

An Analytical Study on Nuclear Weapon Testing, Controlling and Eliminating the Use of Nuclear Weapons

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Abstract— *The weapons used for mass destruction can be identified as nuclear, biological and chemical (NBC). The controlling, reduction and eventual elimination of the use of nuclear weapons are analyzed as the main objective of the international community. According to world history there is only one such example, that is the Nuclear Weapon US used against Japan in World War II, which is in the history of physical warfare. There were many nuclear testing done during the cold war and they were carried out at maximum safety levels. Their intention and outcome were not physical conflicts. Many countries have used nuclear explosions to display nuclear capability. With the advancement of modern technology, destruction of human and physical resources would increase in a massive scale in comparison with the past. The main objectives of this research are, to identify the effects of nuclear weapons, analyze the use and their function to find information on the treaties on nuclear weapons and their practical application. The research question is on why powerful countries put much effort to develop their nuclear strength despite being in agreement to reduce the use of nuclear weapons. This research is based on secondary data. As for limitations, complete dependence on secondary data sources and the inability to identify countries that possess nuclear energy can be stated. The outcomes would enable us to show the effort of powerful countries to enhance their nuclear capability considering their differences in the international politics, lack of practicality in treaties agreed upon and absence of mechanism to effectively enforce those treaties. Due to these conditions banning nuclear testing and controlling and eliminating nuclear weapons have not become a reality yet. We can see that the powerful nations of the world continue with discussions to ban nuclear weapons. Hence it can be identified as a root cause in aggravating the conflicts in the arena of international politics.*

Keywords— Nuclear Weapons, Mass Destruction, World Politics

I. INTRODUCTION

When we look into the world history, homicide an aggregation otherwise a mass destruction does not mean a resent occurrence and it can be analyzed as a phenomenon, which existed in the human society from

time immemorial. The historical treatises prove that kings such as Great Alexander and Emperor Ashok assassinated large enemy groups in association with the great conquest in order to expand their kingdoms. Although Hitler and Polpot can be indicated as persons, who made leading homicide an aggregation in the recent history, but the mass destructions executed by dropping nuclear bombs to Japan and dropping bombs to the human settlements in Vietnam by United States of America, can be considered in the category of flagrant acts.

However, post war era of World War II, can be introduced as a, which an era of enemy by counter and colossal attacks in once or twice are better than combating by deploying a large army, incurring heavy expenses, loosing soldiers as well as army properties in large scale and affecting severe influence to own country's economy, can be presented as a concealed conception, which most of powerful countries bear in the world. Weapon of Mass Destruction can be introduced as a weapon, which can assassinate human in large groups and which can make a massive destruction.

II. WHAT ARE THE NUCLEAR WEAPONS AND THEIR UTILITY?

First of all it is important to introduce the weapons of mass destruction and it is internationally interpreted as "Weapon of Mass Destruction is considered as a weapon, which can cause huge scale destruction (supreme size life destruction and property destruction) to people, animal, objects created by human on earth as well as the objects situated naturally on earth as a result of a process in chemical, biological or nuclear". The weapons, which are used for mass destruction, are introduced as chemical, biological and nuclear weapons. (The discussions can be seen nowadays about the nuclear weapons out of them.) Videlicet, it can be analyzed as a goal of international community to achieve the goal of administration of nuclear weapons, minimizing and finally sequestering them entirely.

When a nuclear weapon is recognized, it is a weapon like a bomb, which can make mass destruction by causing an immediate explosion as a result of raising a nuclear

reaction. So called definition shall be important. Accordingly, it seems that while the nuclear weapon is a weapon specialty, which explodes and the reason for that explosion is the delivery of a great pressure due to a nuclear reaction or causing explosion or composition. As a result of it, although nuclear weapon is small, it possesses a tremendous power and it is more powerful than a weapon consisted with large size explosives. There is an opportunity, which a nuclear weapon was at exploded contrarily in the war history. That incident was that the United States of America made arrangements to explode at the latterly. Videlicet, on August in the year 1945, it was a nuclear weapon with the meaning and name of Little Boy, which contained uranium. It was dropped on to the city of Hiroshima in Japan. Another incident was the bomb, which was containing plutonium and named and meant Fat Man, which was dropped on to the city of Nagasaki. It reported that many sudden deaths about 140,000 brought to the people with the explosion of this bomb. More than this number of people died after transfusing radiations to their bodies.

