STATES THAT END NUCLEAR WEAPONS PROGRAMS: IMPLICATIONS FOR IRAN

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A Thesis
Submitted to the Graduate College of Bowling Green
State University in partial fulfillment of
the requirements for the degree of

MASTER OF PUBLIC ADMINISTRATION

August 2007

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This thesis seeks to identify factors that cause countries to discontinue their nuclear weapons program using the qualitative case study method. Regime change, regional threats and/or tensions, economic sanctions, and US influence were found to be the most significant factors in states’ decision to discontinue their nuclear weapons program.

Chapter One provides an overview of the study. Chapter Two discusses regime theory, the nonproliferation regime, and the current threats to the nonproliferation regime. Chapter Three provides case studies in which states sought nuclear weapon programs but later decided to discontinue its nuclear weapon programs. Countries included in the case studies are Argentina, Brazil, Libya, North Korea, South Africa, and South Korea. Factors that contributed to each country’s decision to end their nuclear weapons program are identified. Chapter Four provides an analysis of the factors identified in Chapter Three. Chapter Five discusses Iran’s nuclear weapon program, and then consider whether any of factors and identified in Chapter 4 can help us find solutions to an ongoing proliferation case. This thesis is concluded with recommendations for the nonproliferation regime and suggestions for further research.
To my parents, Wayne and Deborah Freeman, who taught me that perseverance overcomes all obstacles.
ACKNOWLEDGMENTS

I would like to express my appreciation to all of those who helped me throughout this enduring process, my “Dream Team”. My greatest appreciation goes to my advisor, Dr. Marc Simon, for all his insightful guidance, and lasting patience. I would also like to thank Dr. Candace Archer and Dr. Shannon Orr for their wonderful insight and direction. Sincere appreciation is expressed to my friend and colleague, Luther Koch, someone who was able to empathize with me throughout this process, for all his encouragement and wonderful insight. A special thanks is extended to Dr. Pamela Longmire- for all of her encouragement and assistance in understanding the scientific background of the nuclear energy process. In addition, I would like to express my appreciation to Dr. Paula Whetsel-Ribeau for her support and mentorship. Gratitude is extended to my family and friends - Elizabeth Brockway, Jovon Burkes, Aisha Cody, Christopher Ellis, Deborah Freeman, Allia Miller, and Na’Tasha Shabazz and my co-workers – who supported me during difficult times. Finally, I would like to thank God, for without God completion of this thesis would not have been possible.
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CHAPTER I: INTRODUCTION TO STUDY

Introduction

It can be reasonably argued that one of the most immediate threats facing the international community today is the spread of nuclear weapons. To date there are eight declared nuclear countries: Britain, China, France, India, Pakistan, Russia, North Korea, and the United States. Israel has nuclear weapons but they have yet to openly admit it to the international community. In addition, Iran may be currently pursuing a nuclear weapons program, however they deny this accusation.

While the threat of nuclear proliferation is serious, one could argue that the international community has done well to keep the world to only 8-9 nuclear powers in the 63 years since the invention of the bomb. There have been many successful cases where proliferation was stopped in the past. We need to draw lessons from these cases to address the current threat.

This thesis identifies the reasons why states that sought nuclear weapons decided to dismantle their nuclear weapon programs. By examining these reasons, the author is able to make recommendations about what prevents states from acquiring nuclear weapon capabilities. Also included is a detailed analysis of the nonproliferation regime which seeks to limit the spread of nuclear weapons. The purpose of including a discussion of the nonproliferation regime is to examine the current crisis that the nonproliferation regime is facing.

Scientific Background

The concern with states developing secret nuclear weapon programs is that many states claim they are seeking nuclear capabilities for peaceful purposes. The same facilities used to generate nuclear energy are used to generate a nuclear weapon. There are three types of reactors
used in the nuclear energy process: light-water reactors, heavy-water reactors, and research reactors.

Natural uranium consists of approximately 99.3% uranium 238 and about 0.7% uranium 235. In order to create a nuclear reaction, natural uranium has to be enriched to either 80 or 90% U-235. Uranium only needs to be enriched to 4% for electronic power production. In order to fuel the light-water and research reactors, uranium has to go through an enrichment process which is done in two different ways, centrifuge or gaseous diffusion. In both the centrifuge and diffusion processes, uranium hexafluoride is used, which is a gas form of uranium. The centrifuge method separates the isotopes of uranium hexafluoride through a spinning process. In the gaseous diffusion method, uranium hexafluoride gas is put under pressure into membranes through which the smaller U-235 isotope can pass more easily. In all uranium in enrichment process the byproduct plutonium is formed, which can also be used to form a nuclear weapon.¹

Heavy-water reactors do not need uranium enrichment facilities, but both light-water reactors and research reactors need enriched uranium. Therefore light-water reactors and research reactors are more dangerous in terms of countries starting parallel nuclear weapon programs because they need the uranium enrichment facilities, unless they are purchasing highly enriched uranium from another country.

Given the complexity of the nuclear energy programs, it is difficult to monitor states commitment to having a nuclear program for peaceful purposes. In order to tackle the problem that the international community is facing in regards to nuclear proliferation, a nonproliferation regime has been developed. This is examined in Chapter Two. To evaluate problems in the regime and to identify the ways in which nuclear proliferation can be stopped, the thesis examines the following questions: What prevents states from going nuclear? How can a serious

nuclear weapon program be stopped? To address these questions, hypotheses were generated from several theories, including the democratic peace theory and realism.

*Hypotheses*

1. States will stop acquiring nuclear capabilities once regional conflicts/tensions are reduced.

2. States’ pursuit of nuclear capabilities will cease once their national agenda is modified through changes in their system of government.

3. If economic sanctions serve as the primary means of persuading the states to denuclearize, states will develop a nuclear weapon.

The first hypothesis is derived from a realist perspective. Realists believe that:

1.) States and other actors interact in an anarchic environment. 2.) The most critical problem presented by anarchy is survival. 3.) States see all other states as potential enemies and threats to their national security.²

Because states are concerned with their national security, if there are regional threats or tensions, then states are less likely to forfeit their nuclear weapon programs.

The second hypothesis is generated from the Democratic Peace Theory postulates that democratic states do not go to war with one another. The democratic peace theory emphasizes democracy, commitment to human rights, and transnational interdependence. A change in government would change a country’s national agenda in terms of what domestic and international issues that are addressed. If a country’s governmental structure shifted towards a more democratic system then its national agenda would change and would allow for more cooperative behavior in regards to its nuclear policy and the international community.

The third hypothesis is derived from the realist perspective and asserts that economic sanctions are simply not costly enough to stop states from pursuing their national security interest. Realists would assert that states’ national security would be valued above the small economic penalty usually imposed by sanctions.

The nonproliferation regime is examined in the second chapter. A regime is “a set of implicit or explicit principles, norms, rules and decision-making procedures around which actors’ expectations converge in a given issue area”\(^3\). This is important when identifying what international structures are in place to regulate the proliferation of nuclear weapons and how a regime can influence states that are not fully adhering to the rules, procedures, norms, rules, and principles that form a regime.

Method

The qualitative case study approach is used for this study. The countries selected in this case study are ones that began a significant nuclear weapon program but later decided to dismantle or discontinue their nuclear weapon program. In this particular study, a time-series case analysis is used to identify factors that changed countries’ nuclear policies over time until the nuclear programs were stopped. The factors that are identified are then evaluated by applying them to an ongoing case- Iran’s uranium enrichment program.

First, an in-depth presentation of the nonproliferation regime is given in the second chapter. This chapter shows the existing constraints on countries with nuclear weapons and those with nuclear energy facilities. The nonproliferation regime may be in a crisis situation because of North Korea and Iran, and we need to understand the regime in order to recommend solutions to preserve the regime. The third chapter provides six case studies that examine countries that

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sought nuclear weapon capabilities but made the decision to dismantle or discontinue. The following countries are used as case studies: Argentina, Brazil, Libya, North Korea, South Africa, and South Korea. Other than Taiwan, the countries examined in this case study are all the countries known to have started and stopped significant nuclear weapons programs. The goal of each case study is to isolate the key factors that contributed to the dismantlement of the nuclear program in each country.

The fourth chapter reveals patterns that emerged from the six case studies. This will identify a set of factors that have been historically most important for countries ending their nuclear weapons programs. The goal of the fourth chapter will be to identify all the feasible means that might be used to stop other countries from going nuclear or cause them to dismantle their nuclear weapons program.

The fifth chapter provides evaluates the utility of the five factors identified in Chapter Four by applying them to the case of Iran. Iran is a state that the international community believes is close to developing a nuclear weapon program. Iran’s motivation for seeking nuclear weapons, a description of Iran’s nuclear weapon program, and a discussion of its domestic politics are all provided. Then, each of the five factors from Chapter Four, are evaluated for their likely impact on Iran’s nuclear weapon program. Finally, chapter five will provide recommendations for the nonproliferation regime for states that may be seeking nuclear weapon capabilities.

Conclusion

The research from this document should present a better understanding of the nonproliferation, current and past threats to the nonproliferation regime, factors that motivate
states to go nuclear, and the factors that may coerce and/or encourage states to discontinue or
dismantle their nuclear weapon programs. The world would be safer if countries did not have
nuclear weapons due to their capacity to destroy. Understanding what factors motivate countries
to go nuclear and understanding the factors that encourage states to dismantle their nuclear
programs will help make a safer future for all states. By looking at past cases in which countries
have started and stopped nuclear weapon programs, this study seeks to provide a plausible means
by which a state that seek nuclear weapon(s) capabilities might forfeit its nuclear weapon
program.
CHAPTER II: THE NON-PROLIFERATION REGIME

Introduction

In order to coherently answer the question “What prevents states from going nuclear” it is important to have an understanding of how the non-proliferation regime operates and the primary responsibilities of all parties. First the concept of a regime will be introduced, followed by a description of the nonproliferation regime, an overview of the most dominant treaties in the regime, the current threats to the regime, and lastly a summary alluding to the fate of the nonproliferation regime. The purpose of this chapter is to examine the regime and its operation so that recommendations can be made to effectively address proliferation that the international community is facing with countries such as Iran.

Regimes

The concept of an international regime was pioneered in 1975 by John Ruggie. Ruggie defined international regimes as a “set of mutual expectations, rules and plans, organizational energies and financial commitments, which have been accepted by a group of states.” After the term was coined by John Ruggie, Krasner defined the concept regime into four different elements; beliefs, norms, rules, and procedures.

Krasner defines principles as “beliefs of fact, causation, and rectitude. Norms are standards of behavior defined in terms of rights and obligations. Rules are specific prescriptions or proscriptions for action. Decision-making procedures are prevailing practices for making and implementing collective choice.”

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The term regime has been formalized by a number of scholars, however the prevailing view in international relations is the definition prescribed by Stephen D. Krasner. A regime, defined by Krasner, is a “set of implicit or explicit principles, norms, rules and decision-making procedures around which actors’ expectations converge in a given issue area”\(^7\). Equally important in regime theory is the presence of interdependence. Regimes operate in a formal environment that is neither hierarchical nor anarchical. Krasner’s definition also emphasizes that regimes are issue specific. Regimes can be categorized into four issue areas: communication, economic, environmental, and security. Each category addresses a specific issue or need in the international community.

Additional scholars such as Haas define a regime as “norms, rules, and procedures agreed by states in order to regulate an issue area”\(^8\), asserting that an agreement is most important in regime theory. However, Krasner emphasizes a unique divergence between regimes and agreements, stating that the objectives of the two concepts differ greatly. Agreements are short-term arrangements while regimes attempt to achieve long-term goals or collaboration. These long-term arrangements are a product of the “policy contingency” that creates a regime. Policy contingency is “the situation in which actors consider carefully the opportunity cost of disturbing a relationship before practicing self-help”\(^9\). Krasner offers two forms of policy contingency, conceived by Arthur Stein, that attempt to codify regimes. The first is regimes of common interest and the second is regimes of common aversion. In common interest regimes, parties agree that acting in their own rational framework and/or self interest would lead them further away from their objective. “Collaboration is then received as the second best strategy, becoming

\(^7\) Krasner, Stephen D., ed. *International Regimes*. Ithaca, N.Y.: Cornell University Press, 1983. pg.11  
optimal policy.” On the contrary, Stein defines common aversion as each party having a “common interest in avoiding a particular outcome.” Collaboration occurs because all parties want to prevent a situation from occurring. Both common interest and common aversion regimes lead to the intended outcome in regime theory, which is ultimately collaboration and/or consensus on norms, beliefs, principles, and rules related to the specific issue central to the complication.

In 1982, Robert Jervis coined the concept of security regimes, which are “principles, rules, and norms that permit nations to be restrained in their behavior in the belief that others will reciprocate.” Jervis expanded regime theory by adding the idea of reciprocity. Reciprocity suggests that states are willing to forfeit their immediate interest for the long-term benefit, trusting that other parties will do the same in the future if they are confronted with a parallel situation.

The Non-Proliferation regime would for the most part be characterized as a common aversion security regime. All actors share the common concern of preventing and/or avoiding the spread of weapons of mass destruction.

This chapter will provide a succinct history of the Non-Proliferation regime, identify the principles, norms, values, and rules illustrated in the Non-Proliferation regime, review the Non-Proliferation Treaty (NPT), present the possible threats to the regime, and lastly provide a critical evaluation.

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Non-Proliferation Regime

The non-proliferation regime is composed of a “series of interlocking international treaties, bilateral undertakings, and multilateral inspections aimed at halting the spread of nuclear weapons”\(^{13}\). All major states are a part of the non-proliferation regime except India, Pakistan, and Israel who have yet to sign the Non-Proliferation Treaty.

The principle, “beliefs of fact, causation, and rectitude”\(^{14}\), on which the Non-Proliferation regime operates is, “the presumption that the increase of nuclear weapons throughout the international community would endanger and increase the vulnerability of international security and peace”\(^{15}\). All actors share the belief that if states are prevented from acquiring nuclear weapon capabilities then the international community as a whole will be more secure. If more states were to acquire nuclear weapons it would then create an international community that is less secure and more prone to violent responses to conflict. The non-proliferation regime, operating from the basis of this principle, creates a set of expected behaviors defined as norms.

Norms are defined as “standards of behavior defined in terms of rights and obligations”\(^{16}\). All parties agree “not to supply any countries with nuclear material. Moreover, countries that do not have nuclear weapon capabilities must abstain from acquiring nuclear weaponry”\(^{17}\). These are the central norms in which the non-proliferation regime operates. These standardized behavioral acts are then enforced and formalized in the form of rules.

\(^{13}\) Cirincione, Joseph. “Repairing the Regime: Preventing the Spread of Weapons of Mass Destruction.
\(^{14}\) Smith, Roger. “Explaining the Non-Proliferation Regime: Anomalies for Contemporary International Relations Theory. *International Organization.* pg. 258
\(^{15}\) Smith, Roger. “Explaining the Non-Proliferation Regime: Anomalies for Contemporary International Relations Theory. *International Organization.* pg. 257
\(^{16}\) Smith, Roger. “Explaining the Non-Proliferation Regime: Anomalies for Contemporary International Relations Theory. *International Organization.* pg. 257
\(^{17}\) Smith, Roger. “Explaining the Non-Proliferation Regime: Anomalies for Contemporary International Relations Theory. *International Organization.* pg. 257
The non-proliferation regime provides rudimentary rules, specific prescriptions and proscriptions in which the non-proliferation regime functions. A few of the basic rules are non-nuclear weapon states (NWS) should not produce nuclear weapons; nuclear weapon states should not provide nuclear weapons to non-nuclear states, and lastly NWS should not engage in exporting nuclear materials without following safeguards and inspection procedures.\textsuperscript{18}

Detailed procedures, assuring the consistent implementation of the central rules, have been developed through over forty series of international treaties. First, there are several geographic treaties related to the location of weapons of mass destruction: the Antarctic Treaty (1959), the Outer Space Treaty (1967), the Treaty of Tlatelolco (1967), and the Seabed Arms Control Treaty (1972). Second are the treaties that are concerned with testing nuclear weapons: The Partial Test Ban Treaty (1958), Threshold Test Ban Treaty (1972), Peaceful Nuclear Explosions Treaty (1976), and the Comprehensive Test Ban Treaty (1994). The next set of treaties addressed covers disarmament: SALT I (1977), SALT II (1979), and START (1989). The next section will discuss these treaties in-depth. This is not an exhaustive list of all the treaties in the non-proliferation regime\textsuperscript{19}.

\textsuperscript{18} Smith, Roger. “Explaining the Non-Proliferation Regime: Anomalies for Contemporary International Relations Theory. \textit{International Organization}. pg. 258


**Geographic Treaties**

The Antarctic Treaty of 1959 signified the beginning of international nuclear arms control. The Antarctic Treaty was intended to preserve the environment of Antarctica, which is the only continent not occupied by a government population. In Article V, Section 1, of the treaty it addresses the “prohibition of nuclear explosions and the disposal of radioactive waste material on the continent”\(^{20}\). This treaty made Antarctica into a nuclear free zone that would only be used for peaceful purposes. Initially this treaty was proposed by the United States in 1948, and negotiations continued until 1953\(^{21}\). Under article seven Contracting Parties have the right to designate an observer and have the right to carry out inspections. Inspections include:

all areas of Antarctica, including all stations, installations and equipment within those areas, and all ships and aircraft at points of discharging or embarking cargoes or personnel in Antarctica, shall be open at all time to inspection by any observers designated in accordance with paragraph 1 of this Article.\(^{22}\)

The Antarctic Treaty was signed and ratified by 12 countries, and 25 countries acceded. The Outer Space Treaty prevents signatories from placing or testing weapons of mass destruction in orbit of the earth, on the moon, and anywhere else in space to preserve these areas for peaceful purposes. The United States urged the United Nations to act quickly in regards to pushing legislation forward in terms of outer space occupation. On May 7, 1966 President Johnson proposed that the appropriate action should be taken in regards to providing rules and procedures for the use of outer space. On May 30, 1966 the Soviet Union presented a statement

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\(^{22}\) The Antarctic Treaty Article VII paragraph 3
to the United Nations that was in many ways similar to the United States\textsuperscript{23}. In July of that same year the United States and the Soviet Union presented two separate treaties to the United Nations. There were a number of negotiations until an agreement was finally reached on December 8, 1966. Procedures concluded are as follows:

If a State Party has a reason to believe that an activity or experiment by it or its nationals in outer space, including the Moon and other celestial bodies, would cause potentially harmful interference with activities of other State Parties the peaceful exploration and use of outer space, including the and other celestial in the peaceful exploration and use of outer space, including the Moon and other celestial bodies, it shall undertake appropriate international consultations before proceeding with any such activity.\textsuperscript{24}

A State Party to the Treaty which has reason to believe that an activity or experiment planned by another State Party in outer space, including the Moon and other celestial bodies, would cause potentially harmful interference with activities in the peaceful exploration and use of outer space, including the Moon and other celestial bodies, may request consultation concerning the activity or experiment.\textsuperscript{25}

States Parties to the Treaty conducting activities in outer space, including the Moon and other celestial bodies, agree to inform the Secretary-General of the United Nations as well as the public and the international scientific community, to the greatest extent feasible and practicable, of the nature, conduct, locations and results of such activities. On receiving the said information, the Secretary-General of the United Nations should be prepared to disseminate it immediately and effectively.\textsuperscript{26}

Ninety-one (91) countries signed the Outer Space Treaty and sixty-two (62) of those countries ratified, while 36 more signed after the treaty went into force.

The Treaty of Tlatelolco was signed February 14, 1967 by eighteen Latin American countries and later signed by all thirty-three Latin American states, with Cuba being the last to sign in 2002\textsuperscript{27}. The Treaty of Tlatelolco forbids all involved parties from developing or producing nuclear weapons. The treaty also prohibits any Latin American country from housing

\textsuperscript{24} Outer Space Treaty Article IX
\textsuperscript{25} Outer Space Treaty Article IX
\textsuperscript{26} Outer Space Treaty Article XI
nuclear weapons for nuclear states. Two years after the development of the treaty the Organization for the Prohibition of Nuclear Weapons in Latin America (OPANAL) was established to make certain all parties remained in compliance with the rules delineated in the treaty. The General Conference, the Council, and the Secretariats are the three orchestrating bodies within OPANAL, with the General Conference being the most central. The General Conference body consists of eighteen Latin American countries, all having signed and ratified the treaty. This body is responsible for allotting a budget, providing procedures for the control system, and establishing long-term goals\(^2\). In addition to the treaty the Agency for the Prohibition of Nuclear Weapons in Latin America ensures that all parties to the treaty remain in compliance with all procedures. Procedures are as follows:

With the authorization of the Council, the General Secretary may request any of the Contracting Parties to provide the Agency with complementary or supplementary information regarding any event or circumstance connected with compliance with this Treaty, explaining his reasons. The Contracting Parties undertake to co-operate promptly and fully with the General Secretary.

The General Conference shall take note of all cases in which, in its opinion, any Contracting Party is not complying fully with its obligations under this Treaty and shall draw the matter to the attention of the Party concerned, making such recommendations as it deems appropriate.

If, in its opinion, such non-compliance constitutes a violation of this Treaty which might endanger peace and security, the General Conference shall report thereon simultaneously to the United Nations Security Council and the General Assembly through the Secretary-General of the United Nations, and to the Council of the Organization of American States. The General Conference shall likewise report to the International Atomic Energy Agency for such purposes as are relevant in accordance with its Statute.\(^2\)

The council consists of representatives from five of the elected nations. The council is responsible for “specific functions operational functions concerning the undertaking of special inspections under the control system”. The Secretariat is under the authority of the General

\(^{28}\) Treaty of Tlatelolco
\(^{29}\) Treaty of Tlatelolco Article 20
Secretary. It is responsible for overseeing the entire body. The Treaty of Tlatelolco has been signed by 29 countries and ratified by 26.  

