon states do not want to surrender their nuclear weapons; they want to maintain the *status quo*. Thus, South Africa is shifting from a reformist nation to a revisionist state in nuclear diplomacy. For

example, it has expressed concerns about how international law has been selectively applied and how multilateral institutions are a podium for major powers to use in their favour to maintain the balance of power. It has questioned international institutions that promote important values like human rights and peace such as the ICC, and UNSC (Leith & Pretorius, 2009, p. 356). In the UNSC, South Africa has voted against sanctions and interventions in smaller countries - all in the name of protecting their sovereignty. This discontent of the international law application and multilateral institutions has extended to the nuclear realm (Leith & Pretorius, 2009, p. 356). South Africa has expressed the discontent of western powers (US, Britain, and France) that impose their will on small states while using multinational institutions and treaties such as the NPT to their advantage. South Africa's refusal to give up HEU can be seen and interpreted with revisionist lenses. It is using HEU as an act of defiance against nuclear weapon states (such as the US) that are yet to disarm their nuclear weapons. South Africa has used it as leverage against nuclear weapon states in nuclear diplomacy.

4.4.3 South Africa's anti-imperialist position

Jo-Ansie van Wyk (2015) argues that after 1994, the ANC government admitted that its foreign policy focus is to strengthen and promote the 'new' South Africa as a possessor, a producer, and trader of defence-related goods and advanced technologies in the biological, chemical, missile and nuclear fields. The government argues that it is promoting the benefits hold by non-proliferation, disarmament, and arms control for international peace and security to African states and the Non-Aligned Movement (NAM) (van Wyk, 2015, p. 109). Moreover, the South African governor in the International Atomic Energy Agency (IAEA) Abdul Minty (2006) emphasised the basic and inalienable right of developing states to '"develop research, production, and use of atomic energy for peaceful purposes' and that this right 'should be without any discrimination and in conformity with their respective legal obligations." However, Spies (2008) argues that South Africa presents a dichotomy between rhetoric and practice in the UNSC in which it preaches human rights but upholds sovereignty when its global South peers violate human rights. South Africa has been accused of discounting Khartoum's violence in Darfur, betraying its democratic principles and commitment to promoting human rights (Nathan, 2011, p. 1). This anti-imperialist position has led South Africa's foreign policy to be considered to be inconsistent with its liberation struggle against oppression and its democratic principles of human rights and belief in the constitution. According to Van Nieuwkerk (2007), South Africa has aligned with NAM countries, disregarding its constitutional and human rights principles. This dichotomy depicts a shift from

liberal foreign policy and a universal morality towards a focus on anti-imperialism. Jordaan (2008) argues that this anti-imperialist strain in SA's foreign policy renders it unlikely to be considered a neutral negotiator in several Middle East conflicts.

4.5 SA's reputation and its HEU

Nuclear technology is value-neutral (Tannenwald & Acton, 2018, p. 9). This means that nuclear technology is neither good nor bad, but it depends on how you use it. This was the argument of the US military planners, who were referring to nuclear technology. Technology can be used for good purposes and bad purposes by good people and bad people. Thus, in this case, the technology itself is not bad but it depends on who is using it and for what purposes. A good man might peel a pear or an apple with a knife for a starving man, or a murderer might use the same knife to harm someone, but the knife will remain a mere instrument (Miller, 2020, p. 1). The possession of HEU by South Africa only creates a possibility; however, possibilities do not mean they will automatically lead to realisation. Having HEU creates the possibility that South Africa might build a nuclear bomb or sell it to a rogue state to create a bomb, but the mere possibility does not lead to realisation. Therefore, technology itself brings neither bad nor good consequences, but it depends on how one uses it. According to Miller (2020), the above thesis means that technology is not a suitable subject for moral evaluation. Germany, on the contrary, was hugely criticised by the US after seeking to build a nuclear reactor fuelled with HEU (Walker, 1995, p. 1). Critics contended that the argument of neutrality in nuclear technology is an effort to dodge the responsibility of the costs of the use (weapon use) of nuclear technology. Nevertheless, German scientists defended their project and claimed that reducing HEU in Germany will not solve the problem of nuclear diversion/ nuclear proliferation (Walker, 1995, p. 3). Consequently, Germany lost its credibility as a global advocate of nuclear non-proliferation. This means that South Africa's resistance to give up its HEU might negatively affect its credibility as a non-proliferation and disarmament advocate as well.