After the bombing in Hiroshima and Nagasaki, nuclear bombs were blasted with the objectives of testing and demonstration purposes by countries such as United States of America, Soviet Union, England, France, People's China, India, Pakistan and North Korea. There are many varieties among the nuclear weapons and many states precede the intention of administration of nuclear weapons, minimizing and finally sequestering them entirely. There are many states, which tested nuclear weapons with the objectives of testing and demonstration purposes at present and if a war erupts using nuclear weapons, with the advancement of modern technology, there may be damages to the human and

physical resources in more than hundred or thousand times compared with the past. Therefore, although many groups attempt to eliminate the nuclear weapon system from the world politics, a practicality cannot be seen. However, a priority of enhancing the nuclear weapons is seen although the powerful states have agreed with the agreements of nuclear weapons limitations.

As of 2014, only two nuclear weapons have been used in the course of warfare, both times by the United States near the end of World War II. On 6 August 1945, a uranium gun-type fission bomb code-named 'Little Boy' was detonated over the Japanese city of Hiroshima. Three days later, on 9 August, a plutonium implosion-type fission bomb code-named 'Fat Man' was exploded over the Japanese city of Nagasaki. These two bombings resulted in the deaths of approximately 140,000 civilians and military personnel from acute injuries sustained from the explosions.

Since the bombings of Hiroshima and Nagasaki, nuclear weapons have been detonated on over two thousand occasions for testing purposes and demonstrations. Only a few nations possess such weapons or are suspected of seeking them. The only countries known to have detonated nuclear weapons and that acknowledge possessing such weapons are (chronologically by date of first test) the United States, the Soviet Union (succeeded as a nuclear power by Russia), the United Kingdom, France, the People's Republic of China, India, Pakistan, and North Korea. Israel is also widely believed to possess nuclear weapons, though it does not acknowledge having them.

Country	Operational (Strategic)	Operational (Non Strategic)	Reserved/ Undeveloped	Military stockpile	Inventory total
Russia	2430	-	3000	5500	10000
U.S	1950	200	2850	5000	8500
France	290	n.a	Unknown	300	300
China	0	Unknown	180	240	240
Britain	160	n.a	65	225	225
Israel	-	n.a	80	80	80
Pakistan	-	n.a	90-110	90-110	90-110
India	-	n.a	80-100	80-100	80-100
N.Korea	-	n.a	<10	<10	<10
Total	4830	200	6400	11500	19500

Source- Reuters, www.fas.org

Nations with nuclear weapons	United States, Russia, Britain, France, China, Israel, India, Pakistan, North Korea
Nations hosting nuclear weapons	Belgium, Germany, Italy, Netherlands, Turkey
Nations in nuclear alliances	Albania, Australia, Bulgaria, Canada, Croatia, Czech, Denmark, Estonia, Greece, Hungary, Iceland, Japan, Latvia, Lithuania, Luxembourg, Norway, Poland, Portugal, Romania, Slovakia, Slovenia, South Korea, Spain

Source- www.icanw.org

One state, South Africa, fabricated nuclear weapons in the past, but as its apartheid regime was coming to an end, it disassembled its arsenal, acceded to the Nuclear Non-Proliferation Treaty, and accepted full-scope international safeguards. The Federation of American Scientists estimates there are more than 17,000 nuclear warheads in the world as of 2012, with around 4,300 of them considered operational, ready for use. (www.fissilematerials.org).