The Seabed Treaty is formally referred to as the Treaty on the Prohibition of the Emplacement of Nuclear Weapons and Other Weapons of Mass Destruction on the Seabed and the Ocean Floor and in the Subsoil. This treaty was opened for signature on February 11, 1971 and was put into force on May 18, 1972. The treaty asserts that there is an “area of seabed and ocean floor beyond the limits of natural jurisdiction. The regime shall provide for orderly and safe development and rational management of the area and its resources.” The Seabed Treaty has been signed by 89 states and ratified by 66, while 28 other states have signed the treaty after the original signature date.

Prior to the implementation of the NPT, the non-proliferation regime operated from the four treaties presented above. The regime began with the placing of guidelines on unclaimed property and or land such as Antarctica, outer space, and certain areas of the ocean. The previous mentioned treaties are primarily concerned with areas that are uninhabited by human beginnings. The next sets of treaties discussed were drafted around the same time as the geographic treaties; however these treaties address states testing nuclear weapons.

**Test Ban Treaties**

The Limited Test Ban Treaty was signed in 1963, in response to increasing concern with radioactive fall-out from countries testing nuclear weapons above ground. Scientists expressed great concern about the increase in cancer rates and possible genetic defects. The treaty was created in response to public opinion grew increasingly concerned with the possible effects of

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30 Treaty of Tlatelolco Article 20  
31 *The International Comparative Law Quarterly*. Vol. 21 No. 4 Oct. 1972 pg. 806  
32 *The International Comparative Law Quarterly*. Vol. 20 No. 3 July 1971 pg. 583
nuclear testing. In 1958, both the United States and the Soviet Union were responsible for the majority of the nuclear testing. They signed agreed to a moratorium on nuclear testing, known as the Limited Test Ban Treaty (LTBT)\(^{33}\). However, a disagreement arose between the superpowers. The Soviet Union refused to permit on-site inspection and the United States insisted that there be strict verification. Because of the inability to compromise at this point in time, the USSR continued testing in 1961, which may have been in response to France’s nuclear explosion, in 1960. The United States did not feel that they were bound to the moratorium because of the USSR’s decision to continue testing. In October of 1962, at the beginning of the Cuban Missile Crisis, the negotiations between both superpowers come to a complete halt. In December of 1962, Nikita Khrushchev “offered to permit three seismic stations on Soviet soil, as well as three annual inspections in the event of suspicious events”\(^{34}\). The United States did not feel that three inspections were enough. They believed that there should be between eight to ten inspections and consequently the Soviet Union withdrew its concession. It wasn’t until August 1963 that both parties finally reached an agreement and the LTBT came into force. The treaty banned nuclear testing in the atmosphere, in space, and underwater. Two months prior to the implementation of the treaty President Kennedy made a speech commonly referred to as the “Strategy for Peace”, stating that the United States would initiate a unilateral test ban and would discontinue testing weapons as long as the Soviet Union discontinued to test. Since then, 112 nations have signed excluding France. This treaty did not provide any procedures for countries to follow nor did it provide a way to assess states’ commitment.


The LTBT had both positive and negative affects. Among the benefits of the treaty were the decrease in the amount of contamination fallout, the reduction of nuclear competition, and the LTBT’s longevity. Nevertheless, the LTBT did not address underground testing, inspections, or a system to monitor states nuclear weapons. This resulted in a phenomenal increase in the amount of underground testing. “The US and the USSR tested approximately 488 nuclear weapons between the years of 1945-1963, before the LTBT. After the LTBT, between the years of 1963-1981 there were more than 700 nuclear tests reported between both states”\(^{35}\). Consequently the LTBT did not stop the nuclear race, but actually increased the amount of nuclear testing because states began testing weapons underground, which is the method still being used today. The Limited Test Ban Treaty was put into force in October of 1963. The LTBT eliminated the worldwide fallout from nuclear testing and set the stage for the Non-Proliferation Treaty \(^{36}\). A total of 116 countries have signed this treaty.

In response to the increasing amount of underground testing, the Threshold Test Ban Treaty (TTBT) and the Peaceful Nuclear explosion treaties were developed. These treaties were established because of the increase in nuclear testing after nuclear testing was moved underground. The Threshold Test Ban Treaty is a bilateral treaty between the US and the USSR that “prohibits the underground testing of nuclear weapons having yields about 150 kilotons and restricts conduct of test below 150 kilotons to certain established sites”\(^{37}\). The TTBT was signed in July of 1972. This treaty provided a protocol in which both parties had to follow agreeing that testing would only be conducted within specified geographic areas. Shortly after this treaty was


signed the Peaceful Nuclear Explosions Treaty was signed on May 28, 1976. This treaty stated that nuclear explosions would only occur for peaceful purposes. Moreover this treaty stated that:

An upper limit of a 150-kiloton yield of any single explosive device-group explosions that have an aggregate yield of up to 1.5 megatons may be carried out only if the individual explosive devices can be clearly measured as not exceeding 150 kilotons. Such experiments must be conducted outside the boundaries of the weapons test site and explosions must be conducted in compliance with the LTBT. Lastly, nuclear explosions must be observed on site.38

Members of the US Congress were concerned with the on site verification portion of the treaty because of the lack of guidelines. There was no sure way to assess that explosions were above 200 kilotons. Both states agreed to observe the “150-kiloton portion of the treaty, pending an agreement of adequate verification”39. However, the treaty did have distinct verification procedures. For example parties must share “the geographic coordinates of underground nuclear weapon tests, after they have been conducted”.40 For further verification procedures, please refer to appendix A.

The Comprehensive Test Ban Treaty (CTBT) was presented by the United Nations Committee on Disarmament in January of 1994. This treaty “prevents the five declared nuclear states and other states from developing new or advanced weapon designs and reinforces the international norm against nuclear proliferation”41. The CTBT was a result of the promise made by states to permanently discontinue their nuclear explosions made in the LTBT. The negotiations for this treaty started in 1963. However, it was not until 1994 that the treaty was open for signature. The United States signed the treaty in September of 1996 and has yet to ratify. In order for the treaty to enter into force it has to be ratified by all 44 states listed. The

40 Threshold Test Ban Treaty: Protocol to the Treaty Between the United States and the Soviet Socialist Republics on the Limitation of Underground Nuclear Weapon Tests 1(c)
procedures/verifications in this treaty are spelled out in great detail including sanctions for parties who violate the agreed terms. The detailed procedures are provided in appendix B.

India refused to sign until nuclear power states agreed on a date in which they will eliminate their nuclear weapons. In response to this, Pakistan has refused to sign until India agrees to sign the treaty. There are a total of 164 countries that have signed the CTBT, and 89 have ratified.

Reduction Treaties

The Strategic Arms Limitation Talks (SALT) began on November 17, 1969, following a three year delay. The goal of SALT was “to enhance the security of the United States and the Soviet Union by reducing the risks and cost of the strategic arms competition”\(^{42}\). Two main components of SALT were discussions and limitations. There were two agreements reached during this negotiation. First, is the ABM treaty which, “prohibited the testing and deployment of air-, space, or land based ABM systems and limited each side to no more that two ABM sites”\(^{43}\). Second, is the Interim Agreement on the Limitation on Strategic Arms. This agreement was responsible for establishing a set number on the maximum amount of intercontinental ballistic missiles (ICBMs), submarine-launched ballistic missiles (SLBMs), and missile carrying submarines on each side\(^{44}\). SALT I also was responsible for establishing the Standing Consultative Commission. This commission was responsible for addressing the concerns of treaty noncompliance and working out possible uncertainties within the treaties. This commission was composed of representatives from both the United States and the Soviet Union.

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Procedures for SALT I were problematic because it did not address new technology such as cruise missiles or bombers that the US and Soviet Union were beginning to develop. In response to this new phenomenon SALT II began to address this new security threat.

SALT II was signed in 1979 in Vienna. The quantitative portion of SALT enforced the following:

The Vladivostok ceiling of 2,400 ICBMs, SLBMs, and bombers combined and reaffirmed the number until 1982, which was reduced to 2,250. Out of the 2,250, no more than 1,320 could be MIRVed (multiple independently targetable re-entry vehicle). Of the 1,320 MIRVed vehicles, no more than 1200 may be ballistic missiles and no more than 820 of the 1,200 can be ICBMs. 45.

The qualitative portion of the treaty addressed the following:

“Prohibited rapid reload capabilities, existing missiles cannot involve changing in size, launch weight, or throw weight by more than 5%. Fractionally orbiting nuclear weapons are forbidden. Bombers carrying cruise missiles may not have more than an average of 28 cruise missiles apiece and must be clearly distinguished from bombers not carrying them”46.

SALT II provided defined guidelines by which both countries were to abide. The US signed the treaty but refused to ratify because of the USSR invasion Afghanistan in 1979.

The Strategic Arms Reduction Talks (START) began in May of 1982, by US President Reagan, in response to the nuclear freeze movement in the United States. START was more concerned with the reduction of nuclear weapons verses the limitation. President Reagan’s proposal included the following:

A limit of 5,000 strategic warheads on both the United States and the Soviet Union side, of the 5,000, 2,500 on ICBMs, neither side having more than 850 ICBMs and SLBMs, and lastly further negotiations would stress the limitations on missile throw weight, including strategic bombers47.

46 Ibid 230
47 Ibid 231
The Soviet Union had a great deal of problems with the proposal, asserting that it was one-sided, being in total opposition to the Soviet Union. Consequently, negotiations proceeded for seven years. In September of 1989, progress finally began to take place. Both the United States and the Soviet Union agreed to the following:

- 1,600 accountable strategic nuclear delivery vehicles, such as strategic bombers, sea-launched ballistic missiles.
- 6,000 accountable total warheads could be carries on these delivery vehicles;
- 4,900 of the 6,000 warheads could accountable ballistic missile warheads
- 1,540 of the 4,900 warheads could be accountable heavy ICBM warheads

In order to more fully address the issue of sovereign state’s commitment to the preventing the spread of nuclear weapons, the Non-Proliferation Treaty was created and is the most central component to the non-proliferation regime.

The Non-Proliferation Treaty

The Non-Proliferation Treaty (NPT), the core of the non-proliferation regime, serves as the most comprehensive approach to limiting the spread of the nuclear weapons. In 1968 the NPT was opened for signature but did not come in to force until March 5, 1970. There are currently 170 signatories. This treaty encompassed the five declared nuclear states; Britain, China, France, Russia and the United States, and those countries without nuclear capabilities. A nuclear state is defined as a state tested a nuclear weapon prior to January 1, 1967. However North Korea tested a nuclear weapon in 2006 and both India and Pakistan have admitted to having nuclear weapons. Israel is suspected of having nuclear capabilities, however they have

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51 Farooq, Brigadier. “Nuclear Deterrence in South Asia: S Strategic Failure or Beginning of Regional Stability”. *USAWC Strategy Research Project*. Pg 2
not revealed their program to the international community. Jayantha Dhanapala, the President of
the 1995 Non-Proliferation Treaty Review and Extension Conference, states that the NPT
“consist of states that have undertaken binding legal obligations that change incrementally
through the accretion of customs and general practices of state behavior or through mutual
agreement.” The NPT prevents countries that do not have nuclear capabilities from amassing
nuclear materials by requiring them to pass inspections by the IAEA. This treaty serves as a
compromise between states that are declared nuclear powers and the non-nuclear states. The
NPT is most notable for

nuclear states agreeing not to transfer nuclear weapons to non-nuclear states, or help
non-nuclear states make their own weapons. Non-nuclear states agree not to receive
nuclear weapons, and not to manufacture their own. They also agree to accept safeguards
on their nuclear facilities to be monitored by the International Atomic Energy Agency
(IAEA).53

However, the non-nuclear states were still not satisfied with the agreement because they
felt that it was unfair. Therefore provisions were added stating that nuclear states would share
nuclear technology with non-nuclear states for peaceful purposes and that nuclear weapon states
had to be more committed to ending the arms race. The overall objective of the NPT is to
“prevent the spread of nuclear weapons to non-nuclear states and ensure international
safeguards.”54

The International Atomic Energy Act (IAEA) is the NPT’s most crucial enforcement
mechanism. Its main function “is to ensure, via comprehensive process involving periodic, on-
site inspections, that only peaceful benefits ensure from nuclear activities over which it has

jurisdiction”\textsuperscript{55}. All non-nuclear states are required to report their nuclear facilities to the IAEA. Once these facilities are reported they are then subject to inspections. The IAEA is divided into three pillars: safeguards and verification, safety and security, and science and technology.

Safeguards are defined as “a set of activities by which the IAEA seeks to verify that a state is living up to its international undertakings not to use nuclear programmes for nuclear weapons purposes”\textsuperscript{56}. The IAEA monitors source and special fissionable materials. They screen the quantities of nuclear material in a nuclear facility and changes in the quantity\textsuperscript{57}. States must provide the IAEA with the following:

- information and access to all aspects of States’ nuclear fuel cycle, including uranium mines and other locations where nuclear material intended for non-nuclear uses is present
- Short-notice inspector access to all buildings on a nuclear site and access to other nuclear-related locations. Short-notice inspections are defined as an inspection performed at a facility or a location outside facilities for which less advance notice is provided by the IAEA to the State\textsuperscript{58}
- Information on the manufacture and export of sensitive nuclear-related technologies and inspection mechanisms for manufacturing and import locations
- Collection of environmental samples beyond declared locations when deemed necessary by the IAEA\textsuperscript{59}

The Safety and Security Department establishes the IAEA Safety Standards and publications, provides the application of standards for the safety of nuclear installations, radioactive sources, transportation of radioactive material and management of radioactive waste\textsuperscript{60}. The Science and Technology Department focus on technical cooperation, research and development, and Energy and Electricity.

\textsuperscript{55} Ibid 403
\textsuperscript{56} “IAEA Safeguards: Stemming the Spread of Nuclear Weapons”. \textit{International Atomic Agency Information Series} pg. 1
\textsuperscript{57} “IAEA Safeguards: Stemming the Spread of Nuclear Weapons”. \textit{International Atomic Agency Information Series} pg. 2
\textsuperscript{58} IAEA Safeguards Glossary 2001, International Nuclear Verification Series No. 3 Edition pg. 84
The NPT is reviewed every five years and was to undergo a comprehensive review 25 years after it went into force, which was 1995. During the review, known as the Non-Proliferation Review and Extension Conference, the signatories approved the following: “1.) the NPT’s indefinite extension; 2.) a resolution on ‘principles and objectives for nuclear non-proliferation and disarmament’; 3.) a resolution calling for a strengthened review process”\textsuperscript{61}. Following this review in 1995 was a conference held in 2000. This conference established thirteen steps that the five nuclear states should follow in order to dismantle their nuclear weapons.

**Conclusions**

The nonproliferation regime has evolved greatly over the years, beginning with states valuing the idea that outer space, certain parts of the ocean, and Antarctica are unclaimed territories and should be nuclear free. States cooperated with one another agreeing that these areas should not be used for the purposes of advancing nuclear technology. It is fairly easy to assess states’ cooperation with these treaties because the procedures are clearly defined. Guidelines were unambiguous resulting in Antarctica, outer space and certain parts of the ocean being declared nuclear free zones. Shortly after the enforcement of the treaty, citizens became increasingly concerned with the effects of radioactive fall-out after nuclear weapons were being tested. Therefore test ban treaties were added to eliminate above ground testing. The Partial Test Ban Treaty eliminated the above ground testing, however this did not eliminate the testing of nuclear weapons as a whole. The testing of nuclear weapons actually increased and was moved below ground. This in turn prompted the development of the TTBT and the Peaceful Nuclear

\textsuperscript{61} Rauf, Tariq and Johnson, Rebecca. “After the NPT’s Indefinite Extension: The Future of the Global Nonproliferation Regime”. pg. 28
explosion treaty. Following these treaties were the arms reduction treaties between the United States and the Soviet Union. These treaties outlined specific measurements in terms of how many weapons countries were able to keep. This was an attempt to stop the arms race between the United States and the Soviet Union.

The norms of this regime have remained stable. All states first set the standard of wanting to ensure that non-sovereign territories were not used to create, advance, or test nuclear weapons. Next, states became concerned with the effects testing of nuclear weapons in regards to their citizens’ health. States believed they were obligated to act on behalf of their citizens and their best interest. Moreover, all participating states shared the same obligations of avoiding the exposure of dangerous material to their citizens. The procedures within the regime continued to shift. In SALT I, procedures were loosely defined, eventually leading to the need of a SALT II. In both the chemical and biological treaties, all weapons (biological and chemical) are prohibited. The regime itself has evolved incrementally throughout time through towards concrete verification safeguards and accountability, resulting in more stringent procedures.

Threats to the Nonproliferation Treaty

Since the ratification of the Nonproliferation Treaty many changes have occurred in international system which challenge the NPT regime. Among the current challenges to the international non-proliferation treaty are North Korea, which tested its first nuclear weapon in September of 2006; Iran, which has decided to continue enriching uranium; and India and Pakistan’s active nuclear programs. However, beyond the most obvious threats are the proliferation rings discussed by Braun and Chyba (2004).
Proliferation Rings

Braun and Chyba identified three proliferation rings that serve as major threats to the nonproliferation regime. A proliferation ring consists of a group of individuals and/or states that spread intelligence and technology need to create a nuclear weapon. These are latent proliferation, first-tier, and second-tier proliferation.

Latent proliferation is when a country remains committed to formal obligations of the regime but still continues to develop nuclear weapons. First-tier states are states that buy or steal nuclear weapons from private companies. Lastly, second-tier proliferation is the trading of nuclear weapons among developing countries.

An example of latent proliferation would be North Korea. They were somewhat committed to the formal obligations of the NPT however, they still developed and tested a nuclear weapon in 2006. An example of a first-tier state would be Iran, and an example of a second-tier state would be Pakistan. These proliferation rings are major threats to the nonproliferation regime because these particular states have no loyalty to the international community, which reduces the stability of the norms that have been established in the regime. If states are formally following the principles of the regime but violate these principles at a sub-state level, they lack loyalty to the international community. A regime is bound together through treaties. If states are violating the rules presented in the treaties then it begins to weaken the regime as a whole. Members are forced to deal with states that repeatedly violate the rules.

These three threats to the nonproliferation regime described by Braun and Chyba are weakening the norms of the nonproliferation regime in regards to not spreading nuclear weapon intelligence and technology to non-nuclear states. The nonproliferation regime seeks to first stop the spread of nuclear weapons. These proliferation rings contradict the entire purpose of the regime because they continue to spread nuclear weapon technology, whereas the nonproliferation

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regime’s purpose is to eliminate the spread of WMD. When the regime is faced with noncompliance, it raises of the issue how the regime implicates repercussions for parties that are part of the treaty. One punishment is economic sanctions enforced by the UN Security Council. However, states such as Iran have had sanctions for years and still refuse to cooperate. The lack of states complying with the international regime is an issue of concern.

Six Changes to the Nonproliferation Regime that Serve as Threats

Vladimir Orlov articulates several of the same concerns as Braun and Chyba, however he presents six changes to the nonproliferation regime that serve as threats to its existence.

First is the decision to use force against Iraq, second is North Korea pulling out of the NPT, third, Iran’s intentions, fourth, failure of the universality of the nonproliferation regime, fifth, failure to make progress towards ‘the thirteen steps’, and lastly, non-state actors.63

There has been a lot of controversy over the last several years about the United States’ decision to invade Iraq. Iraq was invaded because the US intelligence believed it had weapons of mass destruction. The nonproliferation regime does not discuss pre-emptive invasion of countries nor does it discuss necessary procedures if a country fails to comply with the procedure expressed within the regime. The UN did not approve of the US invasion of Iraq. The US invasion of Iraq is a threat to the nonproliferation regime because countries without nuclear weapons may feel insure because of how aggressive the United States was in dealing with the situation in Iraq.

North Korea pulling out of the NPT and Iran’s intentions are threats as well. North Korea pulling out of the NPT shifts the international norm because they are not cooperating with the regime. This might cause other countries to do the same. North Korea and South Korea are enemies, and if North Korea seeks to produce nuclear weapons, then South Korea might start to

seek nuclear weapons because they view North Korea as a threat. Iran’s intentions with their nuclear program are highly questionable in the international community. If Iran creates nuclear weapons it might encourage other countries in the Middle East to pursue weapons as well.

In addition to the latter threats to the nonproliferation regime, nuclear states have not followed through with their portion of the Non-Proliferation Treaty in regards to the “thirteen steps” outlined after the 2005 Non-Proliferation Treaty Review. The thirteen steps are practical procedures that nuclear states should take to adequately dismantle their nuclear weapons. Other threats such as non-state actors continue to threaten the regime.

The three proliferation rings discussed by Braun and Chyba and the six threats outlined by Orlov are all viable threats to the nonproliferation regime. The proliferation rings serve as a means through which non-nuclear states are able to acquire the technology and intelligence to build infrastructure needed to build a nuclear weapon. The six threats proposed by Orlov describe specific events that have occurred that threaten the nonproliferation regime. All six of the threats described challenge the legitimacy of the nonproliferation regime.

