INTRODUCTION

Nuclear Arms Control is Volume 432 in the ‘Issues in Society’ series of educational resource books. The aim of this series is to offer current, diverse information about important issues in our world, from an Australian perspective.

KEY ISSUES IN THIS TOPIC

Nuclear arms are the most destructive weapons on the planet, capable of destroying cities, killing millions and leaving behind catastrophic, long-term humanitarian and environmental consequences. Recent friction involving a provocative round of missile tests by North Korea and subsequent ongoing diplomatic efforts to denuclearise the Korean Peninsula and avoid a devastating nuclear conflict has prompted louder calls by many nations for the prohibition and elimination of all nuclear weapons.

Which nations currently possess these weapons of mass destruction; and what countermeasures are being taken by the international community, such as the implementation of treaties, negotiations, sanctions and inspections?

What is Australia’s current nuclear non-proliferation and disarmament policy; are we doing enough to contain and control the global threat of mutually assured destruction?

SOURCES OF INFORMATION

Titles in the ‘Issues in Society’ series are individual resource books which provide an overview on a specific subject comprised of facts and opinions.

The information in this resource book is not from any single author, publication or organisation. The unique value of the ‘Issues in Society’ series lies in its diversity of content and perspectives.

The content comes from a wide variety of sources and includes:

- Newspaper reports and opinion pieces
- Website fact sheets
- Magazine and journal articles
- Statistics and surveys
- Government reports
- Literature from special interest groups

CRITICAL EVALUATION

As the information reproduced in this book is from a number of different sources, readers should always be aware of the origin of the text and whether or not the source is likely to be expressing a particular bias or agenda.

It is hoped that, as you read about the many aspects of the issues explored in this book, you will critically evaluate the information presented. In some cases, it is important that you decide whether you are being presented with facts or opinions. Does the writer give a biased or an unbiased report? If an opinion is being expressed, do you agree with the writer?

EXPLORING ISSUES

The ‘Exploring issues’ section at the back of this book features a range of ready-to-use worksheets relating to the articles and issues raised in this book. The activities and exercises in these worksheets are suitable for use by students at middle secondary school level and beyond.

FURTHER RESEARCH

This title offers a useful starting point for those who need convenient access to information about the issues involved. However, it is only a starting point. The ‘Web links’ section at the back of this book contains a list of useful websites which you can access for more reading on the topic.
CHAPTER 1
Nuclear proliferation

NUCLEAR WEAPONS: THE BASICS
From NuclearFiles.org – a project of the Nuclear Age Peace Foundation

This article is an introduction to some of the scientific concepts and history behind nuclear weapons. The first section is a list of some basic terms, followed by an explanation of how a nuclear weapon works and a description of the immediate damage caused by a nuclear explosion and the harmful effects of radiation on humans.

HOW THE BOMB WORKS

Nuclear weapons, like conventional bombs, are designed to cause damage through an explosion, i.e. the release of a large amount of energy in a short period of time.

In conventional bombs the explosion is created by a chemical reaction, which involves the rearrangement of atoms to form new molecules. The amount of energy

BASIC TERMS

Atom: The smallest particle of matter that can have the properties of a chemical element. Atoms are composed of protons (positively charged particles), electrons (negatively charged particles) and neutrons (uncharged particles). Protons and neutrons are heavy particles that are found in an atom’s nucleus (the core). Electrons, which are much smaller and lighter, orbit the nucleus. Source: www.academicpress.com

Fission: The splitting of the nucleus of an element into fragments. Heavy elements such as uranium or plutonium release energy when fissioned.

Fusion: The combining of two nuclei to form a heavier one. Fusion of the isotopes of light elements such as hydrogen or lithium gives a large release of energy.

Radiation: Radiation is any energy that is emitted from some source and travels through space. This includes things such as light, sound and heat. The radiation typically referred to when discussing nuclear weapons or nuclear energy is ionizing radiation, which comes from unstable atoms. To become stable, unstable atoms emit radiation in the form of particles, such as alpha and beta radiation, or in the form of electromagnetic waves, such as gamma radiation and x-rays. Source: www.orau.gov/reacts/define.htm

Alpha radiation: Radiation consisting of helium nuclei (atomic weight 4, atomic number 2) that are discharged by radioactive disintegration of some heavy elements, including uranium-238, radium-226 and plutonium-239.