Technology is made by people for their interests. Technology can destroy people, whether by deliberate intent or mistake. That is why the values that guide technological processes must constantly be discussed and evaluated (Energy Advisory Group, 1977, p. 8). Moreover, the primary purpose of the invention of nuclear technology was for military applications. Therefore, nuclear technology is not a civilian enterprise that has a military application, but it is a military enterprise that happens to have peaceful uses (Acton, 2016, p. 21). This is why

having nuclear technology will always be under scrutiny and to some extent a taboo attached to it. More to the point, the US does not fully trust South Africa's motivations for regaining production capabilities across the whole fuel cycle (Piombo, 2014, p. 34). The US sometimes refers to SA as a "proliferation danger" or "concern" (Piombo, 2014, p. 34). This means that South Africa's ambitions place its peaceful nuclear energy program under suspicion and these suspicions dent its image as a non-proliferation and disarmament champion and it negatively impacts its credentials as a key player in the non-proliferation and disarmament regime. Nevertheless, South Africa justifies its ambitions with the benefits of job creation and prestige. However, according to Boureston and Lacey (2007), South Africa's solidarity with the NAM countries in nuclear matters and its interest to increase nuclear activities can damage its non-proliferation and disarmament credentials.

4.6 Intended uses of SA's HEU

South Africa considers HEU as a strategic asset and it does not want to give it up or to dilute it into LEU (Pretorius & Tom, 2014, p. 8). South Africa is keen on opening or restarting its uranium enrichment programme (Pretorius & Tom, 2014, p. 8). It seeks to be a global nuclear industry player. As an emerging middle power, South Africa views itself as a country with an advanced nuclear industry and should play its rightful role in the international market (Piombo, 2014, p. 36). It is against any measures that will impede its pursuit as a global nuclear industry player. It is South Africa's policy to build the capacity to beneficiate its minerals including uranium (Piombo, 2014, p. 36). Therefore, South Africa will not give up the option to regaining production capabilities across the entire fuel cycle or its option to enrich uranium (Piombo, 2014, p. 36). That is why South Africa has not signed on the idea of international fuel banks, a US initiative to limit and control the possession of nuclear technology and materials (HEU) of other states. However, according to *Mail&Guardian* (2013), the National Nuclear Regulator said in 2013 that they have not received a specific proposal regarding restarting its enrichment programme.

South Africa refers to its uranium as a strategic mineral (*Mail&Guardian*, 2013, p. 2). According to the World Nuclear Association, by 2023 the global demand for uranium will increase by 48% because of the construction of about 68 nuclear reactors (*Mail&Guardian*, 2013, p. 5). Moreover, South Africa develops new nuclear technologies that will be worth a high market value and will benefit South Africa's economy in the future. Its nuclear industry is considered to be one of the most innovative in the world (Boureston & Lacey, 2007, p. 2).

This industry includes the pebble-bed modular reactor which makes South Africa a leader in nuclear energy technologies.

South Africa's ambition to restart its uranium enrichment programme is not in line with the US post-Cold War non-proliferation policy and its nuclear security agenda (Pretorius & Sauer, 2014, p. 9). However, South Africa is persistent in its desire to use HEU in the Safari research reactor (Boureston & Lacey, 2007, p. 2). It rejects the calls from the US and other nuclear-weapon states to phase out the use of its weapons-grade material, and it claims that it is within its right in the NPT to use HEU. Article IV of the NPT states "the basic inalienable right of all states to develop research, production, and use of atomic energy for peaceful purposes without any discrimination and in conformity with their respective legal obligations" (Boureston & Lacey, 2007, p. 2). Furthermore, according to Fabricius, the "stockpile is a symbol of South Africa's sovereignty, its power and its integrity" (Gottesman, 2015, p. 3). This means that HEU is a reminder that SA can build nuclear weapons, but it is their moral choice not to build them.

4.7 Findings

South Africa is using HEU as leverage against nuclear weapon states in nuclear diplomacy and as a bargaining chip to change the nuclear order towards its values, such as equality and nuclear disarmament.

South Africa is using its HEU as a tool to expose the hypocrisy and the inequality in the NPT and to actively challenge the preservation of the *status quo*. It repels any processes that will not revise the P5 privileges in the NPT or what it considers to be the inequality and injustice built into the NPT (Piombo, 2014, p. 36). South Africa does not support any nuclear treaty that does not support reductions in nuclear-weapon states' existing stockpiles of fissile materials in a legally-binding way (Piombo, 2014, p. 36). The failure to address this inequality and historic injustice embedded into the NPT perpetuates what SA calls "nuclear apartheid" (a term coined by India to label the unfair nuclear order brought about by the NPT) (Piombo, 2014, p. 36).