The treaties established within the nonproliferation regime outline specific behaviors of member states. The proliferation rings serve as a means in which states can illegitimately acquire materials and intelligence that are normally regulated by the IAEA in violation of the procedures outlined in the Non-Proliferation Treaty. The six threats to the nonproliferation regime are events that have occurred that has challenged the enforcement mechanisms of the regime and its ability to negotiate with states.
Conclusion

The nonproliferation regime is the most consistent way to monitor, eliminate, and negotiate nuclear weapons. This regime has lead throughout time in spite of challenges that it has faced. However, the regime is currently facing direct threats that may eventually evolve to its elimination due to the actions of states such as Iran, India, and Pakistan. However, there have been cases in the past where countries have attempted to cross the nuclear threshold or have already crossed and created nuclear weapons, but later decided to dismantle their weapons or eliminate their program. Such cases show that the nonproliferation regime can survive major challenges. The next chapter will discuss cases in which countries had a nuclear program or had developed nuclear weapons but decided to dismantle. Factors which contributed to the dismantlement or elimination of the nuclear programs will be identified in each of the case studies.
CHAPTER III: CASE STUDIES

Introduction

This chapter examines cases in which countries have started nuclear energy and/or weapon programs. All of the cases presented in this chapter had controversial nuclear programs that caused the international community to question the countries’ motives and intentions. Each country initially made a commitment to pursue nuclear energy for peaceful purposes. It was later discovered that they were seeking to build a nuclear bomb. However, a series of events occurred that made each country discontinue its nuclear weapon program, sign the Non-Proliferation Treaty, and become subject to IAEA safeguard inspections.

This chapter will provide the following: a brief discussion of what each country’s nuclear program, followed by each country’s motivations to pursue a nuclear weapons program, and the conclusion to each country’s nuclear weapon program. Next, factors that contributed to the conclusion of the country’s nuclear weapon program are presented, organized by levels of analysis.

The goal of these case studies is to determine why the nuclear weapon programs were ended, and to see whether there are any patterns which may help us understand how other countries who decide to start nuclear program might be enticed to end their nuclear program.

Argentina

Description and History of Nuclear Program

Argentina’s nuclear program started in 1950 under President Juan D. Peron. In that same year the Argentine government created the National Commission for Atomic Energy

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(CNEA). This commission was put under the jurisdiction of the office of head of state. By 1958 Argentina had constructed its first experimental reactor and later built reactors in Peru, Egypt, and Algeria. “Argentina’s first research reactor was manufactured and assembled in Argentina using US plans”. Argentina had access to its own natural uranium due to an abundance of uranium reserves which worked in favor of its nuclear program aspirations. Argentina’s initial intentions in regards to its nuclear program were to “pursue an independent route by developing natural uranium methods, enabling it to limit international control over its nuclear program”.

In 1965 Argentina began to seek electricity generating nuclear plants with the help of German technology. The Atucha plant was built utilizing a design purchased from Germany and served as Argentina’s first heavy-water nuclear plant. Atucha began operation in 1974. The CNEA signed a contract in 1973 for a reactor CANDU reactor and they also announced their plan to start constructing a of a heavy water plant by 1980. The reactor CANDU, a heavy-water nuclear power plant was purchased from Canada and positioned in the Embalse plant. A third heavy water plant design was purchased from a Switzerland company and placed at the Atucha II

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The uranium enrichment method employed by Argentina was the “gaseous diffusion mechanism of enriching uranium in which the uranium is converted into gas uranium hexafluoride”. In 1983 the Argentine military junta revealed to the Argentineans that they had been secretly developing a uranium enrichment facility since 1978 at both Pilcaniyeu and Ezeiza. In 1983, Argentina finally completed its long-term goal of having the ability to enrich uranium. By 1988 Argentina was able to enrich uranium up to twenty percent.

Motivations for Nuclear Program

Argentina’s nuclear program was a “symbol of the nation’s technological prowess and its aspirations for continental leadership”. In addition foreign observers have suspected that the motivations behind Argentina’s nuclear program were to

- secure popular approval for illegitimate military regimes;
- to maintain a technological and scientific lead over its neighbors;
- and perhaps most important, to hedge against the possibility of a Brazilian nuclear bomb.

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74 Ibid Pg. 99
76 Barash, David. “The Arms Race and Nuclear War”. Copyright 1987 Blemont, California. Pg. 9
Note: Argentine research reactors consisted of “RA-0, Cordoba, RA-1, Constituyentes, RA-2, Constituyentes, RA-3, Ezeiza, RA-Rosario, RA-6, San Carlos de Bariloche, and RA-10, Cordoba.
By Argentina being one of the most dominant countries in Latin America, having access to its own nuclear energy would ensure that they remained dominant in the Latin American region.

**Conclusion of Nuclear Program**

Argentina’s arms race with Brazil and desire for nuclear energy independence encouraged its nuclear ambitions in the 1970s. Its well known, ongoing conflict with Brazil was definitely a factor in Brazil’s continuous pursuit of nuclear weapons. Spector writes:

Rather, the risk of a nuclear arms race between them has arisen largely because both viewed nuclear development as a potential factor in their enduring competition for regional preeminence and, at a minimum, an area in which neither could afford to fall behind. Over the years, nationalistic desires for nuclear mastery, combined with concerns over their neighbor’s nuclear activities, have led to a process of action and reaction that has gradually propelled the two countries ever closer to nuclear-weapons capabilities.  

In 1983, under the leadership of newly elected President Raul Alfonsin, Argentina’s nuclear policy began to shift. After Argentina’s loss to the British in the war over the Malvinas/Falklands Islands, Argentina’s government shifted from military to democratic. This transition was rather speedy because the military government lost its credibility when they failed to win the war over the British. In addition to the shift in government there were, “a series of technical and financial problems plagued the country’s key nuclear installations during the latter part of Alfonsin’s presidency”.

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Factors Affecting Decision to End Program

Domestic/Societal

After the Argentine military government was defeated by the British in the Malvinas/Falklands war, President Raul Alfonsin came into office in 1983 and made significant changes to Argentina’s nuclear policy. Prior to 1983 Argentina was firmly committed to pursuing a nuclear program. Under his authority “(m)ilitary involvement in the country’s nuclear affairs was ended, and nuclear confidence-building measures with neighboring Brazil initiated earlier were accelerated”.

In addition Alfonsin severely reduced financial and human resource support to given by the government to the National Commission for Atomic Energy. This occurred because Argentina’s economy began to decline and the country could no longer afford to offer superior treatment to the organization. Consequently the nuclear program moved from being under the authority of the Council of National Defense to being the primary responsibility of the Ministry of Foreign Affairs. Government funding was then cut by 40%. Following his presidency, President Menem was elected in 1989. He continued to modify Argentina’s nuclear policy and also ensure cooperation with the international community.

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Both Argentina and Brazil were aware that both had been seeking nuclear materials for purposes of producing a nuclear weapon. However, both parties refusal to sign the Treaty of Tlatelolco heightened the suspension of each country towards the other, causing both counties to continue pursuing nuclear capabilities to protect their national security. Spector and Smith assert that the arms race between Brazil and Argentina was a result of “nationalism that characterized military regimes in both the 1970s and the early 1980s”.\textsuperscript{87} In the 1980s, following a democratic shift in both governments, both parties began to negotiate possible solutions to the arms race. On July 18, 1991 Brazil and Argentina signed a “bilateral agreement that allow mutual inspections of nuclear installations and established the Argentina-Brazilian Accounting and Control Commission (ABACC) established in 1991”\textsuperscript{88} Prior to this agreement Argentina and Brazil had been “pursuing a series of promising non-proliferation initiatives, including negotiations on a system of mutual inspections, including those not subject to IAEA safeguards”.\textsuperscript{89} Prior to the bilateral agreement between the two nations were a “number of initiatives aimed at economic ties, the coordination of foreign polices, and a commitment to develop nuclear energy for peaceful purposes”.\textsuperscript{90} These set of agreements led to Argentina ratifying the Treaty of Tlatelolco in January of 1994, approximately 27 years after it was signed in September 1967.\textsuperscript{91}

This change in Argentina’s regional policy led to changes in Argentina’s broader foreign policy. “Argentina decided to give security guarantees in this area by means of legally

\textsuperscript{88} Ibid 147 Doyle, James. “Nuclear Rapprochement in Argentina and Brazil Workshop Summary”. \textit{LosAlamos National Laboratory}. pg. 3
enforceable national treaties”.\textsuperscript{92} This in turn forced Argentina to forfeit some of its autonomy to cooperate with IAEA inspections. Eventually Argentina acceded in to the NPT in February of 1995.\textsuperscript{93}

Argentina became isolated from the international community because of its continual denial to end its nuclear program.\textsuperscript{94} Eventually, its refusal resulted in making it extremely difficult to obtain foreign technology to further their nuclear program.\textsuperscript{95} In addition, new limitations were enacted by the Nuclear Suppliers Group, which controls 30 nuclear suppliers, making it even harder for the Argentine nuclear program to acquire materials. “Argentinean authorities expected that a changing attitude to international commitments on nonproliferation would facilitate or even precipitate considerable international assistance in this area”.\textsuperscript{96} In order to combat this dilemma President Menem, who was elected in 1989, developed a foreign policy in alignment with the United States.\textsuperscript{97}

\textit{Individual Level}

One central figure in regards to the dismantlement of the Argentine nuclear program was President Raul Alfonsin. The former military leaders in the country were prosecuted because of human rights violations.\textsuperscript{98} When Alfonsin took over it was easier for him to make policy

\textsuperscript{92} Carasales, Julio. 1999. The So-Called Proliferator That Wasn’t: The True Story Of Argentina’s Nuclear Policy. \textit{The Nonproliferation Review}. pg. 59


\textsuperscript{94} Carasales, Julio. “The So-Called Proliferator That Wasn’t: The True Story Of Argentina’s Nuclear Policy”. \textit{The Nonproliferation Review}. 1999. pg. 60

\textsuperscript{95} Carasales, Julio. “The So-Called Proliferator That Wasn’t: The True Story Of Argentina’s Nuclear Policy”. \textit{The Nonproliferation Review}. 1999. pg. 60

\textsuperscript{96} Carasales, Julio. The So-Called Proliferator That Wasn’t: The True Story Of Argentina’s Nuclear Policy. \textit{The Nonproliferation Review}. 1999 Pg. 60

\textsuperscript{97} Carasales, Julio. The So-Called Proliferator That Wasn’t: The True Story Of Argentina’s Nuclear Policy. \textit{The Nonproliferation Review}. 1999. Pg. 60

changes because the military government had failed so greatly. Aflonsin was in total opposition to the nuclear program and “was a prominent figure in international disarmament efforts” to bring Argentina’s nuclear program under civilian control.99 Alfonsin’s motivation to change Argentina’s nuclear policy brewed from his desire to improve international relations. Prior to Alfonsin’s election Argentina was becoming closer to the nuclear threshold, there was no clear way to gauge how other nuclear powers would react to a nuclear Argentina. This may have been one reason as to why Alfonsin contributed greatly to the dismantlement of Argentina’s nuclear program.100

In the early 1990s President Menem took an interest “in reaching binding bilateral and multilateral agreements”.101 During his term he was concerned with the progression of “economic reform, increased trade and investment, reduction of military influence, and exclusively peaceful use of nuclear energy”.102 He believed the most efficient way to conquer all the above goals through cooperation. This shift in thought resulted the signing of bilateral agreements presented in the above section.

Analysis

Argentina’s shift towards democracy, the state of its economy, international isolation, and Argentine president, Raul Alfonsin are all factors that caused Argentina to dismantle its nuclear weapons program. The most significant factor was the shift in government from military

102 147 Doyle, James. “Nuclear Rapprochement in Argentina and Brazil Workshop Summary”. LosAlamos National Laboratory. pg. 3
to civilian. Argentina’s shift from a military government to a democratic government caused its nuclear program to move from being dominated by the military to being under civilian control. Second, it gave Argentina the flexibility to engage in more bilateral and multilateral agreements. Third, the priorities of the government changed and resulted in a large decrease in funding that had been previously given to the nuclear program when it was under military jurisdiction.

The immense dedication of President Alfonsin helped change domestic structures systematically. Prior to his election Argentina was slowly approaching the nuclear threshold. He was unsure of what the international community’s response would entail and in addition Argentina had been suffering from financial hardships. The changes to the nuclear program structure consequently changed the amount of authority given to the National Commission for Atomic Energy. Improvement in bilateral and multilateral cooperation soon emerged from lessening the authority of this commission and placing the program under the jurisdiction of the Ministry of Foreign Affairs, which left negotiations in the hands of the current president. Nuclear research did not display notable changes; there was no immediate halt to the pursuit of producing a nuclear weapon. However, the suppression of overall economic contributions helped suppress further development of the program. Substantial evidence illustrates that the lack of technical intelligence and financial resources contributed to the idleness of the program. President Alfonsin’s successor, President Menem, invested the same amount of enthusiasm in curtailing Argentina’s nuclear program. His major contribution was getting Argentina to sign the Nonproliferation Treaty on October 14, 1996. This action was considered the “end” to Argentina’s nuclear weapons program.

Brazil

Description and History of Nuclear Program

Brazil’s nuclear program dates back to 1953 under President Getulio Vargas. Admiral Alvaro Alberto was sent to West Germany to get gas centrifuges by President Vargas. Brazil’s nuclear program “emphasized the use of nuclear energy and, potentially national security requirements”. President Vargas arranged for Brazilian scientists to be trained in Germany, however the United States interfered with the agreement. The agreement was cancelled due to extreme diplomatic pressure from the United States.

Historically Brazil’s nuclear program has taken two separate tracks. The first track was operated by the government, which funded the Brazilian Nuclear Corporation (Nuclebras). Brazil signed an agreement with Germany in 1975 which allowed for them to buy “up to eight 1300-megawatt nuclear power reactors, a pilot reprocessing plant, and a large scale enrichment plant”. This initial purchase was made to advance Brazil’s program and an attempt to catch-up to Argentina’s program, which was far more advanced. However, President Sarney announced in August of 1985 that only two of the power reactors would be purchased from Germany because of “major construction delays, massive cost overruns, and severe budget cutbacks”. Following

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that purchase, in 1985 a 626-megawatt reactor located in the Angra I nuclear power plant was purchased from the United States.\textsuperscript{108}

At the same time, Brazil developed a second program commonly referred to as the “Parallel Nuclear Programme”. The parallel program was placed under the jurisdiction of the Brazilian military and the National Energy Commission (CNEN), a research development organization that is managed in secret and not subject to IAEA safeguards.\textsuperscript{109} This program was initiated in 1953 by former military President Getúlio Vargas. His rationale for this program was “that it was necessary to develop the technology that had not been transferred satisfactorily through the Nuclear Agreement with Germany”.\textsuperscript{110} The CNEN in collaboration with the Navy program at the Institute of Nuclear and Energy Research used the gas-centrifuge method of enriching uranium. The goal of this program was to achieve fuel cycle autonomy. A large amount of progress was made at the Institute of Nuclear Energy Research (IPEN), a federally funded program stationed at the University of Sao Paulo\textsuperscript{111} This program was of great concern to the international community due to its secrecy and absence of IAEA safeguard enforcements.\textsuperscript{112} Brazil eventually acquired the ability to possess natural uranium and the unsafeguarded technology for both converting and refining uranium into the form needed for nuclear weapons.\textsuperscript{113}

\textsuperscript{110} Rosa, Luiz. “History of Nuclear Power in Brazil” Energy and Environment. 17(3) 2006. pg. 491
\textsuperscript{111} Rosa, Luiz. “History of Nuclear Power in Brazil” Energy and Environment. 17(3) 2006. pg. 491
Motivations for Nuclear Program

Motivations behind the initial enactment of the Brazilian nuclear program were to strengthen national security and promote greater economic development.\textsuperscript{114} Nationalism was an underpinning factor behind the motivations of Brazil’s nuclear program, along with Brazil’s desire for regional power and apprehension over Argentina’s prosperity.\textsuperscript{115} In 1979 it was estimated by the Brazilian government that Brazil only produced 15 percent of the oil consumed in its country and that it spent $6.5 to $7.5 billion a year on imports.\textsuperscript{116} Therefore its nuclear program began to accelerate under the belief that nuclear energy was needed to prevent the country from spending vast amounts of funds on oil from other countries.

Conclusion of Nuclear Program

Brazil’s program launched late in comparison to its top competitor Argentina, and its program never surpassed what Argentina had already established. There were a number of obstacles that the program encountered that were not successfully overcome. An example of such an obstacle is the lack of monies provided to fund the nuclear deal with Germany, labor strikes that were occurring, and hyperinflation.\textsuperscript{117} The expectations set by the government for progress in building a nuclear weapon were never reached.

Between the years of 1964-1985 Brazil operated under a military regime which presided over its nuclear program. President Sarney was elected in 1985. While Brazil’s government had shifted from being under military authority to civilian control, Brazil’s military still had a large

amount of influence in governmental affairs. They were still in favor of making a nuclear bomb. Nonetheless, bilateral negotiations still continued.\textsuperscript{118} These negotiations lasted for approximately five years. After this, both of the presidents signed an agreement stating that they would only pursue nuclear energy for peaceful purposes. Nevertheless, the military still had a large amount of influence during Sarney’s presidency. When bilateral negotiations first began with Argentina, they sought to help integrate their economies and enhance foreign policies.\textsuperscript{119} However, when Fernando Collor de Mello became Brazil’s president on March 15, 1990\textsuperscript{120}, he was very open in regards to cooperating with the international community. Brazil acceded into the NPT in September of 1998. Brazil’s late ascension into the NPT is due largely to it not being totally free from military authority until Collor took presidential office. Collor replaced the Secretary of Science and Technology and replaced the leaders of the military with more moderate leaders. Thereafter, Brazil’s nuclear program was directed more towards commercial and/or peaceful usage verse military.

\textit{Factors Affecting Decision to End Program}

\textit{Domestic/Societal}

Domestically Brazil underwent a major change in government with the adoption of a new constitution on September 3, 1988. The constitution states that “any nuclear activities within the

national territory will be permitted for peaceful purposes and if approved by Congress”. The new constitution eliminated the option of creating a nuclear weapon and placed the nuclear program under civilian control. The second domestic change occurred in 1990 when the Jose Goldemberg, a known critic of Brazil’s nuclear program, was named Secretary of Science and Technology by Collor. In addition the president of the National Energy Commission (CNEN) and replaced the heads of the military services with more moderate figures. Lastly, during Collor’s presidency (1989-1992), the amount of influence of the military in the government was reduced.

The third domestic factor that helped cease the advancement of Brazil’s nuclear program was the economic state of the country during the 1990s. During the last year of Sarney’s presidency (1985-1990), the economy in Brazil began to suffer greatly, prompting a need for a large change domestically. Economically, Brazil could not afford to continue to pursue nuclear capabilities at the same pace in which it did in previous years. These economic hardships made it difficult to continue spending vast amounts of funds on a program when citizens were suffering.

*International/Regional*

Both Presidents Sarney and Menem signed a number of agreements with Argentina that included bilateral cooperation with civilian nuclear research and cooperation with space related projects. These bilateral agreements helped to cultivate a positive relationship between the two states and helped to eliminate the nuclear arms race between the two. In May of 1990 Brazil and

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Argentina signed the Brazilian-Argentine Agreement on the Peaceful Use of Nuclear Energy.\footnote{Global Security. http://www.globalsecurity.org/wmd/world/brazil/nuke.htm 1 April 2007} Shortly afterward they signed the Joint Declarations on Nuclear Policy of Foz do Iguaçu.\footnote{Global Security. http://www.globalsecurity.org/wmd/world/brazil/nuke.htm 1 April 2007} Then 1991 both Argentina and Brazil signed the Quadripartite Agreement, allowing safeguard inspections. This agreement required IAEA safeguard inspections on nuclear installations and gave each country rights over each other’s technical secrets, including nuclear energy development for submarines.\footnote{Nuclear Threat Initiative. http://www.nti.org/e_research/e3_79.html 1 April 2007}

\textit{Individual}

Under Sarney’s presidency few changes were made to Brazil’s domestic nuclear policy, however President Collor’s contributions to the closure of Brazil’s nuclear program were far more extensive. Collor was against Brazil’s nuclear program prior to his election as president, furthermore he expressed this during his campaign.\footnote{Leonard Spector and Jacqueline Smith, \textit{Nuclear Ambitions: The Spread of Nuclear Weapons 1989-1990}. (1990) Westview Press: Boulder, Colorado, pg. 256} He closed a nuclear test site in September of 1990 and he exposed the military’s secret about developing an atomic bomb.\footnote{Global Security. http://www.globalsecurity.org/wmd/world/brazil/nuke.htm 1 April 2007} Collor was very public with his opinion on Brazil’s nuclear program. His goal was to eliminate the military’s influence over Brazil’s nuclear program. He replaced the Secretary of Science and Technology and president of the National Energy Commission (CNEN). These two changes were critical to Brazil’s cooperation with the international community and their decision to pursue nuclear energy for peaceful purposes.

\footnote{Global Security. http://www.globalsecurity.org/wmd/world/brazil/nuke.htm 1 April 2007}
Analysis

Brazil’s nuclear program started off with the intention of pursuing nuclear energy for peaceful purposes. Regime shift towards democracy, changes in key leaders, economic crisis, regional cooperation, and President Collor, all contributed to Brazil’s decision to dismantle its nuclear weapon program. During Collor’s presidency (1989-1992) campaign he declared that Brazil’s current nuclear program was “unrealistic” and “needs to be reviewed”. Collor was motivated by his dislike of the nuclear program and he thoroughly expressed his dislike for the nuclear weapon program during his campaign. The first agreement reached by both parties was to pursue nuclear energy for peaceful purposes. Incrementally both parties began to develop a more trustworthy relationship eventually allowing both to inspect each other facilities.