Beta radiation: Radiation consisting of electrons or positrons emitted from atoms at speeds approaching the speed of light.

Gamma radiation: Electromagnetic waves released during radioactive decay that can ionize atoms and split chemical bonds.

Rad: A unit of absorbed dose of radiation defined as deposition of 100 ergs of energy per gram of tissue. It amounts to approximately one ionization per cubic micron.

Chain reaction: The process of nuclear fission in which the neutrons released trigger other nuclear fission reactions at the same or greater rate. In a nuclear weapon, an extremely rapid multiplying chain reaction causes an explosive release of energy. In a nuclear reactor the pace of the chain reaction is controlled to produce heat (in a power reactor) or large quantities of neutrons (in a research or production reactor).

Critical mass: The amount of a fissile substance that will allow a self-sustaining chain reaction. The amount depends both on the properties of the fissile element and on the shape of the mass.

Atom bomb: A nuclear bomb whose energy comes from the fission of uranium or plutonium.

Hydrogen bomb: A nuclear weapon that derives its energy from the fusion of hydrogen. Also known as a thermonuclear weapon.

Source: Unless otherwise indicated, definitions are prepared by Alyn Ware, Coordinator of the Parliamentary Network for Nuclear Disarmament, a project of the Middle Powers Initiative, www.pnnd.org.
released is proportional to the binding energies of the molecules. In nuclear weapons the explosion is created by changing the atoms themselves – they are either split or fused to create new atoms.

The binding energies within atoms are many magnitudes of order greater than the binding energies of molecules. The amount of energy available within an atom is given by Einstein’s famous formula \( E=MC^2 \), where \( E \) = energy, \( M \) = the mass and \( C \) = the speed of light. Thus the energy available equals the mass multiplied by \( 9,000,000,000,000,000,000 \). As a result, a nuclear bomb using a kilogram of plutonium could have the same explosive force of approximately 15 million kilograms of TNT.

There are two main types of nuclear weapons:

- Atom bombs which use fission as the main reaction, i.e. the atoms are split;
- Hydrogen bombs which use fusion as the main reaction, i.e. the atoms are fused together.

**Fission bombs**

**Materials**
The core of a fission bomb is either plutonium or highly-enriched uranium. These are the only materials that can achieve a self-sustaining chain reaction.

Plutonium occurs naturally only in minute quantities. Most plutonium is produced in reactors through the fission of uranium. It must then be extracted in a reprocessing facility if it is to be useable.

Naturally occurring uranium is mostly Ur238, which is not suitable for nuclear weapons. Ur235, which is better at sustaining a chain reaction, comprises about 0.7% of natural uranium. An enrichment facility is used to increase the proportion of Ur235 to about 90%, although lower grades can be used. Uranium which is composed of more than 20% Ur235 is known as highly-enriched uranium and can be used in a nuclear weapon. Low-enriched uranium can be used in nuclear power reactors.

**Mechanics**

Plutonium and uranium atoms are both heavy, meaning they have a large number of protons and neutrons in the nucleus. Fission of a heavy nucleus can be spontaneous or induced by the absorption of a neutron. During fission, when the heavy nucleus splits into two smaller nuclei, extra neutrons are released. If these neutrons are absorbed by other nuclei, they in turn could split, also releasing neutrons. Generally, the neutrons released by an atom splitting spontaneously “miss” other atoms and so do not stimulate further fission. However, if the atoms are brought together under high pressure, the “hit rate” of neutrons is increased and a chain reaction can occur. In nuclear power plants this chain reaction is controlled by absorbing extra neutrons. In nuclear weapons this chain reaction becomes critical, i.e. uncontrolled.

**Achieving criticality in an atom bomb**

In order to achieve criticality and thus create an explosion from the fission of atoms, an uncontrolled chain reaction must be generated by compressing the fissile material so that the atoms are close enough for the released neutrons to continue to hit. Such compression can be obtained through a gun method or an implosion method.

**Gun method**

One mass of uranium is fired down a barrel into another mass of uranium. This is the simplest design and was used for the Hiroshima bomb. However, it is not as efficient as the implosion method.

**Implosion method**

A sphere of fissile material – plutonium or highly-enriched uranium – is surrounded by conventional high explosives, which are detonated simultaneously. Timing of the detonation is crucial for the material to be compressed sufficiently and uniformly.