B. Verities of Nuclear Weapons and their Effects

Usage of nuclear weapons in the world history can be noted the dropping of bombs on to the cities of Hiroshima and Nagasaki, but it is a matter of controversy in the international politics that powerful countries in the world possess the nuclear weapon technology. No any country has confirmed whether they possess the nuclear power or not in their states. For an example, though international reviewers confirm that Israel possesses modern war technology and a wide project with hundred of missiles, it has not been confirmed with evidences in the international politics. Once Iran was criticized by United States of America that an attempt of developing their ability of nuclear weapons. America expressed that although there is no opportunity for conducting tests aiming a weapon, but there are opportunities for testing non weapon affairs using uranium.

There are two kinds of nuclear weapons mainly called Atomic Bomb/Fission Weapon and h-bomb. Out of these two kinds of bombs more powerful one is h-bomb. In order to obtain the high temperature to explode an h-bomb, first the temperature should be obtained by exploding a nuclear bomb. Everything made of metal was instantly melted against the affect of the bombs which were dropped on to the cities of Hiroshima and Nagasaki in Japan. At present, bombs have been produced 50 times to 100 times more powerful than earlier. The gamma rays emanate when atomic is exploded and though it does not travel long distance, those absorbed with the rays, such as trees, creepers, buildings, vehicles, air, water, etc. become a state of

radioactive. It spreads to different distances through the air to various objects in all sizes whether visible or invisible. All of them are called as radioactive materials and the rays, which emanate out of them, attack the affect of radio activeness to all objects of live and lifeless, which exist in the distance environment oreganos. The results orientated out of it will last for many years, cannot be removed for generations and there are no treatments as well. Until the radio activeness in the materials ends automatically some day or other, their unfavorable effects will remain same attacking accordingly. While there are current evidences in Japan to have the existence the effect of the radio activeness from a nuclear bomb, there are many persons, whom were affected with radioactive and suffering from various deceases includingirremediable cancers and from gene mutation.

There is an importance for the Neutron Bomb and E-bomb among the nuclear weapons. Neutron Bomb is introduced as the high conditioned Enhanced Radiation Weapon (ERW). There is a significant place for the Neutron Bomb among nuclear weapons.

This bomb causes very strong neutron energy eruption by activating differently more than the energy eruptions of a normal nuclear bomb. Because of that, cell membranes of the live beings are destroyed instantly and huge damages cause by gamma rays.

Everyone is eagerly waiting for a world free from the threat of nuclear. However, many people have a pessimism ideology when they see the reality of the world. The idea of administration of nuclear weapons, minimizing and finally eliminating, has been thrown away from the agenda of United States and international community. (Guardian Weekly News Paper)

C. Testing of Nuclear Weapons

The history of nuclear testing began early on the morning of 16 July 1945 at a desert test site in Alamogordo, New Mexico when the United States exploded its first atomic

bomb. Designated as the Trinity Site, this initial test was the culmination of years of scientific research under the banner of the so-called "Manhattan Project".

In the five decades between that fateful day in 1945 and the opening for signature of the Comprehensive Nuclear-Test-Ban Treaty (CTBT) in 1996, over 2,000 nuclear tests were carried out all over the world.

- **The United States** conducted **1,032** tests between 1945 and 1992.
- **The Soviet Union** carried out **715** tests between 1949 and 1990.
- **The United Kingdom** carried out **45** tests between 1952 and 1991.
- **France** carried out **210** tests between 1960 and 1996.
- **China** carried out **45** tests between 1964 and 1996.

After the CTBT was opened for signature in September 1996, about half a dozen nuclear tests have been conducted:

- **India** conducted **two** tests in 1998 (India had also conducted one so-called peaceful nuclear explosion in 1974.)
- **Pakistan** conducted **two** tests in 1998.
- **The Democratic People's Republic of Korea** announced that it had conducted a nuclear test in 2006. (www.ctbto.org)

D. Types of Nuclear Test

Nuclear explosions have been detonated in all environments: above ground, underground and underwater. Bombs have been detonated on top of towers, onboard barges, suspended from balloons, on the earth's surface, underwater to depths of 600m, underground to depths of more than 2,400m and in horizontal tunnels. Test bombs have been dropped by aircraft and fired by rockets up to 200 miles into the atmosphere.