Other factors contributed to Brazil’s decision to dismantle its nuclear program, such as the economic crisis that the country faced. The economic crisis helped the country as a whole focus more on domestic issues such as economic development verses national security. This presented the perfect opportunity for President Collor to push forward his personal agenda of ridding Brazil’s nuclear weapon program.

The most important factors in Brazil’s case are regime change and the reduction of potential regional threats. After Collar took office, Brazil’s nuclear program and policy changed drastically. He replaced governmental leaders with more moderate figures. This then placed Brazil’s government under civilian control. Although Brazil was considered to be a democracy under Sarney, it was still heavily influenced by the military. It was the changes enacted by Collar that actually made the difference in Brazil’s nuclear policy. Collar was willing to establish a working relationship with Argentina in regards to nuclear energy. A result of this regime change was better bilateral cooperation.
In addition, Argentina was no longer a potential threat to Brazil’s national security. Furthermore the Treaty of Tlatelolco had already been signed by all regional countries excluding Cuba. Brazil did not have a need for nuclear weapons because all of the possible threats had been reduced. Moreover, its economy was suffering greatly and funds used for the program could be used to fund that of other domestic concerns. Therefore Brazil’s agenda had shifted, as well as its government.

South Africa

*Description and History of Nuclear Program*

South Africa’s nuclear program dates back to the 1940s. In 1949 South African President Jan Smuts introduced the Uranium Research Program.\(^\text{128}\) South Africa had a large quantity of uranium. They supplied both the United States and Great Britain with uranium and trained numerous US nuclear scientists.\(^\text{129}\) In 1952 South Africa opened its first uranium processing plant at Surbekom.\(^\text{130}\) South Africa also helped establish the IAEA in 1957, maintaining a permanent seat on the board of governors because it had the most advanced nuclear program in its region.\(^\text{131}\)

The SAFARI I research reactor was bought from the United States and began operation in 1965. This reactor was fueled with highly enriched uranium from the United States and

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subject to the IAEA safeguards. The Pelinduna-Zero nuclear research center, was developed by South African intelligence in 1967. A heavy-water research reactor was included in the center, however due to financial restraints it was discontinued in 1971. In 1967 South Africa was able to develop enriched uranium using the centrifuge method. It is believed that the German firm STEAG assisted South Africa with developing uranium enrichment technology. South Africa developed its first nuclear weapon in November of 1979. On September 22 of that same year there was a suspicion that South Africa or Israel had tested a nuclear weapon because a flash was detected by a US satellite over the Indian Ocean. US intelligence believed that it was “an Israeli test using South African facilities”; nevertheless there is still a large amount of uncertainty about the event. In 1981 South Africa’s Prime Minister of Mineral and Energy Affairs revealed that the SAFARI I reach reactor was able to enrich uranium 238 up to 45 percent, U-235. However, uranium 238 must be enriched to at least 93.5 percent for a nuclear explosion to occur. With South Africa having the ability to enrich uranium by 45 percent it was not long after they would be able to enrich uranium up to 93.5 percent. Approximately nine years later South Africa announced that it had successfully completed the development of six nuclear weapons before they began to dismantle in 1990.

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Motivations for Nuclear Program

South Africa’s quest for nuclear energy first began for peaceful purposes starting with the establishment of the South African Atomic Energy Board in 1949. However, between the 1960s-1970s South Africa’s quest for nuclear energy transitioned into the pursuit of a nuclear weapons program.

South Africa’s motivations for a nuclear program stemmed from its unstable regional environment and decolonization in South Africa. South Africa became greatly concerned about its national security for several reasons. In 1975 both Mozambique and Angola gained independence, soon after both established Marxist governments. The South African defense establishment declared that “the country faced the threat of ‘total onslaught’ by Soviet-backed forces in the front-line states”. South Africa’s program began to flourish during the 1970’s. During this period South Africa was surrounded by three Marxists states, and the South African Apartheid policy was still in effect. National security served as South Africa’s primary motivation for seeking weapons of mass destruction, while the apartheid policy continued to isolate South Africa from the international community.

Conclusion of Nuclear Program

When de Klerk came into office in 1989 the nuclear weapons program in South Africa came to an immediate stop. Several factors played a role in the conclusion of South Africa’s

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nuclear weapons program, all of which are discussed below. South Africa signed the Non-
Proliferation Treaty on July 10 1990.\textsuperscript{142}

\textit{Factors Affecting Decision to End Program}

\textbf{Domestic}

South Africa experienced a shift from an authoritative government to democratic following de Klerk’s election in 1989. South Africa’s nuclear weapon program was dismantled before President Nelson Mandela was voted in to office in 1994. Prior to Mandela’s election South Africa’s apartheid policy had come to an end in 1992. Nevertheless, there was still white minority dominance. When Mandela came in to office he confirmed South Africa’s commitment to dismantling and discontinuing its nuclear weapon program. Mandela declared “that South Africa must never again allow its resources, scientists, and engineers to produce weapons of mass destruction”.\textsuperscript{143} The African National Congress sought full participation with the IAEA.\textsuperscript{144}

\textbf{International/Regional}

Beginning in about 1963 South Africa became isolated from the international community due its apartheid policy. On November 6, 1962 the first economic sanctions were placed on South Africa. The United Nations Resolution 1761 called for all states to discontinue

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“all diplomatic relations, close ports to South Africa, to forbid vessels flying their flags to enter South African ports, to boycott South African trade, and to suspend landing rights for South Africa.”\textsuperscript{145}

The United Nations then passed a resolution, supported by the US and UK, to end all shipment of arms to South Africa on August 7, 1963.\textsuperscript{146} In July of 1970 the UN Security Council passed a resolution to extend the arms embargo and the embargo was later reaffirmed in 1977.\textsuperscript{147}

In the mid-1970’s nuclear embargoes and boycotts were placed on South Africa by the international community. In particular the United States, France, and West Germany stopped all weapons trade with South Africa in the late 1970’s.\textsuperscript{148} In 1977 President Carter ordered that South Africa had to sign the Non-Proliferation Treaty to continue receiving highly enriched uranium for its Safari-I research reactor.\textsuperscript{149}

In addition, all regional and international motivating factors contributing to South Africa’s initial pursuit for nuclear weapons capabilities had begun to diminish in the 1980s. “A cease-fire on the northern boarder of Namibia was agreed on in August 1988. In addition South Africa, Angola, and Cuba had signed a tripartite agreement in December 1988.”\textsuperscript{150} The threat posed by the Cold War had come to end.


Individual

President F.W. de Klerk contributed greatly to the dismantlement of South Africa’s nuclear weapon program. He was elected on September 14, 1989.\textsuperscript{151} Prior to his presidency Klerk served as the minister of mines in the late 1970s, so he had vast amount of knowledge about South Africa’s nuclear weapon arsenal. De Klerk was appointed by the nationalist party when the former president, P.W. Botha was suffering from a stroke. An election took place after De Klerk’s one month appointment in which his was elected a full term. At this time blacks were still not allowed to vote.\textsuperscript{152}

Following this election, De Klerk ordered the establishment of an Experts Committee that would be responsible for evaluating the pros and cons of their nuclear weapon program.\textsuperscript{153} In addition he wanted a timeline of how long it would take for them to enter the NPT and sign IAEA safeguard agreement.\textsuperscript{154} He also made changes to South Africa’s apartheid policy by reforming its policy to increase the civil rights of blacks. However he opposed policies that might help blacks overthrow the dominant white rule.\textsuperscript{155}

Analysis

South Africa’s motivations towards nuclear proliferation stemmed from regional and domestic tensions. Democracy, the apartheid policy, international isolation, reduction of regional


threats, and South African President De Klerk, all contributed greatly to South Africa’s decision to dismantle its nuclear weapon program and destroying of the seven nuclear weapons.

In 1988 regional tensions in the area began to disintegrate when South Africa, Angola, and Cuba signed a tripartite agreement in favor of phase withdrawal of Cuban troops stationed in Angola.\textsuperscript{156} South Africa had also become exceptionally isolated from the international community mainly because of its Apartheid policy. Prior to the conclusion of the Cold War, Cuban troops were still stationed in Angola. South Africa was extremely Anti-Communist. During this time South Africa could make the case that these weapons were needed for national security purposes based on the fact that the Soviet Union had a large nuclear arsenal. When the tripartite agreement was signed and the Cold War began to come to an end, there was no viable reason why South Africa would need nuclear weapons. Another prominent factor in the conclusion of South Africa’s nuclear program was the governmental changes enacted by President F.W. de Klerk.

South Africa, to date, remains the only country that has crossed the nuclear threshold and dismantled, however there has been no evidence provided to indicate that South Africa tested a nuclear weapon. However, this could change because North Korea has successfully tested a nuclear weapon and is currently engaging in Six-Party Talks in regards to disarming its program. South Africa’s program started out as a nuclear program that entailed the uranium mining process in which they sold uranium to countries such as the United States and Great Britain. South Africa has a vast amount of natural uranium resources. External regional threats, not to mention the Cold War, further fueled South Africa’s interest in building a nuclear bomb.

\textsuperscript{156} Albright, David. “South Africa and the Affordable Bomb”. \textit{The Bulletin of the Atomic Scientist.} (1995 July/August)
Another significant factor contributing to South Africa’s decision to dismantle its nuclear weapon program was South African President De Klerk. It was not until 1989 that the newly elected President De Klerk came into office that significant changes were made in terms of dismantling South Africa’s nuclear weapon program. Not only did they dismantle all six of their weapons, they also revealed all nuclear successes to the international community. De Klerk wanted to cultivate better a relationship between South Africa and the international community. Prior to his election South Africa was extremely isolated from the other states because of the nuclear program and apartheid, which did not start ending until 1994 when President Mandela was elected in to office. However, in addition to the latter, regional threats served as the primary motivations to the nuclear weapon program ceased. Regime change, economic sanctions, and the reduction of regional threats contributed to the conclusion and disarmament of the South African nuclear weapon program.

South Korea

Description and History of Nuclear Program

South Korea began its program by pursuing nuclear energy. They began with a plan in 1968 to create two 500-megawatt electric nuclear power plants by 1976. However, that plan changed when they became interested in constructing a 600 mega-watt electric plant be operated by the Korea Power Corporation. By March of 1976, the Korea Atomic Energy Research Institute requested that Korea create 22 nuclear power plants by 2000. In further pursuit of

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nuclear power, in 1978 the Ministry of Commerce, Industry and Energy requested that they construct 46 nuclear power plants by 2000.\textsuperscript{159}

So in September of 1970, South Korea began its pursuit of nuclear power. However, at the same time, President Park Chung Hee ordered the pursuit a secret parallel nuclear weapons research program as well.\textsuperscript{160}

South Korea’s nuclear weapons program consisted of a light water reactor, CANDU purchased from Canada, a heavy-water reactor, and TRIGA MARK II & III, both small research reactors. Despite these reactors, South Korea was unable to acquire enough material needed to produce nuclear weapons with both enriched uranium and separated plutonium”.\textsuperscript{161} To solve this problem, South Korea wanted to buy a reprocessing plant from France.\textsuperscript{162} However, the South Korean government cancelled plan to purchase a nuclear reprocessing plant from France due to concern from the US that it might raise suspicion that South Korea was developing nuclear weapons. Subsequently, South Korea never proceeded with its nuclear weapon program.

\textit{Motivations for Nuclear Program}

South Korea began its quest for nuclear weapons in September of 1970. Prior events, such as the Korean War, intensified South Korea’s nuclear interest. Mitchell Reiss states:

Given its enthusiasm for industrial advance, its desire for prestige projects to highlight the difference between North and South, its status as a client of the world’s leading exporter of nuclear technology, and its lack of indigenous energy resources, it was not surprising that the Republic of Korea (ROK) became interested in nuclear energy. Most

\textsuperscript{160} Engelhardt, Michael J. "Rewarding Nonproliferation: The South and North Korea Cases." \textit{The Nonproliferation Review}, 1996, 31-37
\textsuperscript{162} Kang, Jungmin and Feiveson. "South Korea’s Shifting and Controversial Interest in Spent Fuel Reprocessing". \textit{The Nonproliferation Review}. Spring 2001. pg. 71
importantly, South Korea’s dependence on Middle East oil supplies made nuclear power appear all the more attractive.\textsuperscript{163}

After Japan surrendered in World War II the United States was responsible for South Korea and the Soviet Union was responsible for North Korea. South Korea and North Korea were divided by the 38\textsuperscript{th} parallel. However in June of 1950 North Korea invaded South Korea, claiming they were going to liberate the South.\textsuperscript{164} The United States sent troops to defeat North Korean troops and reclaimed the invaded territory. After China intervened on behalf of North Korea, the war came to an end in 1953. The United States and the Republic of Korea signed a Mutual Defense treaty, confirming the stationing of US troops in South Korea.\textsuperscript{165}

Tension between the Koreas remained. North Korea attempted to assassinate South Korea President Park Chung Hee in both 1968 and 1974.\textsuperscript{166} There were also border issues such as the Korean Tree Trimming issue of 1973.\textsuperscript{167} Regional tension with North Korea is the primary motivation as to why South Korea sought nuclear weapon capabilities. Seoul is only 20 miles from the border, easily within North Korea’s artillery range.

\textit{Conclusion to Nuclear Program}

In 1974-1975 the United States investigated South Korea’s secret parallel nuclear weapon program. Soon after in 1974-1975 the United States announced that they were going to

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\textsuperscript{166} Engelhardt, Michael J. "Rewarding Nonproliferation: The South and North Korea Cases." \textit{The Nonproliferation Review}, 1996, 31-37
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withdraw American troops if South Korea would not cease its program.\textsuperscript{168} As a result, South Korea signed the Non-Proliferation Treaty 1975. Shortly after, this France announced its intentions to sell a reprocessing plant to South Korea.\textsuperscript{169} Then the United States stated that this action would “result in a loss of American Export-Import Bank loans for South Korea’s nuclear civilian program and ‘jeopardize’ Korea-American security relationship”.\textsuperscript{170} South Korea’s decision to conclude its nuclear program can be reduced to the United States ability to coerce them into dismantling by supplying them with troops and nuclear weapons.

\textit{Factors Affecting Decision to End Program}

\textit{International/Regional}

South Korea’s decision to dismantle its program was mainly due to the United States’ ability to coerce South Korea by threats to withdraw funding and troops, while at the same time, the US maintained its security guarantees. During this time South Korea depended largely on the United States for both financial and military assistance. However, the US was distracted with the Vietnam War, and Seoul might have had doubts about the willingness of the US to come to its defense. Therefore South Korea sought nuclear weapons in part because it was unsure about the United States’ commitment to defend its ally.

\textsuperscript{168} Engelhardt, Michael J. "Rewarding Nonproliferation: The South and North Korea Cases." \textit{The Nonproliferation Review}, 1996, 31-37
\textsuperscript{169} Engelhardt, Michael J. "Rewarding Nonproliferation: The South and North Korea Cases." \textit{The Nonproliferation Review}, 1996, 31-37
\textsuperscript{170} Engelhardt, Michael J. "Rewarding Nonproliferation: The South and North Korea Cases." \textit{The Nonproliferation Review}, 1996, 31-37
Analysis

In the case of South Korea, the United States’ ability to coerce South Korea to stop their program is the primary reason they decided to stop pursuing a nuclear weapons program. First, South Korea attempted to purchase a reprocessing plant from France in 1975 however they were stopped by the United States. South Korea tried once again to build its own reprocessing plant. The United States stopped that as well.

South Korea’s nuclear weapon program was never able to mature due to its heavy dependence on the United States. Every attempt that was made to further its nuclear weapon program was blocked by the United States. Its relationship with North Korea still remained problematic.

In addition to the United States’ ability to coerce South Korea to halt its nuclear program, the United States also supplied security guarantees and rewards for cooperation. The United States provided South Korea with nuclear weapons in 1958, and by 1967 the United States had stationed 950 warheads in South Korea in 1967.171 Also thousands of US troops were stationed in Seoul.

In order for South Korea to construct a nuclear weapon, South Korea would have to buy nuclear facilities, train scientists, and obtain nuclear technology. Along with gathering all the materials needed and training, South Korea would have to sacrifice its relationship with the United States. The cost of investing in a nuclear weapons program outweighed the benefits of keeping a good relationship with the United States. Moreover, the security guarantees provided by the US were sufficient to withstand the tension between South Korea and North Korea.

North Korea

Description and History of Nuclear Program

The Soviet Union helped North Korea begin its nuclear program by providing “various types of missiles, supporting technology, and training.” In the early 1980s North Korea started constructing their first nuclear reactor that was five mega-watts and began constructing a second nuclear reactor at Yongbyon. By 1986 North Korea began operating its first 5-megawatt reactor. In addition they had already bought a small nuclear reactor from the Soviet Union. In 1989 North Korea built the second largest plutonium reprocessing plant in the world. Experts estimated that could the Yongbyon could handle over 200 tons of plutonium per year. Most of North Korea’s nuclear facilities are located at Yongbyon.

North Korea’s plutonium facility consists of a 5 megaton atomic reactor, constructed between 1980 and 1987. It can produce up to 7 kilograms of plutonium yearly, which is enough to construct one nuclear weapon. It also has two larger, 50 and 200 megawatt atomic reactors that had been under construction since 1984. In addition, North Korea has a plutonium processing plant that is approximately 600 feet long. In 1989 a North Korean newspaper announced that Yongbyon also had a testing site.

In the 1990s North Korea began a highly secret uranium enrichment program with the help of Pakistan. North Korea agreed to provide Pakistan with ballistic missiles in exchange for its assistance with its highly enriched uranium program. Evidence shows that this agreement was made between 1993 and 1996. However, the United States, under the Clinton administration, was not aware of this agreement until 1998 or 1999.\textsuperscript{181}

In January of 1992 North Korea signed the International Atomic Energy Agency’s safeguard agreement that requires them to report all nuclear activities to the IAEA and the right to perform inspections on nuclear installations and programs. However, this agreement was interrupted when IAEA wanted to conduct a special inspection on two of nuclear waste sites in Yongbyon in February of 1993. On March 12, 1993, North Korea announced its refusal to allow the IAEA to proceed with the special inspection and its intention to withdraw from the Non-Proliferation Treaty. In response to this, the United States proposed economic sanctions to the United Nations Security Council on North Korea. However, North Korea agreed to halt its program after China informed them they would not veto the first round of economic sanctions. The United States agreed to drop economic sanctions on North Korea. These actions by both parties began the negotiations for the Agreed Framework of 1994.\textsuperscript{182}

The Agreed Framework was an agreement between the United States and North Korea. In this agreement the United States agreed to supply North Korea with two light water reactors as a source of alternative energy. In exchange North Korea agreed to halt and ultimately dismantle its nuclear program and agreed that its progressed could be monitored by the IAEA. In addition to

providing North Korea with materials for nuclear energy, the United States also agreed to provide them with both economic and diplomatic benefits.\textsuperscript{183}

The specifics to the 1994 Agreed Framework are as follows: the United States agreed to provide North Korea with two light water reactors of approximately 2,000 megawatts. The United States was to provide 500,000 metric tons of oil yearly until the first heavy water reactor is received. Both states were to have liaison offices in each country to establish better diplomatic relations. Economic embargoes were to be reduced by the United States encourage more trade and investment.\textsuperscript{184}

Though there were high expectations set when the 1994 Agreed Framework was established, it failed because North Korea believed that the United States did not follow through with its part of the agreement. Tensions began to heighten in August of 1998 when North Korea fired a missile that proved they have to capabilities to strike any area of Japan. On September 13, 1999 North Korea agreed to halt its missile testing. In December of that year same year the United States signed a 4.6 million dollar consortium with North Korea agreeing to build two light-water nuclear reactors. When the United States failed to push through with this agreement, North Korea threatened to restart its program in July of 2000. In June of 2001 North Korea stated that it would restart its missile testing program if the United States did not resume negotiations.\textsuperscript{185}

During President Bush’s January of 2002 State of the Union address he labeled North Korea, Iran, and Iraq as the “axis of evil”, stating that these countries were committed to developing weapons of mass destruction. On December 12, 2002 North Korea reactivated nuclear facilities at the Yongbyon plant that were stopped under the 1994 Agreed Framework.

The CIA asserted that North Korea began to accelerate its enrichment program between 1999-2001 and they would be able “to produce a uranium based-atomic weapon by the second half of 2004.\textsuperscript{186}

The CIA estimated that North Korea had one or two nuclear weapons in September of 2002 at the Pyongang plant.\textsuperscript{187} In October 5, 2002 North Korea revealed to the United States Assistant Secretary of State, James Kelly “that it had a secret nuclear weapons program based on highly enriched uranium”.\textsuperscript{188} On October 9, 2006 North Korea announced that it had successfully tested its first nuclear weapon.\textsuperscript{189}

Shortly after, On October 14, 2006 North Korea agreed to stop its nuclear program and has resumed the Six Party Talks with China, Japan, Russia, South Korea, and the United States.\textsuperscript{190}

\textit{Motivations for Nuclear Program}

North Korea’s nuclear weapon program has been in process since the late 1950s. The program resulted from conflict with South Korea after Japan surrendered in 1945.\textsuperscript{191}

North Korean leader, Kim Il Sung’s repeated attempts to dominate the South “by force led the United States to guarantee North Korea’s security with the use of nuclear weapons, if necessary, in its defense”\textsuperscript{192}. The United States threatened to use a nuclear weapon in South

\textsuperscript{186} Niksch, Larry A. "North Korea's Nuclear Weapons Program."\textit{CRS Report for Congress} (2006).
\textsuperscript{188} Niksch, Larry A. "North Korea's Nuclear Weapons Program."\textit{CRS Report for Congress} (2006).
\textsuperscript{190} Timeline: North Korea Nuclear Stand-Off. \textit{BBC News} http://news.bbc.co.uk/1/hi/world/asia-pacific/2604437.stm
Korea’s defense several times during the Korean War (1950-1953). Soon after, this threat the United States began to ship different types of nuclear weapons to South Korea in January of 1958. The first shipment consisted of:

- four surface missiles, the massive 280-millimeter gun, the 8-inch artillery shell and atomic demolition munitions were introduced: Lacrosse and Sergeant ballistic missiles, Nike Hercules surface-to-air missiles, Davy Crockett nuclear bazookas, and 155-millimeter artillery shells. The arsenal in South Korea was at its largest in 1967, with approximately 950 nuclear warheads of eight types.