**Fusion bombs**

**Mechanics**

In fusion bombs, deuterium and tritium – two isotopes of hydrogen – are fused together to create heavier atoms. This is the same reaction as occurs in the centre of the sun. Fusion can only happen at very high temperatures and pressures. In a nuclear weapon, these temperature and pressure levels are created by using a fission explosion (i.e. an atom bomb) to trigger the fusion reaction.

There is no theoretical limit to the explosive force of a fusion weapon. Typically, fusion weapons are 10-100 times as explosive as the fission bombs that nearly destroyed Hiroshima and Nagasaki.

**Weapons materials**

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A nuclear weapon. Low-enriched uranium can be used in nuclear power reactors.

Deuterium (H₂) and tritium (H₃) are isotopes of hydrogen which are used in fusion weapons. Tritium is also used in a fission bomb as a source of additional neutrons to assist the fission process.

Source: Prepared by Alyn Ware, Coordinator of the Parliamentary Network for Nuclear Disarmament, a project of the Middle Powers Initiative, www.pnnd.org.

Further reading:

A Call to a New Exodus: An Anti-Nuclear Primer for Pacific People, Suliana Siwatibau and David Williams, Pacific Conference of Churches, Fiji, 1982.


IMMEDIATE AFTERMATH OF A NUCLEAR EXPLOSION

A nuclear explosion produces several distinct forms of energy that have damaging effects: blast, thermal radiation, electromagnetic pulse, direct nuclear radiation and fall out. The extent of damage will depend on various factors, including the size of the nuclear weapon, the height at which it is detonated and the geography of the target.

**Blast**

The rapid release of energy in an explosion creates a shockwave of overpressure. Very close to the centre of a nuclear explosion, overpressure is equivalent to several thousand pounds per square inch (psi). This is hundreds of times greater than the pressure in a pressure cooker.

The overpressure crushes objects. Human lungs are crushed at about 30 psi overpressure. Brick houses are destroyed at about 10-15 psi overpressure. The blast also generates high velocity winds which can turn humans or objects into missiles. At 15-20 psi the winds can fling a person at several hundred kilometres per hour. The pressure of the shockwave can also cause deafness.

**Thermal radiation**

Thermal radiation includes light and heat.

A nuclear explosion releases a huge amount of energy as light (ultraviolet, visible and infrared), which can be seen from hundreds of miles away. The light is so intense that it can make sand explode, blind people many miles away, burn shadows into concrete and ignite flammable materials at large distances. The thermal radiation also causes burns on human skin. The radius of the flash burns depends on the power of the weapon and the clearness of the atmosphere. An explosion above clouds can diminish the burns suffered from heat flash.
The nuclear weapon detonated in Hiroshima was about 12kt, i.e. the equivalent of 12,000 tons of TNT. The combined effects of blast and radiation killed about 300,000 people. Current nuclear weapons range in size from 1 kt to over 1,000 kt. Most are about 100kt, i.e. about 10 times the force of the Hiroshima bomb.

The extent of damage depends on the size of the nuclear weapon, the terrain and the height at which it is detonated. Nuclear weapons detonated at ground level generate more fallout as a result of the large amount of ground material which is irradiated by the explosion and thrown in the air, but the effects of thermal radiation and radioactive waves is less than in an air blast.

The effects of radiation on the human body vary, depending on the dosage of radiation, and whether exposure is slow and protracted or large and instantaneous.

Radiation affects cells in the human body that actively divide (e.g. hair, intestine, bone marrow, reproductive organs). The most frequent kind of radiation exposure is exposure of small areas of the body. Damage in localised tissue and to blood vessels in the exposed areas can lead to disturbed organ functioning. Higher doses cause gangrene and/or death of localised tissue.

A large, rapid dose of radiation causes cell death, and effects are immediately apparent – within hours, days, or weeks. With protracted exposure, cells can do some repair over the exposure period. Protracted exposure is generally better tolerated, even when the total dose is high. (It is impossible to measure how much radiation a person has been exposed to over an extended period of time). Radiation doses low enough to avoid cell damage can still induce cellular changes that may be clinically detected sometime in the future, and could potentially be passed on through defective genes.

With radiation exposure due to internally deposited radiation, effects are delayed, and degeneration or destruction of the irradiated tissue may not be as severe. The initiation of cancer is possible, depending on the affected organ and the nature of the radioactive element (its half-life, radiation characteristics and biochemical behaviour).