1) Atmospheric Testing

Atmospheric testing refers to explosions which take place in or above the atmosphere. All told, of the over 2,000 nuclear explosions detonated worldwide between 16 July 1945 (United States) and 29 July 1996 (China), 25 % or over 500 bombs were exploded in the atmosphere: over 200 by the United States, over 200 by the Soviet Union, about 20 by Britain, about 50 by France and over 20 by China.

International concern over radioactive fallout resulting from atmospheric tests escalated in the mid 1950s. In

March 1954, the United States tested its hydrogen bomb Castle Bravo in the Pacific's Marshall Islands. The Bravo test created the worst radiological disaster in the United States' testing history. By accident, local civilians on the Marshall Islands, US servicemen stationed on Rongerik atoll, and the Japanese fishing trawler Lucky Dragon, were contaminated with the fallout.

Nuclear weapons tests have been carried out in all environments: above ground, underground and underwater. Atmospheric testing was banned by the 1963 Partial Test Ban Treaty. Negotiations had largely responded to the international community's grave concern over the radioactive fallout resulting from atmospheric tests. The United States, the Soviet Union and the United Kingdom became Parties to the Treaty; France and China did not. France conducted its last atmospheric test in 1974, China in 1980. CTBTO's infrasound IMS stations are used to detect nuclear explosions by monitoring low-frequency sound waves in the atmosphere. CTBTO Radionuclide IMS stations are designed to detect radioactive particles emanating from an atmospheric test.

2) Underwater Testing

Underwater testing refers to explosions which take place underwater or close to the surface of the water. Relatively few underwater tests have been conducted. The first underwater nuclear test — Operation Crossroads — was conducted by the United States in 1946 at its Pacific Proving Grounds in the Marshall Islands with the purpose of evaluating the effects of nuclear weapons used against naval vessels. Later, in 1955, the United States' Operation Wigwam conducted a single underwater nuclear test at a depth of 600 m to determine the vulnerability of submarines to nuclear explosions.

Underwater nuclear explosions close to the surface can disperse large amounts of radioactive water and steam, contaminating nearby ships, structures and individuals. Underwater nuclear testing was banned by the 1963 Partial Test Ban Treaty. The CTBTO's hydro acoustic IMS stations are those best suited to detect nuclear explosions underwater.

3) Underground Testing

Underground testing means that nuclear explosions are detonated at varying depths under the surface of the earth. These comprised the majority (i.e. about 75%) of all nuclear explosions detonated during the Cold War (1945–1989); that is, over 800 of all tests conducted by the United States and nearly 500 of all tests conducted by the Soviet Union. When the explosion is fully

contained, underground nuclear testing emits negligible fallout compared to atmospheric testing. However, if underground nuclear tests "vent" to the surface, they can produce considerable radioactive debris. Underground testing is usually evident through seismic activity related to the yield of the nuclear device.

Underground nuclear testing was banned by the 1996 Comprehensive Nuclear-Test-Ban Treaty (CTBT) that bans all nuclear explosions on Earth. 75% of all nuclear test explosions during the cold war were conducted underground.

The CTBTO's seismic IMS stations are used to detect nuclear explosions underground. The seismic data is combined with radionuclide data. Only the radionuclide technology can determine if an explosion is nuclear in origin; its stations and laboratories around the world monitor the presence of particulates and/or noble gases in the atmosphere.

E. The Beginning of the Nuclear Era 1945-2009

The United States launched the Nuclear Age in the pre-dawn hours of 16 July 1945 when it detonated a 20-

kiloton atomic bomb code-named "Trinity" at Alamogordo, New Mexico.

Under the umbrella of the "Manhattan Project", the test's original purpose had been to confirm that an implosion-type nuclear weapon design was feasible. It also gave United States' scientists and the military an idea of what the actual size and effects of such nuclear explosions would be before using them in combat.