This serves as a primary motivation for North Korea to begin a nuclear weapon program, but it is not the sole reason. In addition, North Korea wanted to attain a respectable position in the international community, legitimize its regime, and gain greater independence from China and the Soviet Union. With the help of the Soviet Union and China, North Korea was able to move its nuclear program forward in the 1960s, and in the 1980s, with help from Pakistan.

**Factors Affecting Decision to End Program**

**Domestic**

North Korea currently suffers from an impoverished society. After the Korean war, North Korea’s economy was thriving more so than South Korea. However, over the past several decades North Korea’s economy has slowly declined, while South Korea’s economy has boomed. North Korea’s GDP for 2006 was $1,800 per capita, while South Korea’s was $24,200

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In October of 2006 the United Nations Security Council was in favor of placing more economic sanctions on North Korea if it failed to cooperate.

**International/Regional**

North Korea became a party to the Non-Proliferation Treaty in 1985. In 1991 North Korea and South Korea, in a denuclearization agreement, concurred that not to “possess nuclear weapons, not to possess plutonium reprocessing or enrichment facilities”. In 1994, during the Clinton Administration, North Korea and the US signed the agreed framework in which the United States promised to provide North Korea with two heavy water reactors and 500,000 metric tons of oil until the first heavy water reactor is received, as long as they discontinue their nuclear program. In August of 1998, North Korea tested a long-range missile and announced that it would do so again in October of the same year. But, North Korea agreed to the moratorium in December of 1998. In 2002 North Korea withdrew from the Non-Proliferation Treaty and restarted their research reactor. September 19, 2005 the United States placed economic sanctions on North Korea by freezing funds on a bank account that finances North Korean government agencies. In December of 2006 North Korea agreed to begin Six Party Talks with China, US, South Korea, Russia, and Japan.

On February 13, 2007, North Korea agreed to shut down its Yongbyon nuclear plant within 60 days. However North Korea would only follow through if the other parties (U.S, China, Russia, South Korea, and Japan) supplied it with aid to its energy program and other

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incentives.\textsuperscript{201} However on April 12, 2007, North Korea agreed to stop its main nuclear reactor upon the access to funds in Macao Bank.\textsuperscript{202} As of May 15, 2007 the Six Party Talks had not made any further progress due to the Maco Bank situation.\textsuperscript{203}

Another major player in terms of pushing North Korea to halt its nuclear program is China. China has been spearheading the Six Party Talks and also encouraged North Korea to re-start the talks. China is a major stakeholder in North Korea’s economy and has a significant amount of power within the relationship between the two states. China does not want Japan, a country which is threatened by North Korea and which has the means to acquire nuclear weapons, to proliferate. Therefore they have had a large amount of influence in reference to negotiating with North Korea in the Six Party Talks.

\textit{Individual}

Kim Jong-Il took office, following his father, Kim Il-Sung, in 1994. Kim Jong-Il has not made many international public appearances nor traveled much outside of the Koreas since the 1980s.\textsuperscript{204} On the other hand, Kim-Jong-Il is viewed through the North Korean media as a “peerless leader” and “the great successor to the revolutionary cause”.\textsuperscript{205} Kim Jong-Il’s decisions to continue North Korea’s nuclear program and North Korea’s testing of a nuclear weapon make him all the more revered by North Korean citizens. Kim Jong-Il was willing to engage in the Six Party Talks and also agreed to stop North Korea’s nuclear weapon program as of December,

It is not certain why Kim Jong-Il agreed to stop North Korea’s nuclear program. Nevertheless, one could speculate that economic sanctions and pressure from China serve as his main reasons.

**Analysis**

In the case of North Korea, its nuclear motivations evolved from tensions with South Korea. South Korea had nuclear weapons on its soil, which posed as a threat to North Korea’s national security. In addition the United States threatened to use a nuclear weapon on North Korea, in South Korea’s defense. Moreover, North Korea is under the dictatorship of Kim Jong-Il who firmly believes in self-reliance. He also needs to keep public support/legitimacy given the economic problems in North Korea.

The most important factors that contribute to North Korea’s latest decision to stop its nuclear weapon program are China and North Korea’s current economic state. Especially since the end of the Cold War, China has become a large influence on North Korea. China’s economy has grown quickly in recent years and its economic relationships with other states have improved, giving it greater economic power internationally. If North Korea continues to pursue a nuclear weapon program then it would be risking its working relationship with China, which has a significant amount of economic power. Since North Korea does not have a slew of allies, it would not be in its best interest to ignore China. In addition North Korea may have wanted to avoid a possible invasion after the invasion of Iraq based on suspicions of its nuclear weapon program.

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Moreover, North Korea economy is suffering greatly. Considering the instability of its country and its lack of resources to nourish its country, cooperating with the international community would be the wisest choice. North Korea has had economic sanctions placed on it from the US which froze an account that finances North Korean government agencies. An agreement was made stating that North Korea would halt its nuclear weapon program once it funds were unfrozen. Considering North Korea’s economic state, having access to these funds would surely help its economy. If North Korea continues to act in opposition of the international community, it will have to face great measures such as an increase in international isolation, economic sanctions, and possible more national security threats. Bearing in mind these possible consequences, North Korea may continue to engage in Six Party Talks to avoid the latter.

Libya

Description and History of Nuclear Program

Libya’s first started to pursue nuclear capabilities once Qaddafi came into power in 1969. In the 1970s Libya conventionalized nuclear trade relations, hoping to quickly acquire nuclear weapon technologies. Qaddafi sent a representative to China in 1970 with cash hoping to bring back a prototype nuclear weapon. China rejected this offer. Three years following Libya wanted to purchase electromagnetic enrichment equipment from France, but this offer was also rejected. Finally in 1974 Libya reached an agreement with Argentina. Libya bought uranium processing equipment from Argentina and received training. In 1975 Libya signed an agreement

with Moscow stating that Moscow the Soviets would grant Libya with a small research reactor, located at Tajoura and also help them build a research center.\textsuperscript{210} Moscow and Libya signed a second agreement in 1977 for the construction of two nuclear power reactors.\textsuperscript{211}

Libya’s quest for a nuclear weapon did not go very far. Libya had agreements with India and Pakistan, but both of the agreements were of very little benefit. During Libya’s quest for a nuclear weapon they were able to obtain one research reactor plant, Tajoura. A 440-megawatt reactor was intended to be bought from the Soviet Union and placed at the Gulf of Sidra, however by 1997 it was believed that Libya no longer intended to build the reactor.\textsuperscript{212}

\textit{Motivations for Nuclear Program}

Libya’s nuclear motivations originated from the threat from Israel. Qaddafi stated, “Israel’s arsenal of nuclear weapons and missiles capable of hitting targets in Libya”, serves as the Libya’s primary threat.\textsuperscript{213} Having nuclear weapons could possible “raise his international statue, deter U.S. and Israeli attack, intimidate neighbors, and serves as cheaper alternatives to more conventional forces.\textsuperscript{214} In addition Libya’s military lacks conventional ground, air, and naval forces.\textsuperscript{215}

\textsuperscript{213} Black, Commander Craig R. “Deterring Libya: The Strategic Culture of Mummar Qaddafi. \textit{The Counterproliferation Papers Future Warfare Series No. 8} (2000)
\textsuperscript{214} Black, Commander Craig R. “Deterring Libya: The Strategic Culture of Mummar Qaddafi. \textit{The Counterproliferation Papers Future Warfare Series No. 8} (2000)
Conclusion of Nuclear Program

Libya’s nuclear weapon program did not advance. It was unable to further its pursuit of nuclear weapons because it “lacks well-developed plans, technical expertise, consistent financial support, and sufficient support from foreign suppliers”. When inspectors checked Libya’s nuclear facilities they reported that they were far from being able to produce a nuclear weapon. On December 22, 2003 Libya signed the Additional Protocol to the Non-Proliferation Treaty.

Factors Affecting Decision to End Program

International/Regional

In 1981 Libya agreed to adhere to the IAEA allowing IAEA safeguard implementations and agency protocol procedures. Libya officially dismantled its program in December of 2003, eight months after the Iraq invasion. Considering Libya’s lack of conventional military forces, it would not be able to suppress an invasion. Because of the Iraq invasion, Qaddafi might have had a change in mind, in terms of national security strategy. He once believed that having nuclear weapons would help deter an attack from Israel. However that might have changed after the invasion of Iraq. If Libya continued to pursue its nuclear weapon program it could have provoked a pre-emptive attack. Libya’s nuclear program was very far from producing a nuclear weapon. Libya was not even able to independently enrich uranium. Although, it had received a

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great amount of media attention, Qaddafi was unable to purchase nuclear materials, intelligence, or technology from other countries. US sanctions were extended on Libya for the 1988 US bombing of a US civilian aircraft.\(^{221}\) Therefore, Libya was unable to further its nuclear weapon intentions because it was unable to find a state willing to sell infrastructure needed to produce a bomb.

**Individual**

Muammar al-Qaddafi rose to leadership in September of 1969. Qaddafi overthrew the monarchy through an underground movement.\(^{222}\) He established the Free Officers’ movement.\(^{223}\) Qaddafi eventually turned his coup in to a revolution. Throughout the years Qaddafi has been referred to an inconsistent leader.\(^{224}\) It was also reported that Qaddafi supported over 50 terror organizations.\(^{225}\) Qaddafi initiated Libya’s nuclear program and also decided to dismantle Libya’s nuclear weapon program. He has been very influential in terms of making the decision to both start and stop Libya’s nuclear weapon program.

**Analysis**

Libya’s nuclear motivations originated from it feeling that its national security was threatened by Israel. The factors that contributed to Libya dismantling its nuclear weapon

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program were economic sanctions and US influence. Furthermore, its nuclear arsenal was unable to flourish because the lack of support from the international community in terms of providing means for its program to expand. In addition Libya supported terrorist groups, which could have possibly made its quest for nuclear weapons even more problematic for the West. Libya’s program brought it a lot of attention, which actually made them less secure as a state. After the invasion of Iraq, it was evident that Libya’s nuclear program was putting its national security at risk. Considering the progress of its program along with its weak conventional forces, Libya was extremely vulnerable. Although Libya was not mentioned President Bush as being on the “axis of evil”, the US was still very cautious and aware of its program. The lack of support from foreign suppliers and the Iraq war serve as the two most important factors in regards to Libya’s decision to dismantle its nuclear weapon program and sign the Non-Proliferation Treaty.

Conclusion

Argentina, Brazil, South Africa, South Korea, North Korea, and Libya, all have a variety of factors that influenced them to dismantle their nuclear weapons program, however, there are common patterns that arise.

All six countries wanted nuclear weapons to increase national security because they felt threatened by other regional powers. For example in the case of South Korea, it felt as though its national security because of regional tensions with North Korea. North Korea had attempted twice to assassinate South Korea’s leader. North Korea, however, was threatened by South Korea and the United States. The US stated that if needed, it would use a nuclear weapon in South Korea’s defense. North Korea had no way to deter the United States from using such an extreme measure. North Korean leaders believed that the only way for North Korea to deter a nuclear
weapon from the United States was to have a nuclear weapon of its own. In the case of Libya, it felt threatened by Israel, which has been nuclear power since the 1970s. Therefore it sought nuclear weapon capabilities because of this regional threat. In the case of South Africa, its initial nuclear weapon motivations were due largely to the regional threat of communism and the fact that Cuban troops were stationed in Angola. This served as a threat to South Africa’s national security. In order to deter the possibility of invasion by a communist country it sought nuclear weapons.

Other factors contributed to countries’ motivations as well such as strengthening its military and regional power. In the case of Libya, it sought a nuclear weapon because it lacked conventional military forces. However, in the cases of Argentina, Brazil, and even Libya, these countries wanted more regional power. Argentina is very dominant in its region and it believed that if it had nuclear weapon capabilities that it would have even more regional power. The same is exemplified in Brazil’s situation but they became motivated by the challenge of Argentina’s advanced program in its initial quest. Argentina was already a dominant country in its region, and if it had nuclear weapon capabilities it would have possibly lessened Brazil’s influence in that region.

Each country has its own set of significant factors. However, there are patterns that have emerged from all six case studies. In the following chapter common factors along with patterns of factors are discussed in greater detail in the hope that one might suggest ways in which states end their nuclear weapons program.
CHAPTER IV: ANALYSIS

Introduction

This chapter examines patterns that emerged from the cases in the previous chapter to understand what causes states to dismantle their nuclear weapons program. The major factors that contributed to the six countries’ decision to dismantle their nuclear weapons program are identified. My analysis seeks to explain how factors are related, and the conditions which make each factor important for ending a nuclear program. These factors are as follows: regime change, reduction of regional threats, economic sanctions, US influence, and economic crisis.

Analysis

In regards to commonalities between the six country’s decision to dismantle, regime change, regional cooperation, and economic sanctions have all played a dominant role. Regime change was an important factor in Argentina, Brazil, and South Africa’s decision to dismantle its program. After the Falkland Island War, Argentina’s government transitioned from military dictatorship to a democracy, which gave Argentineans power over Argentina’s nuclear weapon program. The same is true for Brazil. South Africa’s shift in government from authoritarian to democratic also led to changes to its nuclear and foreign policy.

Regional cooperation played a role in the decision of Brazil, Argentina, South Africa, and North Korea to stop their nuclear weapons program. Brazil and Argentina started to develop trusting relationship and eventually signed bilateral agreements in favor of pursuing weapons for peaceful purposes. For South Africa, regional tensions declined when South Africa, Angola, and Cuba signed an agreement, agreeing to remove Cuban troops from Angola. Currently, North
Korea is engaging in Six Party Talks (with China, US, South Korea, Japan and Russia) in which all countries are working on coming to an agreement. In all of these cases, regime change was also an important factor, except in the case of North Korea.

The last major factor, presented in 4 of the 6 cases, is economic sanctions. In the cases of North Korea, South Korea, and South Africa, economic sanctions played a significant role. In the case of North Korea, sanctions were placed because of its lack of compliance to IAEA safeguard protocol. North Korea’s weak economy and dependence on China made it vulnerable to sanction threats. Its weak economy made it desire aid from the US. South Africa was isolated from the international community and also suffered from economic sanctions because of its apartheid policy. After the authoritarian regime was removed, de Klerk aspired to nurture a better relationship with the international community. The economic sanctions placed on South Africa contributed to its isolation.

South Korea’s case was slightly different in that it depended heavily on the United States in terms of its economy and national security. The United States threatened to withdraw its troops if South Korea continued with its nuclear weapon program. If the United States would have removed its troops and placed economic sanctions, it would have been detrimental to both South Korea’s national security and economy. Therefore sanctions were extremely effective when placed by an ally.226

All of the countries in Chapter Three had some unique reasons for starting and later stopping their nuclear weapon program. The common factors in each of the case studies which motivated the start of a nuclear program are: prestige, prosperity, and regional tension/threats.

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The table provided below presents the author’s ranking of relevant factors in each case study. Each factor is given a number between 1 and 5 to rank its level of importance for ending the nuclear weapon program for each country. (1-not very important, 2-not important, 3-neutral, 4-important, 5-very important)

**TABLE 1: Factors and Level of Importance for Ending Nuclear Weapon Programs**

<table>
<thead>
<tr>
<th>Factor</th>
<th>Argentina</th>
<th>Brazil</th>
<th>N. Korea</th>
<th>S. Korea</th>
<th>S. Africa</th>
<th>Libya</th>
</tr>
</thead>
<tbody>
<tr>
<td>Regime Change</td>
<td>5</td>
<td>5</td>
<td>1</td>
<td>5</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Reduction of Regional Threats</td>
<td>3</td>
<td>3</td>
<td>4</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Economic Sanctions</td>
<td>5</td>
<td>5</td>
<td>4</td>
<td>3</td>
<td></td>
<td></td>
</tr>
<tr>
<td>US Influence</td>
<td>1</td>
<td>5</td>
<td>3</td>
<td>5</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Economic Crisis</td>
<td>4</td>
<td>5</td>
<td>3</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Some interesting patterns emerged from this table. All six cases had at least two factors, and at least one factor was a very important factor. In the cases of Argentina, Brazil, and South Africa, regime change was a very important factor. For both North and South Korea economic sanctions were the very important factor. In all of the cases either regime change or economic sanctions was very important factor, except in the case of Libya, where US influence was the very important factor. In addition, whenever regime change was a very important factor, US influence was not an important or very important factor.

The next portion of this chapter will discuss democracy, sanctions, and economic crisis as it applies to the six cases in more detail.
Democracy

To better understand the effect of regime change on nuclear policy, data from the Polity IV project is used. The Polity IV Project “focuses on the more or less institutionalized authority patterns that characterize the most formal classes of polities, that is, states operating within the world’s system”. Each country is administered a score between +10 and -10, with +10 being the most democratic and -10 being the most authoritarian.

In 1950, when Argentina’s government was under the authority of the military, its polity score was -8. It remained at -8 until 1955, when it increased to -1. In 1974 its polity score increased to +6, then dropped to -9 in 1977. It remained at -8 until 1983, when President Raul Alfonsin was elected; at this point Argentina’s polity score increased to +8. There was a 16 point shift towards democracy. Argentina’s nuclear weapon program emerged when it was under a military regime and had a polity score of -8. However, once the 16 point shift towards democracy occurred in 1983, significant changes were made to Argentina’s nuclear policy in terms of international cooperation. Argentina signed the Quadripartite Agreement with Brazil agreeing to mutual inspections in 1994, ratified the Treaty of Tlatelooco, and signed the Non-Proliferation Treaty in 1995. During the years Argentina was under the jurisdiction of its military government, no significant changes were made towards international cooperation. Following the election of President Alfonsin, significant changes were made to its policy that embraced international cooperation such as the policies mentioned above. It took a giant, 16 point increase in democracy to change Argentina’s nuclear policy.

Brazil on the other hand started out with a polity score of +8 in 1945. When Brazil first
began its nuclear program it polity score was still +7. A military regime took over in 1966, and its polity score decreased drastically to -9. It was during this time that they began their nuclear weapon program. While Brazil’s polity score was at -9, it signed an agreement with Germany in 1975 for the purchase of up to eight nuclear reactors and a reprocessing plant. In 1985, Brazil’s polity score increased to +7 with the election of President Sarney.229 Brazil’s polity score increased to +8 once Collar was elected in 1990. Prior to Brazil’s shift towards democracy, Brazil made no efforts towards international cooperation. During the military government’s reign, efforts were made to push forward Brazil’s nuclear weapon program which was illustrated with the purchase of the two reactors and their refusal to sign the NPT and treaty of Tlatelolco. Once the shift towards democracy occurred in 1985, Brazil engaged in bilateral negotiations with Argentina in early 1990s signed a Quadripartite Agreement with Argentina in 1994, and signed the signed the Non-Proliferation Treaty in 1998. Democratization again seems to produce a policy of de-nuclearization.

From 1945-1992, South Africa’s polity score was +4. It did not change until 1991. It increased from +4 to +5 when South African president de Klerk came in to office in 1989 after former president P. W. Botha suffered a stroke. Significant policy changes happened during de Klerk’s presidency, such as dismantling its nuclear weapons in 1990, signing the Non-Proliferation Treaty in 1991, and opening its nuclear arsenal up to IAEA inspections in 1993. From 1991 to 1994 South Africa’s polity score increased from +5 to +9, This is another illustration of how the more democratic a state becomes the more likely they are to dismantle their nuclear programs. Although nuclear policy changes occurred when South Africa only had a 1 point increase in their polity score, democracy steadily increased from +4 to +9 between 1991

and 1994. South Africa continued to modify its nuclear weapon policy during the years in which democracy increased; that is why regime change in the South African case is ranked as +5 (very important).

The Polity IV data presented is an attempt to support the assertion that the more democratic a state becomes, the more willing they are to cooperate with the nonproliferation regime. In the cases of Argentina and Brazil, their nuclear programs emerged when its government operated under a military/authoritarian regime. Once both Brazil and Argentina became more democratic their nuclear weapon programs were terminated. In Brazil the progress was slow after it first became a democracy in 1985. Although Brazil was not run by an authoritarian government after the election of Sarney in 1985, the military still had a large amount of influence on its government. Its polity score increased from +7 to +8 once Collar was elected, and it was then that Brazil made changes to its nuclear policy that embraced both regional and international cooperation. South Africa was already a democratic state, but its polity score was only +4, it was not until democracy increased that changes were made to their nuclear policy. Although in the South African case democracy only increased by 1 point, democracy steadily increased in the following years and during those years South Africa agreed to IAEA inspections in 1994 to verify that they destroyed all nuclear weapons.