South Africa refused to support a US initiative on creating an environment for nuclear disarmament (CEND). CEND aims at opening a dialogue between states to improve the global security environment considering a geopolitical point of view (Kurosawa, 2020, p. 2). According to Meyer (2019), this initiative is another way for the US to maintain its control of the NPT activities. Abbasi (2019) argues that the dialogue on CEND would grant states an

opportunity to justify their nuclear weapon modernizations; it would impede progress on the Comprehensive Test Ban Treaty (CTBT), and on Nuclear Weapon Free Zone (NWFZ) in the Middle East (Abbasi, 2019, p. 1). Thus, South Africa does not support this initiative that will roll back or reinterpret commitments that were previously approved (Matjila, 2019, p. 2). South Africa promotes equality among states and believes that the current nuclear order is the source of inequality: where some states get to have nuclear weapons and others not (Piombo, 2014, p. 35). Consequently, SA is a key proponent of the Treaty on the Prohibition of Nuclear Weapons (TPNW); this treaty forbids state parties from possessing, testing, developing, and acquiring nuclear weapons (NTI, 2021, p. 1). The TPNW was negotiated despite objections from the five nuclear states who tried to undermine it. South Africa's role in the TPNW process displays its effort to change the current nuclear order.

South Africa sees the nuclear weapons states' failure to disarm as a violation of the NPT and that is equivalent to non-nuclear-weapon states not complying with NPT rules (Piombo, 2014, p. 34). The non-nuclear-weapon states, including South Africa, notice this hypocrisy and accuse the US and other nuclear-weapon states in the NPT of undermining the NPT (Economist, 2005, p. 1). All this hypocrisy and nuclear inequality compel South Africa not to give up its HEU. South Africa is actively challenging the *status quo* regardless of costs and consequences. This daring behaviour is consistent with its foreign policy of a middle power revisionist. Like a true middle-power revisionist, South Africa is using HEU to challenge the *status quo* and change the nuclear order towards its values. It motivates its foreign policy actions by referring to liberal values such as equality and non-discrimination on nuclear technology and pursues these values by actively resisting big power behaviour (US) that contradicts these values, and it strongly resists the *status quo* on middle power principles. Hence Kagwanja (2008) argue that South Africa's anti-imperialist position is a compulsory antidote to the unevenness in the global order and US' unilateralism.

As noted above, nuclear technology (including HEU) is attached to national prestige and a demonstration of global competitiveness. South Africa seeks to be a global nuclear industry player and it considers its uranium a strategic mineral (Mail&Guardian, 2013, p. 2). As an emerging middle power, South Africa views itself as a country with an advanced nuclear industry and should play its rightful role in the international market (Piombo, 2014, p. 36). South Africa is against any measures that will impede its pursuit as a global nuclear industry player. It is South Africa's policy to build the capacity to beneficiate its minerals including uranium (Piombo, 2014, p. 36). Therefore, South Africa will not give up the option to regaining

production capabilities across the entire fuel cycle or its option to enrich uranium (Piombo, 2014, p. 36). Consequentially, the more the US regard South Africa as not fit to keep nuclear materials safe, the more SA is determined to keep them. The more the US imposes its will and its desire to collect vulnerable material around the world, the more SA is determined to keep the vulnerable material. The US' pressure on South Africa is only bringing opposite results for them. The US' obsession with SA's HEU makes it easy for South Africa to voice its dissatisfaction with the nuclear world order and makes it easy to highlight the fact that the US wants to preserve the status quo. The US' pressure on South Africa to give up its HEU while NWS do not make any radical and satisfactory efforts to disarm their arsenal makes it easy for South Africa to argue that there is inequality embedded in the NPT, there is hypocrisy, and the US inhibits small states from having access to nuclear technology. This inequality and historic injustice embedded into the NPT makes SA more determined to take a more hostile tone against the NWS and its foreign policy to take a revisionist position. SA is dissatisfied with the current nuclear order and wants it revised towards liberal values such as equality and non-discrimination. Hence it views the current nuclear order as nuclear apartheid.

The five officially recognised nuclear-weapon states under the NPT are yet to disarm. According to South Africa, that is cheating or hypocritical, because they pledged to eventually disarm their nuclear bombs as part of their general disarmament agreement (Economist, 2005, p. 1). South Africa is reminded of the US' disingenuousness when it makes efforts to eliminate South Africa's HEU. Therefore, South Africa uses HEU as leverage against nuclear weapon states in nuclear diplomacy. It is using HEU as an act of defiance against nuclear weapon states (such as the US) that are yet to disarm their nuclear weapons.

It rejects the calls from the US and other nuclear-weapon states to phase out the use of its weapons-grade material, and it claims that it is within its right in the NPT to use HEU. Article IV of the NPT states "the basic inalienable right of all states to develop research, production, and use of atomic energy for peaceful purposes without any discrimination and in conformity with their respective legal obligations" (Boureston & Lacey, 2007, p. 2). As noted above, according to Fabricius, the "stockpile is a symbol of South Africa's sovereignty, its power and its integrity" (Gottesman, 2015, p. 3). This means that HEU is a reminder that SA can build nuclear weapons, but it is their moral choice not to build them. South Africa is using HEU as leverage against nuclear weapon states in nuclear diplomacy and as a bargaining chip to change the nuclear order towards its values, such as equality and nuclear disarmament.