High whole-body doses of radiation produce a characteristic pattern of injury. Doses are measured in rads.

Extremely high doses: 4,000-5,000 rads
Radiation exposure in this range severely damages the vascular system. It also causes accumulation of fluid in the brain (cerebral edema), leading to central nervous system syndrome. Symptoms include nausea, vomiting, explosive diarrhea, convulsions and progressive impairment of cognitive and motor skills. A person exposed to this amount of radiation will enter a coma and die within 48 hours.

High doses: 1,000-4,000 rads
In this range of radiation exposure, vascular damage is less severe, but there is also a loss of fluids and

No early fallout is associated with high-altitude explosions, although an explosion well above the ground causes radioactive residues to rise to a great height in the mushroom cloud and descend gradually over a large area.

The distribution of fallout depends on the topography of the land and weather conditions, especially the direction and speed of winds. Radioactive fallout may travel and settle in areas hundreds of miles from the explosion site.

Radioactive fallout may be the most dangerous effect of a nuclear explosion because the area of exposure to fallout is much wider than that of direct nuclear radiation.

Because there is no known way of neutralising a radioactive substance, apart from sending it through a nuclear reactor, radioactive products are dangerous until they have decayed to such an extent that they no longer emit significant amounts of radiation. This time is usually considered to be 10 times the half-life.

**Effects of Radiation on Humans**

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**High doses: 1,000-4,000 rads**
In this range of radiation exposure, vascular damage is less severe, but there is also a loss of fluids and
electrolytes in intercellular spaces and the gastrointestinal tract. Death occurs within ten days, due to fluid and electrolyte imbalance, severe bone-marrow damage and terminal infection.

**Moderate doses: 400-1,000 rads**

Exposure in this range causes a gastrointestinal form of radiation sickness, with symptoms of nausea, vomiting and diarrhea. Radiation in this range also destroys bone marrow and disrupts its production of blood cells, leading to infection as the white blood cells count decreases. There would also be a drop in the number of platelets (cell fragments that help blood to clot), which would allow massive hemorrhaging. Death is probable and will occur in approximately four to five weeks.

**Low doses: 100-400 rads**

Low doses of radiation cause problems similar to those of moderate exposure. Nausea, vomiting and diarrhea symptoms cease after a few days. Treatment for radiation exposure in this range can be effective, but death is still a possibility.

**Acute radiation syndrome (see 'Extremely high doses' and 'High doses' above)**

Acute radiation syndrome is sickness caused by irradiation of most or all of the body, whether in one large dose or through exposure over time (although it is impossible to measure the amount of radiation a person has accumulated over an extended period of time). Symptoms will be more immediately apparent in the case of a large dose in a short period. Encompassing the most severe effects of radiation exposure, acute radiation syndrome requires immediate medical attention. Without medical treatment, survival is highly unlikely.

Initially patients experience fatigue, loss of appetite, nausea, vomiting and diarrhea for a day or two. If the dose of radiation is very high, there may also be symptoms such as fever and respiratory problems. Symptoms then disappear for several days to several weeks, after which the illness becomes severe.

Radiation inhibits reproduction of blood cells, leading to bleeding and anemia as the number of red blood cells decreases and inability for wounds to heal as blood clotting factors are lost. A decreased white blood cell count hinders the body’s immune system and leads to more infections.

There may also be a loss of fluids, electrolytes and intestinal lining. In more serious cases, accumulation of fluid in the brain can lead to central nervous system syndrome, with symptoms of nausea, vomiting and diarrhea.

Other symptoms may include temporary sterility in males, clouding in the lens of the eye and loss of hair. Hair loss occurs because damage to hair-root cells causes hairs to become thinner and break off.

**Late effects**

Delayed effects of radiation exposure, largely secondary to blood vessel damage, are the impaired functioning of and degenerative changes in many organs, particularly bone marrow, kidneys, lungs and the lens of the eye.

The most serious late effect of radiation exposure is a significantly increased incidence of leukemia and thyroid, lung and breast cancers (compared to the average figure among people exposed to doses of less than 100 rads).

There is also an increased incidence of leukemia, lung cancer, radiation-induced anemia and bone cancer among people exposed to lower doses of radiation. The type of cancer depends on how the radiation exposure occurs.