South Korea’s polity score decreased from +4 to -9, in 1973. Shortly before 1970, President Park Ching started its secret parallel program when its polity score was a +2. As democracy increased in South Korea from 1974 to 1989, from a score of -9 to +6, South Korea began to denuclearize. South Korea signed the Non-Proliferation Treaty in 1974, its polity score increased from -8 to -7. However, regime change had little to do with South Korea’s decision to stop its nuclear weapon program.
North Korea’s polity score has remained at -9 and Libya’s polity score has remained at -7 throughout the period of analysis. Both Libya and North Korea have authoritarian governments. This is reflected in both of their polity scores, which have remained consistent from 1945-2003. Thus regime change had no effect in these cases.

Democracy has an effect on states’ nuclear policy. The more democratic a state becomes the more willing they are to dismantle their nuclear weapon programs. It is the consistent increase in democracy that has an effect on states decisions to dismantle their nuclear weapon program. The beginning of the increase in democracy had the most effect in the South Africa, Brazil, and Argentina cases. However, Brazil and Argentina’s increases were more extreme than in the South Africa case.

Sanctions

To measure the extent in which economic sanctions influenced each countries’ decision to discontinue its nuclear program the assessment provided in the *Economic Sanctions Reconsidered: Supplemental Histories* book is used. The authors used 3 scores to evaluate the impact of sanctions: policy result (1-failed to 4-success), sanctions contribution (1-none to 4-significant), and success score (policy results times sanctions contribution 1-outright failure to 16 (significant success).\(^\text{230}\) This success score is used for the purposes of this paper.

South Africa was impacted the most by economic sanctions placed for its apartheid policy. The success score from Hufbauer for the UN vs. South Africa sanctions is 6 out of 16 (2 x 3), meaning that sanctions had some contribution to the policy changes. Sanctions were placed on trade in 1962, arms in 1970, and embargoes/boycotts were placed in 1970. South Africa’s nuclear weapon program began after the economic sanctions were placed, in 1970. In 1986, an

arms embargo was tightened by the UN. This increased South Africa’s isolation from the international community. However, when de Klerk was elected he sought to eliminate international isolation. If South Africa abolished its apartheid policy, but kept its nuclear program, there would have been a strong possibility that South Africa would have remained isolated from the international community. Knowing this, de Klerk may have realized that continuing the nuclear weapon program would have maintained South Africa’s isolation from the international community. Breaking the nonproliferation norm may have resulted in similar sanctions that they received for the apartheid policy. Once isolation from the international community ended they were able to engage in more diplomatic solutions. The economic sanctions placed on South Africa did not directly impact South Africa’s nuclear weapon policy, rather it was the isolation from the international community that South Africa sought to rid that influenced its decision to dismantle its nuclear weapon program.

In the case of South Korea, the sanctions placed on South Korea from the US were very effective. The success score given was 16 out of 16, meaning that the economic sanctions were a significant cause to a major policy change. In the 1970s, The United States threatened to place economic sanctions on South Korea in the event that they continued their nuclear weapon program. In 1970 South Korea began to secretly develop its parallel nuclear program. The United States began investigating South Korea’s parallel program between 1974 and 1975. In 1975 the US threatened to withdraw troops from South Korea. Soon after South Korea ended its program and signed the Non-Proliferation Treaty in 1975. They attempted to buy a reprocessing plant from France in 1975. However, the US threatened to take away bank loans that were used to subsidize imports and exports. In response to the US threat, South Korea canceled the purchase in 1976. The threat of economic sanctions and lessening security guarantees was enough to stop
South Korea’s nuclear weapon program from mounting.

In 1988 sanctions were placed on Libya by the UN Security Council because of its involvement with the bombing of a US airplane over Lockerbie Scotland.\textsuperscript{231} Those sanctions were suspended in 1999 because Libya extradited the two suspects involved in the 1988 US bombing. In March of 2003 Libya accepted full responsibility for the terrorist attack. In light of this confession, the UN lifted economic sanctions in September of 2003, with both the US and France abstaining. Libya agreed to dismantle its nuclear program and freeze all nuclear activities in December, 2003. Although Libya’s sanctions were not for its nuclear weapon program, lifting the sanctions might have encouraged them to reciprocate cooperation with the international community by ending its nuclear weapons program. After the sanctions were lifted, Libya ratified the Comprehensive Test Ban Treaty in January of 2004. The US then eased Libyan economic sanctions in February of 2004. Libya signed the Additional Protocol to the IAEA Safeguard Agreement in March, 2004. Sanctions were somewhat important for getting Libya to dismantle its nuclear weapons program, but the invasion of Iraq may have played a larger role than the sanctions. Although a success score is not provided in the UN vs. Libya case, it can be argued that sanctions were not a complete failure but a little less than a total success because once Libya began cooperating sanctions were reduced or lifted. The policy change was a success (4) and the sanctions contribution were somewhat significant (3), which would give the UN vs. Libya sanctions 12 out of 16.

In the case of North Korea, sanctions were imposed by the US on North Korea in 1993 when they threatened to withdraw from the Non-Proliferation Treaty. In 1994 North Korea signed the Agreed Framework. North Korea promised to halt its nuclear program facilities, in

exchange for two research reactors. In August of 1998 North Korea tested a long-range missile; however they agreed to halt any further testing in September. It was not until 1999 that the US agreed to ease major economic sanctions against North Korea that had been in place since 1953 during the Korean War. In July of 2001 North Korea continued with long-range testing and in December of 2002 restarted the Yongbyon reactor. On October 4, 2002, North Korea revealed that it had a parallel nuclear program that was in violation of the 1994 Framework Agreement. On November 11, 2002, the US, Japan, and South Korea stopped all oil supplies in response to North Korea reactivating its nuclear reactor. In 2006 North Korea tested 6 long-range missiles. The UN Security council then placed import and export sanctions on North Korea. In October of 2006 North Korea tested a nuclear weapon, and within two days the UN imposed economic and weapon sanctions. In December of 2006 North Korea agreed to re-start negotiations.

North Korea has made agreements in the past and pulled out of the agreements, such as the 1994 Framework Agreement. Since North Korea is under a dictatorship, when ever Kim Jong-Il wants to end an agreement he will, depending on his own discretion. However, it was not until North Korea detonated a nuclear weapon that they began to cooperate with the international community and engage in the Six-Party Talks.

Again, a success score was not provided for the UN and US vs. North Korea, however, significant policy changes were made (3) because they agreed to stop their nuclear weapon program for now and sanctions had a small effect on its policy changes (2), which would give UN and US vs. North Korea sanctions a 6 out of 16.

In the case of North Korea economic sanctions were tightened after they tested a long-range missile and a nuclear weapon. It was not until they decided to detonate a bomb that they

decided to re-start the Six Party Talks. Economic sanctions affected North Korea greatly because it is currently facing an economic crisis. Their nuclear program was keeping its economy in a state of crisis because it isolated them from the international community. In order for North Korea to address the economic crisis it was important for them to re-establish economic relationships in the international community, and dismantling their nuclear weapons program was the start to better international relationships, however this did not occur until after they exploded a nuclear weapon and had the capabilities to deter an invasion.

Economic sanctions made some contribution to the dismantlement of nuclear weapon programs in North Korea, South Korea, South Africa, and Libya. The sanctions were somewhat successful in the cases of South Africa, Libya, and North Korea because the sanctions isolated them from the international community. In the case of South Africa, they wanted to rid isolation from the international community. North Korea was affected by the sanctions because they are in an economic crisis and the sanctions only add to their devastation. In the case of Libya and South Africa, in which they received sanctions based on something other than their nuclear policy, the sanctions still affected their decision to dismantle their nuclear program because both countries sought to end long-term isolation.

*Economic Crisis*

Economic crisis also served as a relevant factor in the case of North Korea and Brazil. Although there is no sequential data illustrating the changes in North Korea’s GDP, there was severe famine in the mid-1990s, with estimates of 300,000 to 800,000 deaths by August of 1998. Its GDP as of 2006 was $1,800 per capita. The economic crisis made the decision to continue the nuclear program in the 1990s a costly one, however North Korea valued its national

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security above issues of domestic concern.

In the case of Brazil its GDP decreased by 10.3 percent from 1981 to 1982. A year later they revealed their nuclear weapon program. Shortly after, in the late 1980s they began negotiations with Argentina agreeing to bilateral agreements. Both Argentina and Brazil began negotiations with the intent of using bilateral agreements to boost its economy. After the series of bilateral agreements, Brazil’s GDP increased by 13.4% between 1991 and 1995. When Brazil had economic downturns between the years of 1981-1983 of -10.3%, the economic downturns affected its nuclear policy because they did not have the funds to further develop their program. In Brazil economic crisis caused regime change which then influenced Brazil’s decision to engage in bilateral negotiations.

South Korea’s economy began to boost during the 1970s. South Korea and the US had significant economic ties. When the US discovered South Korea’s nuclear program between 1974 and 1975, South Korea did not want to sacrifice its economic or security ties with the United States. Between 1968 and 1976 South Korea’s GDP increased by 56%. Its economy was booming. If South Korea made the decision to continue with its nuclear weapon program, its economy could have suffered greatly from US sanctions. In 1975, when South Korea attempted to purchase a research reactor from France the United States threatened to stop bank loans for import and export. If South Korea would not have stopped this transaction, then its economy might have not continued to grow because its decision to continue would have resulted in US economic sanctions.

If countries that are seeking nuclear weapons are facing an economic crisis they are more likely to dismantle their nuclear weapon programs. In the case of Brazil it did not have the financial means to further its nuclear program. However, North Korea does not fit this
conclusion because they continued to break the 1994 Agreed Framework when their country was going through famine. It was not until they detonated a nuclear weapon that they decided to cooperate. Now that they have a nuclear weapon to deter invasion they are trying to re-establish economic relationships to better its economy. So for South Korea, its national security needs seemed to outweigh its economic distress; once national security was ensured, it was motivated by economic crisis to cooperate with the international community. If countries are facing an economic crisis then as in the case of Brazil and South Korea, they are more willing to cooperate with the international community to save their economy.

Conclusion

Each country had its own unique set of factors that played in to its decision to dismantle its nuclear weapon program. However, patterns were discovered illustrating the presence of those that had the most influence and those that had the least. Either regime change or economic sanctions were a very important factor in each of the cases except Libya. All cases had to have at least two factors with one of the factors being very important. The factors and patterns generated from this chapter will help us better understand the likely means in which Iran will stop its uranium enrichment program.
CHAPTER V: IMPLICATIONS FOR IRAN AND RECOMMENDATIONS FOR THE NPT

Introduction

Chapter Four identified causal factors and patterns that emerged when states decide to dismantle their nuclear weapons program. The significant factors are as follows: regime shift towards democracy, reduction of regional threats, economic sanctions, US influence, and economic crisis. All cases had at least two factors that contributed to a country’s decision to end its nuclear weapon program. At least one of the factors was very important, and one of the very important factors was either regime change or economic sanctions, except in the case of Libya. This chapter will evaluate the utility of these factors by applying them to a current case of proliferation, the Iranian nuclear program. The international community and the nonproliferation regime are struggling to keep Iran from going nuclear. If these five factors from the historical cases are useful, they should provide some understanding of the best means to deal with this current situation. First, a brief discussion of Iran’s nuclear weapon program is provided, and then each factor generated from the fourth chapter is considered as a means of stopping proliferation in Iran’s case. Lastly, conclusions are made on what influences states to denuclearize and recommendations are made to preserve the nonproliferation regime.

Iran’s Nuclear Program

Iran initially began its nuclear weapon program in 1985, during its war with Iraq. However, prior to the Iranian Revolution, Iran purchased natural uranium from South Africa in 1976. Before the Shah was overthrown in 1979, he sought nuclear power plants for the use of...

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electricity. Iran’s plans for nuclear power under the Shah came to halt when the Shah was overthrown, and Iran went to war with Iraq. In 1985 Iran obtained materials from the German firm Leifeld that were useful for making steel and uranium tubes. It is also suspected that Iran may have received uranium dioxide from Algeria. In 1987 Iran was able to obtain drawings of centrifuges and centrifuge components. It is not clear who was responsible for giving both centrifuge designs and parts to Iran. However, some believe that Abdul Qadeer Khan of Pakistan provided Iran with these materials. In that same year Argentina agreed to supply Iran’s research reactor located at the Tehran Research Center with fuel. Evidence has also been presented showing that Iran may have gotten assistance from Pakistan. In June of 1989 Iran might have signed a nuclear cooperation agreement with the Soviet Union.

On January 8, 1995, Iran and Russia signed an agreement stating that Russia would help Iran build one or possibly even two nuclear power reactors at its Bushehr plant. Included in this agreement was the training of approximately 500 Iranian technicians and supply fuel for the reactors. In 2002 an Iranian opposition group, the National of Resistance of Iran, discovered that Iran was building a uranium enrichment plant at Natanz and a heavy water plant at Arak.
This facility was not reported to the IAEA; however the Iranian government eventually acknowledged the facility and allowed for IAEA inspections.\textsuperscript{246} In September of 2002, Iran began constructing its first nuclear reactor at Bushehr.\textsuperscript{247} Then the IAEA revealed that Iran was constructing a large scale uranium enrichment program that was scheduled for completion in 2005.\textsuperscript{248} After meeting with the Germany, France, and the United Kingdom, Iran agreed to halt all uranium enrichment facilities in October of 2003, and it agreed to IAEA snapshot inspections.\textsuperscript{249} Nonetheless, the IAEA reported that Iran was not fully cooperating. Once again Iran promised the EU that it would stop all uranium processing and reprocessing.\textsuperscript{250} In September of 2005 an IAEA report revealed that Iran had restarted its uranium program at Isfahan.\textsuperscript{251} On January 13, 2006, France, Germany, and Britain ended talks with Iran and suggested that Iran the situation be taken to the UN Security Council. This referral was supported by the United States, China, and Russia.\textsuperscript{252} That very next day Iran threatened to stop cooperating with the IAEA if it was taken to the National Security Council.\textsuperscript{253} On March 29, 2006 the UN Security Council called for Iran to stop its uranium enrichment program within thirty days, however no consequences for acting in opposition were given.\textsuperscript{254} On April 9, 2007,

\textsuperscript{247} “Timeline: Iran Nuclear Crisis”. \textit{BBC News}. http://news.bbc.co.uk/1/hi/world/middle_east/4134614.stm
\textsuperscript{252} “Timeline: Iran Nuclear Crisis”. \textit{BBC News}. http://news.bbc.co.uk/1/hi/world/middle_east/4134614.stm
President Mahmoud Ahmadinejad announced that Iran had started enriching uranium with 3,000 centrifuges.\textsuperscript{255} As of May 23, 2007, Iran had still not stopped its uranium enrichment program. In response to Iran’s defiant behavior, the US has called for tougher sanctions.\textsuperscript{256}

Comparing Iran to the Case Studies

There are a variety of factors present in the case of Iran that were also present in the Argentina, Brazil, South Africa, South Korea, North Korea, and Libya cases. However, Iran’s case is distinct because of its ethnic and religious conflicts internally and externally. Iran’s majority religion and ethnicity is the minority in its region, which creates even more tension and increases Iran’s perceived for national security and nuclear weapons.

Iran’s case is both similar and different to the historical case studies. Iran’s case is similar to Argentina, Brazil, South Africa, and North Korea in the fact that its nuclear weapons program is being facilitated under an authoritarian regime. Argentina and Brazil were rivalries just like Iran and Saudi Arabia are today. Iran’s case is also similar to South Africa and Libya in terms of its isolation from the international community.

The case that is most similar to Iran is the North Korea case study. North Korea is a dictatorship that wants to preserve communism, and Iran is a theocracy that wants to preserve the Islamic regime. Sanctions were placed on North Korea. But these sanctions did not stop them from moving ahead with their nuclear weapon program. Iran has had sanctions placed on them because of their uranium enrichment program but has still continued to move ahead with its uranium enrichment program despite the economic sanctions.

On the other hand, Iran’s case is extremely different from South Korea’s case because Iran has the ability to sustain its economy. It is different from Libya because they have a more conventionalized military. Iran could possibly defeat a US invasion, Libya cannot.

Iran has enough similarities to past cases that it is appropriate to use Iran to evaluate the key factors generated from the past cases. Nothing is so unique about Iran that analogies cannot be drawn from previous historical cases to provide sufficient means in which Iran would be willing to forfeit its nuclear weapons program.

General Factors for stopping a nuclear program and their Implications for Iran

*Regime Change toward Democracy*

In the Argentina, Brazil, and South Africa cases, regime change was an important influence on their decision to dismantle their nuclear weapon programs. Prior to the establishment of a more democratic government, Argentina, Brazil, and South Africa sought nuclear weapons. It was not until the military regime governments shifted to a more democratic government that all of these countries began making changes to their nuclear policies towards international cooperation.

In the case of Iran, regime change toward a more democratic government would be the most practical means in which Iran would voluntarily stop its uranium enrichment program. Regime changed influenced Argentina, Brazil, and South Korea’s decision to change their nuclear policies resulted in them dismantling their nuclear weapons programs. Judging from the past cases, it would take at least a 4 point shift on the polity score, from +4 to +8. A shift towards democracy would change Iran’s national agenda from national security to international
cooperation. In the Argentina, Brazil, and South Africa cases the more democratic their
governments became, the more changes occurred to their nuclear weapon policies that embraced
the international norms and principles of nonproliferation regime. All three countries signed the
Non-Proliferation Treaty and agreed to IAEA inspections.

Iran’s current regime does not embrace the norm of international cooperation in terms of
nonproliferation, rather it embraces the assertion that Western culture and values seek to weaken
the Islamic regime. Iranian President Mahmoud Ahmadinejad stated that the West is “relying on
their power and wealth to try to impose a climate of intimidation and injustice over the world.
Everyday they are threatening other nations with nuclear weapons, and they are never
inspected”\textsuperscript{257}.

Currently Iran’s polity score is +4, which is the same score as South Africa during the
time they were developing nuclear weapons. It was not until South Africa polity score increased
to +8 that they dismantled their nuclear weapon program. Iran polity score is also a +4. During
the time South Africa had a polity score of +4 it was under the apartheid policy, which
suppressed blacks in South Africa. In Iran’s case they are suppressing the rights of Arabs and
Sunnis; moreover the Supreme Leader has all power. +4 is does not represent a strong
democracy in Iran; its polity score has to at least increase to +8 to see any change in its nuclear
policy. Regime shift towards democracy with at least a 4 point increase in their polity score
would be the surest way in which Iran would stop its nuclear weapon program, based on the six
cases in chapter three.

In for order regime change to occur, Iran could be invaded such as in the case of Iraq, or
its government could be overturned by a coup as in the case of Brazil. However, it is not likely

\textsuperscript{257} “Iran’s Nuclear Development Timeline”. \textit{Washington Post}. http://www.washingtonpost.com/wp-
that Iran will be invaded by the US and Britain because of the war in Iraq. The US and British militaries are pre-occupied with fighting the war in Iraq. It is unlikely that the US would have the military capabilities that it would take to successfully defeat Iran. Other countries are also concerned with Iran’s program. However, states such as China are more concerned with North Korea’s nuclear weapon program, and Russia may be helping Iran with providing intelligence. Therefore regime change through invading Iran is not likely at this time at this point in time.

Iran’s government is presided over by the Guardian Council, which has an enormous amount of influence in regards to its foreign policy. The Guardian Council was formed in 1979 as an addition to the constitution. The Guardian Council is problematic because they decide who can be elected for parliamentary and presidential positions. Part of the Guardian Council is composed of individuals selected by the president, and the other half has to be confirmed by the parliament.

Iran is currently having issues domestically with a conflict between the traditionalists versus the reformists. Citizens are disappointed in terms of not having freedom of speech. Citizens that speak in opposition of the government such as journalists and student protesters are jailed.\textsuperscript{258} Citizens are not happy with these types of events. For example, in January of 2003, “crowds of motorcycles, assaulted demonstrators using batons, chains, and knives, reportedly caused many injuries”.\textsuperscript{259}

If coup was to take place by the reformists, like in 1953 when the Shah came in to power, and replace the current government with a more democratic government, then Iran might be more willing to rid its nuclear weapon program.

\textsuperscript{258} Tarock, Adam. "Iran between religious hardliners and hawks in America." \textit{Central Asian Survey} 22, no. 2/3, 2003, 133-49.
\textsuperscript{259} “Iran: End Vigilante Attacks”. Human Rights Watch. \url{english/docs/2003/06/20/iran6164.htm} 22 April 2007.
Reformists assert that the traditionalist would never share power with other political groups and “therefore political participation would have little impact on deciding who should govern the country and how”.260 In 2002 the reformist president, Khatami, tried to pass two bills in the parliament. The first bill would give the president the right to stop trials that are controlled by conservative judiciary, and the second bill would take power away from the Guardian Council so that they would be allowed to disqualify candidates for parliamentary and presidential elections261. Neither of these two bills was passed because the Guardian Council said they were unconstitutional. After Khatami’s presidency reformists concluded that

Such contempt and disregard for public opinion by authorities on the one hand, coupled with lack of progress towards liberalization and economic prosperity on the other, have created widespread disillusionment, especially among the young and feel that reforming the system through legal means is no longer a viable option.262

One way for a regime change to occur would be a coup that sought to create a new constitution, eliminating the Supreme Leader and the Guardian Council, to ensure an increase in democracy.