While the Alamogordo test demonstrated many of the explosion's effects, it failed to provide a meaningful comprehension of radioactive nuclear fallout, which was not well understood by project scientists until years later.

The United States dropped two atomic bombs on Japan towards the end of World War II: one an untested gun-type fission bomb called "Little Boy" on Hiroshima on 6 August 1945; another implosion-type bomb tested at Alamogordo for the first time a month earlier and called "Fat Man" on Nagasaki on 9 August. Together these two bombs killed some 220,000 Japanese citizens outright, with over 200,000 more dying subsequently from lethal radiation overdoses. (www.un.org)

Date	Description	Estimated Yield	Type	Name	Location
16 July 1945	U.S. tests first nuclear device	~20 kt	plutonium implosion	Trinity	Alamogordo, New Mexico, USA
6 August 1945	Little Boy dropped on Hiroshima	~13 kt	HEU gun-type	Little Boy	Hiroshima, Japan
9 August 1945	Fat Man dropped on Nagasaki	~21 kt	plutonium implosion	Fat Man	Nagasaki, Japan
25 July 1946	U.S. conducts first underwater test	~23 kt	plutonium implosion	Crossroads Baker	Bikini Atoll, Marshall Islands

29 August 1949	U.S.S.R. tests first nuclear weapon	~21 kt	plutonium	Joe 1 (name given by the United States)	Semipalatinsk, Kazakhstan
3 October 1952	U.K. tests first nuclear weapon	~20 kt	plutonium implosion	Hurricane	Monte Bello Islands, Australia
1 November 1952	U.S. tests first thermonuclear device	~10.4 MT	thermonuclear	Ivy Mike	Enewetak Atoll, Marshall Islands
1 March 1954	U.S. tests first deliverable thermonuclear weapon	~14.8 MT	thermonuclear	Castle Bravo	Bikini Atoll, Marshall Islands
22 November 1955	U.S.S.R. tests its first thermonuclear weapon	~1.6 MT	thermonuclear	Joe 19 (name given by the United States)	Semipalatinsk, Kazakhstan
15 May 1957	U.K. tests its first thermonuclear weapon	~200-300 kt	thermonuclear	Grapple	Christmas Island (Kiritimati), South Pacific
19 September 1957	U.S. conducts first fully contained underground nuclear test	~1.7 kt	composite pit implosion	Plumbbob Rainier	Nevada Test Site, USA
8 November 1957	U.K. tests its first successful thermonuclear weapon	~1.8 MT	thermonuclear	Grapple X	Christmas Island (Kiritimati), South Pacific

13 February 1960	France tests its first nuclear weapon	~60-70 kt	plutonium implosion	Gerboise Bleue	Reganne, Algeria
30 October 1961	U.S.S.R. conducts Tsar Bomba test, the biggest nuclear explosion in history	~50-58 MT	thermonuclear	Tsar Bomba	Novaya Zemlya, Russia
6 July 1962	U.S. conducts Sedan test as part of the Plowshare Program	~104 kt	thermonuclear	Storax Sedan	Nevada Test Site, USA
9 July 1962	U.S. conducts Starfish Prime test in outer space	1.45 mt	thermonuclear	Starfish Prime	Lower Outer Space
16 October 1964	China tests its first nuclear weapon	~22 kt	HEU implosion	596	Lop Nur, China
17 June 1967	China tests its first thermonuclear weapon	~3.3 MT	thermonuclear	CHIC-6	Lop Nur, China
24 August 1968	France tests its first successful thermonuclear weapon	~2.6 MT	thermonuclear	Canopus	Fangataufa Atoll, South Pacific