For example, there was a high incidence of lung cancer among uranium mine workers, who inhaled radioactive dust. Watch painters at the turn of the century licked their radioactive paintbrushes, leading to a high incidence of bone cancer and radiation-induced anemia. There is also a very high incidence of leukemia among Hiroshima survivors who were exposed to 100+ rads.

Radiation exposure can also cause cataracts and hair loss and increase the risk of infertility and birth defects.

Additional sources:
- www.rerf.or.jp/radefx/index_e.html
- www.orau.gov/reacts/syndrome.htm
- https://science.howstuffworks.com/nuclear-bomb.htm

NUCLEAR WEAPONS TIMELINE

HISTORY OF THE NUCLEAR ARMS RACE, COMPILED BY THE SPINNEY PRESS

1930s
Key scientific discoveries about the fissioning of atoms are made, laying the groundwork for nuclear weapons development in the next decade.

1940s
United States builds and tests the first atomic bombs, two of which are then used on Hiroshima and Nagasaki leading to the end of World War II. The beginning of the Cold War and a global nuclear arms race ensues with the Soviet Union’s detonation of an atomic bomb in 1949.

August 1942 – Manhattan Project established in the United States to develop the first nuclear weapon.

July 1945 – United States conducts first ever nuclear test in New Mexico, marking the beginning of the nuclear age.

August 1945 – United States drops Little Boy, a gun-type uranium-235 weapon, on Hiroshima killing more than 140,000 Japanese people within months. Many more later die from radiation-related illnesses.

August 1945 – United States drops a second bomb, an implosion-type plutonium-239 explosive called Fat Man, on Nagasaki, Japan. 74,000 people die by the end of 1945.

January 1946 – In its first resolution, the United Nations General Assembly calls for the complete elimination of nuclear weapons and sets up a commission to deal with the problem of the atomic discovery.

August 1949 – Soviet Union conducts its first atomic test, becoming the second nation to develop and successfully test a nuclear device.

1950s
Decade begins with the Korean War and also sees the first space travel by human beings, the construction of bomb shelters, and the US deployment of the first intercontinental ballistic missiles in 1958.

1951 – China and the Soviet Union sign an agreement whereby China supplies uranium ore in exchange for technical assistance in producing nuclear weapons.

October 1952 – United Kingdom conducts its first nuclear test at Montebello Islands off the coast of Western Australia. It later conducts a series of tests at Maralinga and Emu Fields in South Australia.

November 1952 – United States detonates the first hydrogen bomb at Enewetak Atoll in the Marshall Islands; it is 500 times more powerful than the Nagasaki bomb.

March 1954 – United States detonates its first deliverable thermonuclear weapon at Bikini Atoll, a 17-megaton hydrogen bomb called Bravo, at Bikini Atoll in the Pacific Ocean, contaminating a Japanese fishing boat and residents of Rongelap and Utirik. The device had a yield almost three times larger than expected, leading to the worst radiological disaster in US history.

July 1955 – Russell-Einstein Manifesto issued by leading scientists warning of the dangers of nuclear war and urging all governments to resolve disputes peacefully.

May 1958 – United States and United Kingdom sign the US-UK Mutual Defense Agreement, a bilateral treaty on nuclear weapons cooperation signed after the UK successfully tested a hydrogen bomb during Operation Grapple.

1960s
France and China become nuclear weapons powers.

October 1961 – Soviet Union detonates Tsar Bomba, a 58-megaton atmospheric nuclear bomb – the largest, most powerful nuclear weapon ever detonated.

October 1962 – Cuban Missile Crisis, which involves a tense stand-off when the US discovers Soviet missiles in Cuba. The US blockades Cuba for 13 days. The crisis brings the US and Soviet Union to the brink of nuclear war.

August 1963 – Partial Test Ban Treaty signed in Moscow, following large demonstrations in Europe and America against nuclear testing. The treaty bans nuclear testing in the atmosphere, outer space and underwater.

July 1968 – Non-Proliferation Treaty signed. Under the treaty, non-nuclear-weapons states agree never to acquire nuclear weapons, and nuclear-weapon states make a legal undertaking to disarm. To date, 189 countries have signed the treaty, including the 5 permanent members of the UN Security Council. Only India, Israel, Pakistan and North Korea have not signed.