However, regime change is not likely thorough invasion or a coup. Iranian citizens fear that western culture seeks to diminish the Islamic regime, making them less likely to overthrow their current government. The Iranian government has made their citizens fearful of the West and its intentions towards Islamic regime, especially after the invasion of Iraq.263 If a coup were to overthrow the Iranian government it would result in the weakening of the Islamic regime, making a possible invasion easier for the West. Iranian citizens may not totally agree with all the

decisions being made by its government however they fear the intentions of the West, which makes them reluctant to overthrow their government.

**Reduction of Regional Threats**

Iran is located in what could be argued as one of the most unstable and temperamental regions in the world. Though its main two rivals Iraq and Afghanistan are in chaos, this reduction of regional threats is not likely to cause Iran to forfeit its nuclear program for a number of reasons.

First, Iran is one of only three countries in which Shia Muslims are the majority because most of the Middle East Muslims are Sunni. The Sunnis and the Shia are known enemies. This religious conflict continues to separate and divide the Middle East. This conflict between the Sunnis and Shia stretches across the states of Turkey, Iraq, Syria, Lebanon, and Afghanistan. This factor of religious conflict increases regional threats in the Middle East, adding to its instability. Both the Shia and the Sunnis feel threatened by each other. Recent sectarian violence in Iraq has made this a major threat in the region.

Second, Iran is majority Persians while the majority of the Middle East is Arab. There have been complaints made by Arabs in Iran about the treatment of Arab citizens. The Persians and the Arabs feel threatened by one another. The majority of Iranians are Persian and the majority of the Middle East is Arab. This ethnic division also plays in the division of the Sunnis and Shia because in the Middle East, most Persians are Shia and most Sunnis are Arabs.

Third, US troops are located in Iraq, Turkey, and Afghanistan. Iranians feel threatened by the presence of US troops, which also adds tremendously to the tension the Middle East. There

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have been speculations made about Iran supplying Iraqi insurgents with weapons.\textsuperscript{265} The US is aware of Iran’s nuclear program and has been keeping a close watch on military activity in Iran. In December of 2006 the US began to send additional warships to the Persian Gulf and one strike aircraft. After the Iraq invasion, it became clear that the US was willing to invade a country that served as a threat to its national security. Iran wants to preserve its Islamic regime and believes that the United States wants to westernize the Islamic world. The US is not only viewed as a threat to Iran’s national security, it is also viewed as a threat to the Islamic religion.\textsuperscript{266}

Lastly Iran is threatened by Israel and Pakistan, which have nuclear weapons. To counter Israel, Iran supplies Hezbollah with both weapons and money. Hezbollah fought against Israel in the 1980s and was able to get Israel troops out of Lebanon in 2001. In 2006 Hezbollah and Israel engaged in warfare again. There is still tension between Hezbollah and Israel. This is an additional factor that contributes to regional tensions and threatens Iran’s national security.

Iran’s regional tensions are consequently greater than the regional threats and tensions in the Argentina, Brazil, and South Africa cases. In the Argentina, Brazil and South Africa cases regional tensions decreased before they stopped their nuclear weapon program. Argentina felt threatened by Brazil and Brazil felt threatened by Argentina. They were unaware of the progress of each other’s nuclear program.

South Africa felt threatened by Cuban troops that were stationed in Angola. After South Africa, Angola, and Cuba signed a trilateral agreement removing Cuban troops from Angola, South Africa was no longer threatened by Cuba or the Soviet Union. After these regional threats were reduced through the signing of the trilateral agreement, South Africa made incremental


changes towards international cooperation by signing the NPT and engaging in IAEA inspections.

Considering the religious divisions, ethnic divisions, the stationing of US troops, nuclear neighbors, and Iran’s connections with Hezbollah, regional tensions in the Middle East are still central to Iran’s national security policies. It is true that Iraq and Iran are no longer at odds with each other, and one could argue that regional threats have decreased. However, the threat of Iraq was replaced with Iran feeling more threatened by the United States, which is a nuclear power. It can be argued that the regional threats that once faced Iran have been replaced with a far greater threat. Including this element along with ethnicity and religious conflicts, Iran’s connection to Hezbollah, are not reduced, they are increased. Therefore, this factor, regional threat, leads Iran to want to keep its nuclear program, not end it.

**US Influence**

US influence was a key factor in both South Korea and Libya’s decision to stop its nuclear weapon program. South Korea was an ally of the United States. The US was able to influence South Korea because it provided South Korea with security guarantees and held a considerable amount of leverage in South Korea’s economy. South Korea and the United States are allies and have significant military and economic ties. Therefore the United States was successful in persuading South Korea to stop their nuclear weapon program. However, in the case of Iran, its relationship with the US is tremendously different.

In 1953 Mossadeq was overthrown by an operation planned by the US CIA and the British Secret Intelligence Service. Relations between the United States and Iran changed tremendously after the Shah was overthrown in 1979. Prior to the reign of Ayatollah Ruhollah

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Khomeini, the United States and the Shah were allies. When Ayatollah Khomeini came in to power, he broke ties with the United States and turned Iran into a theocratic government. First, the United States depends greatly on the oil in the Middle East, so the US does not have the leverage to influence Iran based on economic ties like it did in the South Korea case.

Secondly, Iran views the US as wanting to force Western culture in the Middle East, and the invasion of Iraq only confirmed this assertion. In addition, Iran does not believe that current nuclear powers are following through with their part of the agreement in the Non-Proliferation Treaty. This provides another barrier between the relationship between the United States and Iran.

On the other hand, some might argue that the US invasion of Iraq could influence Iran to stop its uranium enrichment program, as it did in the case of Libya. However, the United States may not have the military capabilities needed to defeat Iran, because the US has so many troops stationed in Afghanistan and Iraq. In addition, Iran has a stronger military than both Iraq and Libya. Iran was able to effectively combat Iraq in the Iran-Iraq War and Hezbollah was able to push Israel troops from Lebanon in the early 1980s. A successful invasion and defeat of Iran is not likely to happen at this point in time. Sanctions are not likely to work because the US has little economic leverage and a weakened military; US influence is not likely to be a possible factor to get Iran to stop its uranium enrichment program. Although the US could attempt to use incentives to entice Iran to stop its uranium enrichment program, it may not work like in the case of North Korea because North Korea did not stop its nuclear weapon program until they detonated a nuclear bomb.
Economic Crisis

Economic crisis is another factor that contributed to countries such as North Korea and Brazil to end their nuclear weapon program. Currently, Iran is not in a financial crisis. As a matter of fact its economy has been increasingly growing due to the high price of oil. Among Iran’s allies are Lebanon, Syria, and Venezuela. Iran is the country with the most resources among all of its allies, in terms of natural resources, so economic sanctions would hurt Iran’s allies more than it would hurt Iran. North Korea is an ally of China and the United States is an ally of South Korea. In both of these cases the state with the most economic power was able to persuade its ally with less economic power to stop its nuclear weapon program. In addition, North Korea was in a financial crisis, creating a situation in which they had incentive to cooperate because they had an extreme economic need. This factor is not relevant in Iran’s case. Iran is able to sustain itself because of its supply of oil. Iran’s growth rate for 2006 was 5%. Furthermore, Iran is the fourth largest crude oil producing country and owns 7% of the world’s oil reserves.

In the case of Brazil the economy played a significant role in its decision to dismantle. After Sarney presidency, Brazil was facing a financial crisis. When Collar became president he redistributed funds that were set aside for Brazil’s nuclear program. It is extremely expensive to develop infrastructure needed to develop a nuclear weapon program. However, Iran has already past the milestone of purchasing centrifuge plans and has already mastered the uranium enrichment process.

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Economic Sanctions

Economic sanctions were extremely effective in the South Korea and North Korea cases. However, they were effective for different reasons. As stated in the previous section the US and South Korea had strong economic ties. South Korea’s economy has been consistently growing. The threat of US economic sanctions was enough to deter South Korea from pursuing a nuclear weapon program.

In North Korea’s case, it has economic ties with China, whose economy has been increasingly growing. China has continued to influence North Korea to dismantle its nuclear weapon program. Since China has economic ties with North Korea, its influence encouraged North Korea re-enter in to the Six Party Talks in December of 2006. US Special envoy for Six-Party Talks stated that “China has played a constructive role throughout the Six-Party Talks and we are appreciative of China’s efforts to create the conditions for a constructive multilateral discussion with the D.P.R.K”.\textsuperscript{270} In addition the United States agreed to unfreeze funds in a North Korean account if they stopped their nuclear weapon program. Considering North Korea’s economic situation, further isolation from the international community would only add to its devastation. This is not the case for Iran, which is not facing famine or economic devastation.

Rewards are another way that countries may be enticed to stop their nuclear programs, such as in the case of North and South Korea. However, rewards do not seem to work either if all involved parties do not keep their commitment as in the case of North Korea. The EU started negotiations with Iran by offering Iran incentives for trade and other economic issues\textsuperscript{271} if they stopped their enrichment program, however Iran was not responsive. This is not uncommon.


when negotiating with a dictatorship. For example, in the case of North Korea, the United States and North Korea signed the 1994 Agreed Framework, offering North Korea incentives for stopping its nuclear weapon program. North Korea restarted its nuclear weapons program in 2003 because it did not believe the United States was adhering to its portion of the agreement. In addition, after the 1994 Framework was signed North Korea still began building a reprocessing plant, which provided another way for them to create a nuclear weapon. North Korea made a deal with Pakistan agreeing to provide Pakistan with long-range missiles in exchange for assistance with its highly enrichment between 1993 and 1996, during or after the 1994 Agreed Framework was signed. In the case of Iran, EU negotiations did not reach the point in which an agreement was made. Furthermore, North Korea did not agree to stop its research reactor until the detonated a nuclear weapon. In order for incentives to work all parties must follow through with their commitment.

Recommendations

Regime change would be the most effective means to get Iran to dismantle its nuclear weapon program. However, as mentioned previously this is not likely to happen anytime soon. Iran has all the technology needed to construct a nuclear weapon. The hope is that maybe after they develop a weapon they will be more willing to cooperate with the international community, as in the North Korea case study. North Korea now has the ability to deter a possible invasion because it now has a nuclear weapon. It was not until North Korea tested a nuclear weapon that they were willing to re-enter the Six Party Talks. This may work in Iran’s case. Iranians are
trying to preserve the Islamic regime. If they have access to a nuclear weapon to deter an invasion then, they might be more willing to cooperate because they would feel more secure.

There is a limited amount of information available on countries’ nuclear programs. No one truly knows how far away Iran is from developing a nuclear weapon. In 2006 US military intelligence estimated that Iran is five to eight years away from developing its first nuclear weapon.\textsuperscript{273} Therefore, in order to make sound policy recommendations further research is needed.

However, further research is also needed in regards to the effects of incentives on influencing countries to dismantle their nuclear weapon programs. The underling religious factor in Iran’s case is worth further investigation in regards to how it affects Iran’s foreign policy.

Lastly, threats that are currently challenging the nonproliferation regime are very important and may eventually change the nonproliferation regime. The fate of the nonproliferation regime is also worthy of further research in order to identify what procedures have worked in the past to see what will work for the future if there is a future for the nonproliferation regime.

It is this author’s recommendation that the international community do a better job of monitoring the amount of nuclear information being distributed to both individuals and states. Currently, the nonproliferation regime covers the responsibilities of the state but not the responsibilities of individuals who have the intelligence to develop the infrastructure and technology needed to develop a nuclear weapon. Although states tend to monitor these individuals on within their own countries, there is no current structure in the international community that monitors individuals. For example, A.Q. Khan provided North Korea and Iran

with centrifuge designs for their uranium enrichment programs. If the international community was able to monitor the flow of information it could possibly strengthen the nonproliferation regime to further prevent nuclear proliferation. In addition, the UN could make states that sell nuclear weapon material and/or intelligence just as responsible as states that are seeking to build a bomb. Furthermore, the nonproliferation regime should add these accountability measures to its procedures. For example, if sanctions were placed on both the states that sought to build nuclear weapons and states that provided them with information and/or materials needed to further its nuclear weapons program, then that may be more effective, at stopping Iran and other states from acquiring a nuclear weapon, while also strengthening the nonproliferation regime.

Regime change and economic sanctions seem to be the most significant factors that influence states’ decisions to discontinue their nuclear weapon program. US influence, economic crisis, and the reduction of regional threats play a roles as well in countries’ decisions to discontinue their nuclear weapons program.

States will stop acquiring nuclear capabilities once regional conflicts/tensions are reduced. This was exemplified in the Argentina, Brazil, and South Africa case studies. All of these states felt threaten by other regional states. Their nuclear weapon program was not stopped until regional tensions and/or threats were reduced. States’ pursuit of nuclear capabilities will cease once their national agenda is modified through changes in their system of government. This illustrated in the Argentina, Brazil, and South Africa case studies. After they had an increase in democracy they signed more bilateral and multilateral agreements in regards to their nuclear policy. Lastly, if economic sanctions serve as the primary means of persuading the states to denuclearize, then they may still be able to develop a bomb. This was exemplified in the North Korea case study. When sanctions were placed on North Korea they worked harder to get the
bomb even during the famine in the late 1990s. Iran has exemplified the same behavior. After sanctions were tighten in March, Iran announced that they would begin operating 3,000 more centrifuges.

In conclusion, nuclear proliferation is an international security issue that is well worth further investigation. This thesis identified historical factors that cause countries to denuclearize and evaluated the factors as they relate to the Iranian nuclear crisis. The hope is that these factors identified in this thesis help provide a better understanding of what influences states’ decision to end their nuclear weapons program.
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APPENDIX A: THRESHOLD TEST BAN TREATY

PROTOCOL TO THE TREATY BETWEEN THE UNITED STATES OF AMERICA AND THE UNION OF SOVIET SOCIALIST REPUBLICS ON THE LIMITATION OF UNDERGROUND NUCLEAR WEAPON TESTS

The United States of America and the Union of Soviet Socialist Republics, hereinafter referred to as the Parties,

Having agreed to limit underground nuclear weapon tests,

Have agreed as follows:

1. For the Purpose of ensuring verification of compliance with the obligations of the Parties under the Treaty by national technical means, the Parties shall, on the basis of reciprocity, exchange the following data:

   a. The geographic coordinates of the boundaries of each test site and of the boundaries of the geophysically distinct testing areas therein.

   b. Information on the geology of the testing areas of the sites (the rock characteristics of geological formations and the basic physical properties of the rock, i.e., density, seismic velocity, water saturation, porosity and the depth of water table).

   c. The geographic coordinates of underground nuclear weapon tests, after they have been conducted.

   d. Yield, date, time, depth and coordinates for two nuclear weapon tests for calibration purposes from each geophysically distinct testing area where underground nuclear weapon tests have been and are to be conducted. In this connection the yield of such explosions for calibration purposes should be as near as possible to the limit defined in Article I of the Treaty and not less than one-tenth of that limit. In the case of testing areas where data are not available on two tests for calibration purposes, the data pertaining to one such test shall be exchanged, if available, and the data pertaining to the second test shall be exchanged as soon as possible after the second test having a yield in the above-mentioned range. The provisions of this Protocol shall not require the Parties to conduct tests solely for calibration purposes.

2. The Parties agree that the exchange of data pursuant to subparagraphs a, b, and d of paragraph 1 shall be carried out simultaneously with the exchange of instruments of ratification of the Treaty, as provided in Article IV of the Treaty, having in mind that the Parties shall, on the basis of reciprocity, afford each other the opportunity to familiarize themselves with these data before the exchange of instruments of ratification.

3. Should a Party specify a new test site or testing area after the entry into force of the Treaty, the data called for by subparagraphs a and b of paragraph 1 shall be transmitted to the other Party in
advance of use of that site or area. The data called for by subparagraph d of paragraph 1 shall also be transmitted in advance of use of that site or area if they are available; if they are not available, they shall be transmitted as soon as possible after they have been obtained by the transmitting Party.

4. The Parties agree that the test sites of each Party shall be located at places under its jurisdiction or control and that all nuclear weapon tests shall be conducted solely within the testing areas specified in accordance with paragraph 1.

5. For the purposes of the Treaty, all underground nuclear explosions at the specified test sites shall be considered nuclear weapon tests and shall be subject to all the provisions of the Treaty relating to nuclear weapon tests. The provisions of Article III of the Treaty apply to all underground nuclear explosions conducted outside of the specified test sites, and only to such explosions.

This Protocol shall be considered an integral part of the Treaty.

DONE at Moscow on July 3, 1974.

FOR THE UNITED STATES OF AMERICA:
RICHARD M. NIXON
The President of the United States of America

FOR THE UNION OF SOVIET SOCIALIST REPUBLICS:
L. BREZHNEV
General Secretary of the Central Committee of the CPSU

APPENDIX B: COMPREHENSIVE TEST BAN TREATY

ARTICLE IV
VERIFICATION

A. GENERAL PROVISIONS

1. In order to verify compliance with this Treaty, a verification regime shall be established consisting of the following elements:

   (a) An International Monitoring System;

   (b) Consultation and clarification;

   (c) On-site inspections; and

   (d) Confidence-building measures.

At entry into force of this Treaty, the verification regime shall be capable of meeting the verification requirements of this Treaty.

2. Verification activities shall be based on objective information, shall be limited to the subject matter of this Treaty, and shall be carried out on the basis of full respect for the sovereignty of States Parties and in the least intrusive manner possible consistent with the effective and timely accomplishment of their objectives. Each State Party shall refrain from any abuse of the right of verification.

3. Each State Party undertakes in accordance with this Treaty to cooperate, through its National Authority established pursuant to Article III, paragraph 4, with the Organization and with other States Parties to facilitate the verification of compliance with this Treaty by inter alia:

   (a) Establishing the necessary facilities to participate in these verification measures and establishing the necessary communication;

   (b) Providing data obtained from national stations that are part of the International Monitoring System;

   (c) Participating, as appropriate, in a consultation and clarification process;

   (d) Permitting the conduct of on-site inspections; and

   (e) Participating, as appropriate, in confidence-building measures.

4. All States Parties, irrespective of their technical and financial capabilities, shall enjoy the equal right of verification and assume the equal obligation to accept verification.
5. For the purposes of this Treaty, no State Party shall be precluded from using information obtained by national technical means of verification in a manner consistent with generally recognized principles of international law, including that of respect for the sovereignty of States.

6. Without prejudice to the right of States Parties to protect sensitive installations, activities or locations not related to this Treaty, States Parties shall not interfere with elements of the verification regime of this Treaty or with national technical means of verification operating in accordance with paragraph 5.

7. Each State Party shall have the right to take measures to protect sensitive installations and to prevent disclosure of confidential information and data not related to this Treaty.

8. Moreover, all necessary measures shall be taken to protect the confidentiality of any information related to civil and military activities and facilities obtained during verification activities.

9. Subject to paragraph 8, information obtained by the Organization through the verification regime established by this Treaty shall be made available to all States Parties in accordance with the relevant provisions of this Treaty and the Protocol.

10. The provisions of this Treaty shall not be interpreted as restricting the international exchange of data for scientific purposes.

11. Each State Party undertakes to cooperate with the Organization and with other States Parties in the improvement of the verification regime, and in the examination of the verification potential of additional monitoring technologies such as electromagnetic pulse monitoring or satellite monitoring, with a view to developing, when appropriate, specific measures to enhance the efficient and cost-effective verification of this Treaty. Such measures shall, when agreed, be incorporated in existing provisions in this Treaty, the Protocol or as additional sections of the Protocol, in accordance with Article VII, or, if appropriate, be reflected in the operational manuals in accordance with Article II, paragraph 44.

12. The States Parties undertake to promote cooperation among themselves to facilitate and participate in the fullest possible exchange relating to technologies used in the verification of this Treaty in order to enable all States Parties to strengthen their national implementation of verification measures and to benefit from the application of such technologies for peaceful purposes.

13. The provisions of this Treaty shall be implemented in a manner which avoids hampering the economic and technological development of the States Parties for further development of the application of atomic energy for peaceful purposes.

Verification Responsibilities of the Technical Secretariat
14. In discharging its responsibilities in the area of verification specified in this Treaty and the Protocol, in cooperation with the States Parties the Technical Secretariat shall, for the purpose of this Treaty:

(a) Make arrangements to receive and distribute data and reporting products relevant to the verification of this Treaty in accordance with its provisions, and to maintain a global communications infrastructure appropriate to this task;

(b) Routinely through its International Data Centre, which shall in principle be the focal point within the Technical Secretariat for data storage and data processing:

(i) Receive and initiate requests for data from the International Monitoring System;

(ii) Receive data, as appropriate, resulting from the process of consultation and clarification, from on-site inspections, and from confidence-building measures; and

(iii) Receive other relevant data from States Parties and international organizations in accordance with this Treaty and the Protocol;

(c) Supervise, coordinate and ensure the operation of the International Monitoring System and its component elements, and of the International Data Centre, in accordance with the relevant operational manuals;

(d) Routinely process, analyse and report on International Monitoring System data according to agreed procedures so as to permit the effective international verification of this Treaty and to contribute to the early resolution of compliance concerns;

(e) Make available all data, both raw and processed, and any reporting products, to all States Parties, each State Party taking responsibility for the use of International Monitoring System data in accordance with Article II, paragraph 7, and with paragraphs 8 and 13 of this Article;

(f) Provide to all States Parties equal, open, convenient and timely access to all stored data;

(g) Store all data, both raw and processed, and reporting products;

(h) Coordinate and facilitate requests for additional data from the International Monitoring System;

(i) Coordinate requests for additional data from one State Party to another State Party;
(j) Provide technical assistance in, and support for, the installation and operation of monitoring facilities and respective communication means, where such assistance and support are required by the State concerned;

(k) Make available to any State Party, upon its request, techniques utilized by the Technical Secretariat and its International Data Centre in compiling, storing, processing, analysing and reporting on data from the verification regime; and


15. The agreed procedures to be used by the Technical Secretariat in discharging the verification responsibilities referred to in paragraph 14 and detailed in the Protocol shall be elaborated in the relevant operational manuals.