4.7 Conclusion

The chapter has provided an analysis of the role of HEU in South Africa's nuclear diplomacy using middle-power revisionism juxtaposed with the *status quo*. I have shown that one of the concerning reasons when states possess HEU is the theoretical capability to convert it into a nuclear bomb. However, South Africa notices hypocrisy and inequality with the current nuclear order which favours the US, and it believes that the US wants to maintain the *status quo* and protect the current nuclear order. Therefore, SA uses HEU as a tool to highlight the hypocrisy and as a tool to fight for non-nuclear states' right to possess nuclear technology as promised by the NPT. The following chapter provides the overall summary of the study. It summarises all chapters and provides recommendations.

5. Chapter 5: Conclusion, summary, and recommendations

5.1 Introduction

This chapter provides the overall summary of the study. It summarises all chapters and provides findings and recommendations.

5.2 Summary

This study investigated the role of HEU in South Africa's nuclear diplomacy. Chapter 1 outlined the historical background of the study and methodology that was used. Chapter 2 developed the theoretical framework that guided the analysis of the role of HEU in SA's foreign policy. I chose two theoretical paradigms, which I combined to build the framework: middle-power theory and revisionism. I use this framework to provide an analysis of the role of highly enriched uranium in South Africa's nuclear diplomacy. Chapter 3 outlined the South African case. The chapter provided a full overview of the issue. It provided an inside picture of the issue of South Africa's nuclear industry. Chapter 4 was the analysis of the study. I used middle-power revisionism juxtaposed with *status quo* policies to analyse the role played by HEU in South Africa's nuclear diplomacy. This chapter answered various sub-questions that form part of the bigger answer to the question of the project.

5.3 Recommendations

Understanding other states' perspectives in making their foreign policy is a key concern in international relations. States who try to understand other states' policies and motivations increase their chances of succeeding in foreign policy negotiations. However, those who impose their will and interests on others are likely to fail in diplomacy. If the US could understand South Africa's motivations behind their decision to keep its HEU and try to understand the role played by HEU in South Africa's diplomacy, then consensus is possible between the two countries.

The way the US views the vulnerability of HEU in South Africa is completely different from how South Africa views the issue. The US' concerns and their actions that are inspired by their policy to eliminate all the vulnerable materials in the world might be sincere. However, according to South Africa, if the US is concerned about the safety of vulnerable materials that pose a threat to global security why are they not eradicating and do away with nuclear weapons

possessed by the nuclear-weapon states. That is why South Africa sees the US effort as just a ploy to deny small states access to nuclear technology. Moreover, Birch (2015) argues that South Africa's grip on the HEU has something to do with its national pride, its anger toward the US as a key ally to the apartheid government, and its suspicions of big power motivations in its campaign to eradicate SA's HEU while having nuclear weapons. If these two countries could consider each other's viewpoint and where they come from, then there is hope for an adequate resolution towards this problem. If the US can try to see the issue from South Africa's perspective, then their approach towards this issue may change.

The US has valid reasons to be concerned about the safety of the vulnerable material. In a country like South Africa that is battling with the challenge of corruption and crime; South Africa should be concerned as well. South Africa should work closely with the IAEA and other trusted security stakeholders to further safeguard HEU. South Africa signed the Convention on the Physical Protection of Nuclear Material (CPPNM) and has signed the International Convention on the Suppression of Acts of Nuclear Terrorism (ICSANT) (SAIIA, 2016, p. 1). All South Africa needs to do is to comply with the regulations required by these conventions. Moreover, South Africa must not deny the US' help to further secure all nuclear facilities, but it must do it on its terms. For example, the US has offered to secure Pelindaba, but South Africa declined (Pretorius & Sauer, 2014, p. 9). After the 2007 breach, the US government offered to deploy soldiers at Pelindaba to protect HEU, but South Africa declined (News24, 2011, p. 1). Of course, South Africa is sceptical of US intervention. However, the US can fund security upgrades at Pelindaba Nuclear facilities instead. This will make both parties happy if US is concerned about the safety of HEU. Thus, it will be clear if the US' concern is not HEU safety rather it does not approve of the possessor of the material.

South Africa must find a balance between maintaining its moral high ground, its niche identity as a norm entrepreneur, an advocate for nuclear equality, standing for NAM countries while not damaging its credentials as a nuclear non-proliferation champion. South Africa and other NNWS that possess HEU such as Germany, Belarus, the Netherlands, and others, should work together to form a norm on the possession and protection of HEU.

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