1970s
The SALT I and anti-ballistic missile treaties open the 1970s decade on a positive note. The end of the Vietnam War is followed by the SALT II agreement. The accident at the Three Mile Island nuclear energy plant in the US occurs at the end of the decade.

May 1974 – India tests its first nuclear device, Smiling Buddha, underground at Pokharan in the Rajasthan desert. The government falsely claims it is a peaceful nuclear test.

September 1979 – A nuclear test explosion occurs over the South Indian Ocean off the Cape of Good Hope, attributed to South Africa with the assistance of Israel.

1980s
Cold War is at its height with Ronald Reagan declaring the USSR “the Evil Empire”; the US engineers a massive build-up of nuclear arms. In 1985, it is revealed that Israel may have up to 200 nuclear weapons stockpiled. By the end of the 1980s, the Cold War ends with Glasnost in the former Soviet Union.

December 1959 – Nuclear tests banned in Antarctica. The Antarctic Treaty opens for signature, establishing that “any nuclear explosion in Antarctica and the disposal thereof of radioactive waste material shall be prohibited”.

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September 1986 – Mordechai Vanunu divulges secrets about the Israeli nuclear weapons program to a London newspaper.

June 1982 – A million people rally for disarmament in New York City’s Central Park in support of the Second United Nations Special Session on Disarmament, the largest anti-war demonstration in history.

July 1985 – Greenpeace ship Rainbow Warrior destroyed, killing one person, in New Zealand on its way to protesting French nuclear tests. New Zealand later enacts nuclear-free legislation.

August 1985 – South Pacific Nuclear Free Zone Treaty is signed at Rarotonga in the Cook Islands, prohibiting the manufacturing, stationing or testing of nuclear weapons within the area.

September 1986 – Israel’s nuclear program revealed; experts conclude Israel may have up to 200 nuclear weapons.

October 1986 – US President Ronald Reagan and Soviet President Mikhail Gorbachev meet at Reykjavik in Iceland to discuss the possibility of achieving nuclear abolition.


1990s

Post-Cold War disarmament gets a boost when Ukraine, Kazakhstan and Belarus give up their Soviet-inherited nuclear arsenals. However, other nuclear weapons states do not follow suit, and by the end of the decade India and Pakistan test nuclear weapons.

1991 – South Africa signs the Nuclear Non-Proliferation Treaty, announcing between 1979-1989, they had built and then dismantled six nuclear weapons.

December 1995 – Nations of Southeast Asia create a nuclear-weapon-free zone.

April 1996 – 43 African nations sign the Treaty of Pelindaba in Egypt establishing an African nuclear-weapon-free zone and pledging not to build, test or stockpile nuclear weapons.

June 1996 – Ukraine becomes a nuclear-weapon-free state after transferring its last inherited Soviet nuclear warhead to Russia for destruction, calling on others to follow its path.

July 1996 – International Court of Justice hands down an opinion finding the threat or use of nuclear weapons would generally be contrary to international law.

September 1996 – Comprehensive Nuclear-Test-Ban Treaty opens for signatures at the United Nations. China, France, the UK, Russia and the US all sign the treaty. India says it will not sign the treaty.

November 1996 – Belarus turns its last nuclear missile over to Russia for destruction, joining other former Soviet republics Ukraine and Kazakhstan in giving up all their nuclear arms.

May 1998 – India conducts three underground nuclear tests, its first in 24 years. Later in May, Pakistan tests six nuclear weapons in response to India’s tests.

2000s

Decade begins with threats by the United States to proceed with a nationwide missile defence system, even if it abrogates the 1972 Anti-Ballistic Missile Treaty.

2003 – North Korea claims it has several nuclear explosives.

August 2005 – Ayatollah Ali Khamenei of Iran issues a fatwa forbidding production, stockpiling and use of nuclear weapons.

October 2006 – North Korea successfully tests a nuclear weapon for the first time, becoming the ninth country to do so, provoking international condemnation.

2010s

Decade starts with a resurgence of international discussion about nuclear weapons issues, resulting in a treaty on the prohibition of nuclear weapons in 2017.

Provocative nuclear weapons testing by North Korea in 2017 results in negotiations in 2018 between North Korea and South Korea, China and the US in attempts to denuclearise the Korean peninsula and avoid an escalation into disastrous nuclear conflict.

March 2013 – Norway hosts first-ever intergovernmental conference to examine the humanitarian impact of nuclear weapons, bringing together diplomats from 128 states.