B. The International Monitoring System

16. The International Monitoring System shall comprise facilities for seismological monitoring, radionuclide monitoring including certified laboratories, hydroacoustic monitoring, infrasound monitoring, and respective means of communication, and shall be supported by the International Data Centre of the Technical Secretariat.

17. The International Monitoring System shall be placed under the authority of the Technical Secretariat. All monitoring facilities of the International Monitoring System shall be owned and operated by the States hosting or otherwise taking responsibility for them in accordance with the Protocol.

18. Each State Party shall have the right to participate in the international exchange of data and to have access to all data made available to the International Data Centre. Each State Party shall cooperate with the International Data Centre through its National Authority.

Funding the International Monitoring System

19. For facilities incorporated into the International Monitoring System and specified in Tables 1-A, 2-A, 3 and 4 of Annex 1 to the Protocol, and for their functioning, to the extent that such facilities are agreed by the relevant State and the Organization to provide data to the International Data Centre in accordance with the technical requirements of the Protocol and relevant operational manuals, the Organization, as specified in agreements or arrangements pursuant to Part I, paragraph 4 of the Protocol, shall meet the costs of:

(a) Establishing any new facilities and upgrading existing facilities unless the State responsible for such facilities meets these costs itself;
(b) Operating and maintaining International Monitoring System facilities, including facility physical security if appropriate, and application of agreed data authentication procedures;

(c) Transmitting International Monitoring System data (raw or processed) to the International Data Centre by the most direct and cost effective means available, including, if necessary, via appropriate communications nodes, from monitoring stations, laboratories, analytical facilities or from national data centres; or such data (including samples where appropriate) to laboratory and analytical facilities from monitoring stations; and

(d) Analysing samples on behalf of the Organization.

20. For auxiliary network seismic stations specified in Table 1-B of Annex 1 to the Protocol the Organization, as specified in agreements or arrangements pursuant to Part I, paragraph 4 of the Protocol, shall meet the costs only of:

(a) Transmitting data to the International Data Centre;

(b) Authenticating data from such stations;

(c) Upgrading stations to the required technical standard, unless the State responsible for such facilities meets these costs itself;

(d) If necessary, establishing new stations for the purposes of this Treaty where no appropriate facilities currently exist, unless the State responsible for such facilities meets these costs itself; and

(e) Any other costs related to the provision of data required by the Organization as specified in the relevant operational manuals.

21. The Organization shall also meet the cost of provision to each State Party of its requested selection from the standard range of International Data Centre reporting products and services, as specified in Part I, Section F of the Protocol. The cost of preparation and transmission of any additional data or products shall be met by the requesting State Party.

22. The agreements or, if appropriate, arrangements concluded with States Parties or States hosting or otherwise taking responsibility for facilities of the International Monitoring System shall contain provisions for meeting these costs. Such provisions may include modalities whereby a State Party meets any of the costs referred to in paragraphs 19 (a) and 20 (c) and (d) for facilities which it hosts or for which it is responsible, and is compensated by an appropriate reduction in its assessed financial contribution to the Organization. Such a reduction shall not exceed 50 percent of the annual assessed financial contribution of a State Party, but may be spread over successive years. A State Party may share such a reduction with another State Party by agreement or arrangement.
between themselves and with the concurrence of the Executive Council. The agreements or arrangements referred to in this paragraph shall be approved in accordance with Article II, paragraphs 26 (h) and 38 (i).

**Changes to the International Monitoring System**

23. Any measures referred to in paragraph 11 affecting the International Monitoring System by means of addition or deletion of a monitoring technology shall, when agreed, be incorporated into this Treaty and the Protocol pursuant to Article VII, paragraphs 1 to 6.

24. The following changes to the International Monitoring System, subject to the agreement of those States directly affected, shall be regarded as matters of an administrative or technical nature pursuant to Article VII, paragraphs 7 and 8:

   (a) Changes to the number of facilities specified in the Protocol for a given monitoring technology; and

   (b) Changes to other details for particular facilities as reflected in the Tables of Annex 1 to the Protocol (including, *inter alia*, State responsible for the facility; location; name of facility; type of facility; and attribution of a facility between the primary and auxiliary seismic networks).

If the Executive Council recommends, pursuant to Article VII, paragraph 8 (d), that such changes be adopted, it shall as a rule also recommend pursuant to Article VII, paragraph 8 (g), that such changes enter into force upon notification by the Director-General of their approval.

25. The Director-General, in submitting to the Executive Council and States Parties information and evaluation in accordance with Article VII, paragraph 8 (b), shall include in the case of any proposal made pursuant to paragraph 24:

   (a) A technical evaluation of the proposal;

   (b) A statement on the administrative and financial impact of the proposal; and

   (c) A report on consultations with States directly affected by the proposal, including indication of their agreement.

**Temporary Arrangements**

26. In cases of significant or irretrievable breakdown of a monitoring facility specified in the Tables of Annex 1 to the Protocol, or in order to cover other temporary reductions of monitoring coverage, the Director-General shall, in consultation and agreement with those States directly affected, and with the approval of the Executive Council, initiate temporary arrangements of no more than one year's duration, renewable if necessary by
agreement of the Executive Council and of the States directly affected for another year. Such arrangements shall not cause the number of operational facilities of the International Monitoring System to exceed the number specified for the relevant network; shall meet as far as possible the technical and operational requirements specified in the operational manual for the relevant network; and shall be conducted within the budget of the Organization. The Director-General shall furthermore take steps to rectify the situation and make proposals for its permanent resolution. The Director-General shall notify all States Parties of any decision taken pursuant to this paragraph.

Cooperating National Facilities

27. States Parties may also separately establish cooperative arrangements with the Organization, in order to make available to the International Data Centre supplementary data from national monitoring stations that are not formally part of the International Monitoring System.

28. Such cooperative arrangements may be established as follows:

(a) Upon request by a State Party, and at the expense of that State, the Technical Secretariat shall take the steps required to certify that a given monitoring facility meets the technical and operational requirements specified in the relevant operational manuals for an International Monitoring System facility, and make arrangements for the authentication of its data. Subject to the agreement of the Executive Council, the Technical Secretariat shall then formally designate such a facility as a cooperating national facility. The Technical Secretariat shall take the steps required to revalidate its certification as appropriate;

(b) The Technical Secretariat shall maintain a current list of cooperating national facilities and shall distribute it to all States Parties; and

(c) The International Data Centre shall call upon data from cooperating national facilities, if so requested by a State Party, for the purposes of facilitating consultation and clarification and the consideration of on-site inspection requests, data transmission costs being borne by that State Party.

The conditions under which supplementary data from such facilities are made available, and under which the International Data Centre may request further or expedited reporting, or clarifications, shall be elaborated in the operational manual for the respective monitoring network.

C. Consultation and Clarification

29. Without prejudice to the right of any State Party to request an on-site inspection, States Parties should, whenever possible, first make every effort to clarify and resolve, among themselves or with or through the Organization, any matter which may cause concern about possible non-compliance with the basic obligations of this Treaty.
30. A State Party that receives a request pursuant to paragraph 29 directly from another State Party shall provide the clarification to the requesting State Party as soon as possible, but in any case no later than 48 hours after the request. The requesting and requested States Parties may keep the Executive Council and the Director-General informed of the request and the response.

31. A State Party shall have the right to request the Director-General to assist in clarifying any matter which may cause concern about possible non-compliance with the basic obligations of this Treaty. The Director-General shall provide appropriate information in the possession of the Technical Secretariat relevant to such a concern. The Director-General shall inform the Executive Council of the request and of the information provided in response, if so requested by the requesting State Party.

32. A State Party shall have the right to request the Executive Council to obtain clarification from another State Party on any matter which may cause concern about possible non-compliance with the basic obligations of this Treaty. In such a case, the following shall apply:

(a) The Executive Council shall forward the request for clarification to the requested State Party through the Director-General no later than 24 hours after its receipt;

(b) The requested State Party shall provide the clarification to the Executive Council as soon as possible, but in any case no later than 48 hours after receipt of the request;

(c) The Executive Council shall take note of the clarification and forward it to the requesting State Party no later than 24 hours after its receipt;

(d) If the requesting State Party deems the clarification to be inadequate, it shall have the right to request the Executive Council to obtain further clarification from the requested State Party.

The Executive Council shall inform without delay all other States Parties about any request for clarification pursuant to this paragraph as well as any response provided by the requested State Party.

33. If the requesting State Party considers the clarification obtained under paragraph 32 (d) to be unsatisfactory, it shall have the right to request a meeting of the Executive Council in which States Parties involved that are not members of the Executive Council shall be entitled to take part. At such a meeting, the Executive Council shall consider the matter and may recommend any measure in accordance with Article V.

D. On-Site Inspections

Request for an On-Site Inspection
34. Each State Party has the right to request an on-site inspection in accordance with the provisions of this Article and Part II of the Protocol in the territory or in any other place under the jurisdiction or control of any State Party, or in any area beyond the jurisdiction or control of any State.

35. The sole purpose of an on-site inspection shall be to clarify whether a nuclear weapon test explosion or any other nuclear explosion has been carried out in violation of Article I and, to the extent possible, to gather any facts which might assist in identifying any possible violator.

36. The requesting State Party shall be under the obligation to keep the on-site inspection request within the scope of this Treaty and to provide in the request information in accordance with paragraph 37. The requesting State Party shall refrain from unfounded or abusive inspection requests.

37. The on-site inspection request shall be based on information collected by the International Monitoring System, on any relevant technical information obtained by national technical means of verification in a manner consistent with generally recognized principles of international law, or on a combination thereof. The request shall contain information pursuant to Part II, paragraph 41 of the Protocol.

38. The requesting State Party shall present the on-site inspection request to the Executive Council and at the same time to the Director-General for the latter to begin immediate processing.

Follow-up After Submission of an On-Site Inspection Request

39. The Executive Council shall begin its consideration immediately upon receipt of the on-site inspection request.

40. The Director-General, after receiving the on-site inspection request, shall acknowledge receipt of the request to the requesting State Party within two hours and communicate the request to the State Party sought to be inspected within six hours. The Director-General shall ascertain that the request meets the requirements specified in Part II, paragraph 41 of the Protocol, and, if necessary, shall assist the requesting State Party in filing the request accordingly, and shall communicate the request to the Executive Council and to all other States Parties within 24 hours.

41. When the on-site inspection request fulfils the requirements, the Technical Secretariat shall begin preparations for the on-site inspection without delay.

42. The Director-General, upon receipt of an on-site inspection request referring to an inspection area under the jurisdiction or control of a State Party, shall immediately seek clarification from the State Party sought to be inspected in order to clarify and resolve the concern raised in the request.
43. A State Party that receives a request for clarification pursuant to paragraph 42 shall provide the Director-General with explanations and with other relevant information available as soon as possible, but no later than 72 hours after receipt of the request for clarification.

44. The Director-General, before the Executive Council takes a decision on the on-site inspection request, shall transmit immediately to the Executive Council any additional information available from the International Monitoring System or provided by any State Party on the event specified in the request, including any clarification provided pursuant to paragraphs 42 and 43, as well as any other information from within the Technical Secretariat that the Director-General deems relevant or that is requested by the Executive Council.

45. Unless the requesting State Party considers the concern raised in the on-site inspection request to be resolved and withdraws the request, the Executive Council shall take a decision on the request in accordance with paragraph 46.

Executive Council Decisions

46. The Executive Council shall take a decision on the on-site inspection request no later than 96 hours after receipt of the request from the requesting State Party. The decision to approve the on-site inspection shall be made by at least 30 affirmative votes of members of the Executive Council. If the Executive Council does not approve the inspection, preparations shall be stopped and no further action on the request shall be taken.

47. No later than 25 days after the approval of the on-site inspection in accordance with paragraph 46, the inspection team shall transmit to the Executive Council, through the Director-General, a progress inspection report. The continuation of the inspection shall be considered approved unless the Executive Council, no later than 72 hours after receipt of the progress inspection report, decides by a majority of all its members not to continue the inspection. If the Executive Council decides not to continue the inspection, the inspection shall be terminated, and the inspection team shall leave the inspection area and the territory of the inspected State Party as soon as possible in accordance with Part II, paragraphs 109 and 110 of the Protocol.

48. In the course of the on-site inspection, the inspection team may submit to the Executive Council, through the Director-General, a proposal to conduct drilling. The Executive Council shall take a decision on such a proposal no later than 72 hours after receipt of the proposal. The decision to approve drilling shall be made by a majority of all members of the Executive Council.

49. The inspection team may request the Executive Council, through the Director-General, to extend the inspection duration by a maximum of 70 days beyond the 60-day time-frame specified in Part II, paragraph 4 of the Protocol, if the inspection team considers such an extension essential to enable it to fulfil its mandate. The inspection team shall indicate in its request which of the activities and techniques listed in Part II,
paragraph 69 of the Protocol it intends to carry out during the extension period. The Executive Council shall take a decision on the extension request no later than 72 hours after receipt of the request. The decision to approve an extension of the inspection duration shall be made by a majority of all members of the Executive Council.

50. Any time following the approval of the continuation of the on-site inspection in accordance with paragraph 47, the inspection team may submit to the Executive Council, through the Director-General, a recommendation to terminate the inspection. Such a recommendation shall be considered approved unless the Executive Council, no later than 72 hours after receipt of the recommendation, decides by a two-thirds majority of all its members not to approve the termination of the inspection. In case of termination of the inspection, the inspection team shall leave the inspection area and the territory of the inspected State Party as soon as possible in accordance with Part II, paragraphs 109 and 110 of the Protocol.

51. The requesting State Party and the State Party sought to be inspected may participate in the deliberations of the Executive Council on the on-site inspection request without voting. The requesting State Party and the inspected State Party may also participate without voting in any subsequent deliberations of the Executive Council related to the inspection.

52. The Director-General shall notify all States Parties within 24 hours about any decision by and reports, proposals, requests and recommendations to the Executive Council pursuant to paragraphs 46 to 50.

Follow-up after Executive Council Approval of an On-Site Inspection

53. An on-site inspection approved by the Executive Council shall be conducted without delay by an inspection team designated by the Director-General and in accordance with the provisions of this Treaty and the Protocol. The inspection team shall arrive at the point of entry no later than six days following the receipt by the Executive Council of the on-site inspection request from the requesting State Party.

54. The Director-General shall issue an inspection mandate for the conduct of the on-site inspection. The inspection mandate shall contain the information specified in Part II, paragraph 42 of the Protocol.

55. The Director-General shall notify the inspected State Party of the inspection no less than 24 hours before the planned arrival of the inspection team at the point of entry, in accordance with Part II, paragraph 43 of the Protocol.

The Conduct of an On-Site Inspection

56. Each State Party shall permit the Organization to conduct an on-site inspection on its territory or at places under its jurisdiction or control in accordance with the provisions of
this Treaty and the Protocol. However, no State Party shall have to accept simultaneous on-site inspections on its territory or at places under its jurisdiction or control.

57. In accordance with the provisions of this Treaty and the Protocol, the inspected State Party shall have:

(a) The right and the obligation to make every reasonable effort to demonstrate its compliance with this Treaty and, to this end, to enable the inspection team to fulfil its mandate;

(b) The right to take measures it deems necessary to protect national security interests and to prevent disclosure of confidential information not related to the purpose of the inspection;

(c) The obligation to provide access within the inspection area for the sole purpose of determining facts relevant to the purpose of the inspection, taking into account sub-paragraph (b) and any constitutional obligations it may have with regard to proprietary rights or searches and seizures;

(d) The obligation not to invoke this paragraph or Part II, paragraph 88 of the Protocol to conceal any violation of its obligations under Article I; and

(e) The obligation not to impede the ability of the inspection team to move within the inspection area and to carry out inspection activities in accordance with this Treaty and the Protocol.

Access, in the context of an on-site inspection, means both the physical access of the inspection team and the inspection equipment to, and the conduct of inspection activities within, the inspection area.

58. The on-site inspection shall be conducted in the least intrusive manner possible, consistent with the efficient and timely accomplishment of the inspection mandate, and in accordance with the procedures set forth in the Protocol. Wherever possible, the inspection team shall begin with the least intrusive procedures and then proceed to more intrusive procedures only as it deems necessary to collect sufficient information to clarify the concern about possible non-compliance with this Treaty. The inspectors shall seek only the information and data necessary for the purpose of the inspection and shall seek to minimize interference with normal operations of the inspected State Party.

59. The inspected State Party shall assist the inspection team throughout the on-site inspection and facilitate its task.

60. If the inspected State Party, acting in accordance with Part II, paragraphs 86 to 96 of the Protocol, restricts access within the inspection area, it shall make every reasonable effort in consultations with the inspection team to demonstrate through alternative means its compliance with this Treaty.
61. With regard to an observer, the following shall apply:

(a) The requesting State Party, subject to the agreement of the inspected State Party, may send a representative, who shall be a national either of the requesting State Party or of a third State Party, to observe the conduct of the on-site inspection;

(b) The inspected State Party shall notify its acceptance or non-acceptance of the proposed observer to the Director-General within 12 hours after approval of the on-site inspection by the Executive Council;

(c) In case of acceptance, the inspected State Party shall grant access to the observer in accordance with the Protocol;

(d) The inspected State Party shall, as a rule, accept the proposed observer, but if the inspected State Party exercises a refusal, that fact shall be recorded in the inspection report.

There shall be no more than three observers from an aggregate of requesting States Parties.

62. Inspection reports shall contain:

(a) A description of the activities conducted by the inspection team;

(b) The factual findings of the inspection team relevant to the purpose of the inspection;

(c) An account of the cooperation granted during the on-site inspection;

(d) A factual description of the extent of the access granted, including the alternative means provided to the team, during the on-site inspection; and

(e) Any other details relevant to the purpose of the inspection.

Differing observations made by inspectors may be attached to the report.

63. The Director-General shall make draft inspection reports available to the inspected State Party. The inspected State Party shall have the right to provide the Director-General within 48 hours with its comments and explanations, and to identify any information and data which, in its view, are not related to the purpose of the inspection and should not be circulated outside the Technical Secretariat. The Director-General shall consider the
proposals for changes to the draft inspection report made by the inspected State Party and shall wherever possible incorporate them. The Director-General shall also annex the comments and explanations provided by the inspected State Party to the inspection report.

64. The Director-General shall promptly transmit the inspection report to the requesting State Party, the inspected State Party, the Executive Council and to all other States Parties. The Director-General shall further transmit promptly to the Executive Council and to all other States Parties any results of sample analysis in designated laboratories in accordance with Part II, paragraph 104 of the Protocol, relevant data from the International Monitoring System, the assessments of the requesting and inspected States Parties, as well as any other information that the Director-General deems relevant. In the case of the progress inspection report referred to in paragraph 47, the Director-General shall transmit the report to the Executive Council within the time-frame specified in that paragraph.

65. The Executive Council, in accordance with its powers and functions, shall review the inspection report and any material provided pursuant to paragraph 64, and shall address any concerns as to:

(a) Whether any non-compliance with this Treaty has occurred; and

(b) Whether the right to request an on-site inspection has been abused.

66. If the Executive Council reaches the conclusion, in keeping with its powers and functions, that further action may be necessary with regard to paragraph 65, it shall take the appropriate measures in accordance with Article V.

Frivolous or Abusive On-Site Inspection Requests

67. If the Executive Council does not approve the on-site inspection on the basis that the on-site inspection request is frivolous or abusive, or if the inspection is terminated for the same reasons, the Executive Council shall consider and decide on whether to implement appropriate measures to redress the situation, including the following:

(a) Requiring the requesting State Party to pay for the cost of any preparations made by the Technical Secretariat;

(b) Suspending the right of the requesting State Party to request an on-site inspection for a period of time, as determined by the Executive Council; and

(c) Suspending the right of the requesting State Party to serve on the Executive Council for a period of time.

E. Confidence-Building Measures
68. In order to:

(a) Contribute to the timely resolution of any compliance concerns arising from possible misinterpretation of verification data relating to chemical explosions; and

(b) Assist in the calibration of the stations that are part of the component networks of the International Monitoring System, each State Party undertakes to cooperate with the Organization and with other States Parties in implementing relevant measures as set out in Part III of the Protocol.

Article V

Measures To Redress A Situation and To ensure Compliance, Including Sanctions

1. The Conference, taking into account, inter alia, the recommendations of the Executive Council, shall take the necessary measures, as set forth in paragraphs 2 and 3, to ensure compliance with this Treaty and to redress and remedy any situation which contravenes the provisions of this Treaty.

2. In cases where a State Party has been requested by the Conference or the Executive Council to redress a situation raising problems with regard to its compliance and fails to fulfil the request within the specified time, the Conference may, inter alia, decide to restrict or suspend the State Party from the exercise of its rights and privileges under this Treaty until the Conference decides otherwise.

3. In cases where damage to the object and purpose of this Treaty may result from non-compliance with the basic obligations of this Treaty, the Conference may recommend to States Parties collective measures which are in conformity with international law.

4. The Conference, or alternatively, if the case is urgent, the Executive Council, may bring the issue, including relevant information and conclusions, to the attention of the United Nations.275

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