24 October 1990	Last U.S.S.R nuclear test	~1 T	low-yield test	(715th test)	Novaya Zemlya, Russia
26 November 1991	Last U.K. nuclear test	~11 kt	Low-yield option of variable-yield thermonuclear device (?)	Julin Bristol (45th test)	Nevada Test Site, USA
23 September 1992	Last U.S. nuclear test	~5 kt	safety experiment	Julin Divider (1,032nd test)	Nevada Test Site, USA
27 January 1996	Last French nuclear test	~120 kt	thermonuclear	Xouthos (210th test)	Fangataufa Atoll, South Pacific
29 July 1996	Last Chinese nuclear test	~1-5 kt	low-yield test	(45th test)	Lop Nur, China
11 May 1998	India conducts a nuclear test (three nuclear devices)	~45 kt total	thermonuclear device (?), plutonium implosion, low-yield test	Shakti	Pokhran Desert, India
13 May 1998	India conducts a nuclear test (two nuclear devices)	<1 kt	low-yield tests	Shakti	Pokhran Desert, India
28 May 1998	Pakistan conducts a nuclear test (five nuclear devices)	~9-12 kt total	HEU fission device, boosted fission device (?), 3 low-yield tests	Chagai-I	Ras Koh, Pakistan

30 May 1998	Pakistan conducts a nuclear test (one nuclear device)	~4-6 kt	HEU fission device	Chagai-I	Ras Koh, Pakistan
9 October 2006	DPRK announces that it has conducted a first nuclear test	magnitude 4.1	Plutonium implosion (?)		Hwadae-ri, Korea
25 May 2009	DPRK announces that it has conducted a second nuclear test	magnitude 4.52	Plutonium implosion (?)		Hwadae-ri, Korea
12 February 2013	DPRK announces that it has conducted a third nuclear test	magnitude 4.9	plutonium implosion (?)		Hwadae-ri, Korea

Source.- (www.ctbto.org) <http://www.un.org/en/events/againstnucleartestsday/history.shtml>

VI. Existing Agreements for Preventing Nuclear Weapons and their Performances.

Although there are many agreements for disarmament and war weapons control at present, their performance levels are at very minimum conditions. Though the idea has been expressed towards these accords by the powerful countries initially and arguments are conducted regarding a world without nuclear threats but activities are executed for the enhancement of nuclear technology inside their countries. It happens to raise their states in the international arena through the national interest, to conserve the National Security further and to be responsible not be thrown away from the group of powerful states. However, this situation poses very wide problematic situations in the international politics.

Followings are the agreements, which many states have already retracted.

- 1959 Antarctic Treaty
- 1963 Hot Line Agreement
- 1963 Limited Test Ban Treaty
- 1967 Outer Space Treaty
- 1967 Latin America Nuclear Free Zone Treaty
- 1968 Nuclear Non-Proliferation Treaty
- 1971 Seabed Treaty
- 1972 Strategic Arms Limitation Treaty I (Interim Agreement)
- 1972 Anti-Ballistic Missile Treaty
- 1974 Threshold Test Ban Treaty
- 1974 Vladivostok Agreement
- 1976 Peaceful Nuclear Explosions Treaty
- 1977 Environmental Modification Convention
- 1979 Strategic Arms Limitation Treaty II
- 1985 South Pacific Nuclear Free Zone Treaty

- 1987 Intermediate-Range Nuclear Forces Treaty - INF
- 1988 Ballistic Missile Launch Notification Agreement
- 1991 Strategic Arms Reduction Treaty
- 1993 Strategic Arms Reduction Treaty II
- 1996 Treaty of Pelindaba
- 1996 Comprehensive Test Ban Treaty
- 2002 Strategic Offensive Reductions Treaty
- 2005 International Convention for the Suppression of Acts of Nuclear Terrorism
- 2010 New Strategic Arms Reduction Treaty (New START)

VII. CONCLUSION

The outcome of this research would enable us to show the effort of the powerful countries to enhance their nuclear capability considering the change of their positions in the international politics, the lack of practicality in treaties agreed upon and the absence of a mechanism to effectively enforce those treaties. Due to these conditions banning nuclear testing controlling and elimination of nuclear weapons have not become a reality yet. Even though we can see that the powerful nations of the world continue on conducting discussions to ban nuclear weapons. Hence it can be identified as a

root cause in aggravating the conflicts in the arena of international politics.

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