February 2014 – Second Conference on the Humanitarian Impact of Nuclear Weapons, held in Mexico, which concludes it is time for a diplomatic process to ban nuclear weapons.

December 2014 – Host nation Austria issues a landmark pledge to stigmatise, prohibit and eliminate nuclear weapons at the Vienna Conference on the Humanitarian Impact of Nuclear Weapons.

July 2015 – Joint Comprehensive Plan of Action agreement is signed and implemented in 2016 between six world powers (the US, UK, Russia, France, China and Germany) and Iran. The deal lifts sanctions on Iran in exchange for Tehran slowing its nuclear research and development program and allowing UN weapons inspections. World powers fear Iran was on the path to making a nuclear weapon.


February-November 2017 – North Korea successfully tests a number of short-range and intercontinental ballistic missiles, two of which fly over Japanese territory, attracting economic sanctions in response.

July 2017 – 122 nations adopt the United Nations Treaty on the Prohibition of Nuclear Weapons, a legally-binding instrument to prohibit nuclear weapons, leading towards their total elimination.

April 2018 – Inter-Korean summit held between South Korean President Moon Jae-in and North Korean leader Kim Jong-un. The summit focuses on the North Korean nuclear weapons program and denuclearisation of the Korean Peninsula. The Panmunjom Declaration is made following the summit.

May 2018 – US President Donald Trump declares his intention to scrap the Iran nuclear deal, saying it does not go far enough in restraining Iran’s nuclear ambitions, and enables Iran to become a player in other conflicts, such as in Syria and Yemen.

June 2018 – US President Donald Trump and North Korean Chairman Kim Jong-un hold an historic summit in Singapore, releasing a joint agreement aimed at denuclearising North Korea – in exchange for lifting sanctions and legitimising the North Korean communist regime – with the intention of establishing peace on the Korean peninsula and reducing the threat of a globally devastating nuclear conflict.

SOURCES:

- Timeline of the Nuclear Age, Nuclear Age Peace Foundation, www.nuclearfiles.org/menu/timeline

Compiled by The Spinney Press.
HIROSHIMA AND NAGASAKI

In August 1945, the United States dropped two nuclear weapons over the Japanese cities of Hiroshima and Nagasaki. At the end of 1945, more than 230,000 people had died in Hiroshima and Nagasaki due to the immediate and long-term damage of the bombs.

HIROSHIMA

Towards the end of World War II, American air raids had destroyed most Japanese cities. Hiroshima was among the few cities still unharmed. The city also had an important harbour and many Japanese soldiers, military areas and military factories unharmed by US attacks. Since the city carried no signs of previous bombings, the American army expected to clearly see the effects of the use of the nuclear bomb. So would the rest of the world.

Early on the morning of 6 August 1945, the aeroplane Enola Gay left the US occupied island of Tinian. Enola Gay was one of seven American aeroplanes heading for Hiroshima – but the only one equipped with a nuclear bomb. The bomb was more than three metres long, 75 centimetres in diameter and weighed close to four tonnes. It contained 60kg of uranium-235 and carried the name Little Boy.

By 7am, the Japanese radar net detected aircraft flying towards Japan and an alert was broadcast throughout the Hiroshima area.

Soon afterward, a civilian plane circled over the city, but there was no sign of bombers. The people returned to their normal morning routines. When radio stations an hour later broadcast another warning for people to take shelter, many ignored it.

No one could believe what was about to happen. At 8.15am, Little Boy exploded some 600 metres above the centre of the city. The burst temperature was estimated to reach over a million degrees Celsius, which ignited the surrounding air, forming a fireball some 250 metres in diameter. Eyewitnesses all talk about the flashing light with brightness exceeding the sun tenfold followed by intensive heat.

The blast wave shattered windows and felt as far away as 15 kilometres. Over two-thirds of Hiroshima’s buildings were demolished. The hundreds of fires, ignited by the thermal pulse, combined to produce a firestorm that destroyed everything within about ten kilometres from ground zero. A small part of all buildings in the nearest zone survived – mainly due to the fact that Hiroshima is an earthquake-prone area and many important buildings were built extra strongly.

About half an hour after the explosion, heavy rain started falling in the area north east of Hiroshima. The “black rain” was full of dirt, dust, soot and radioactive particles that had been transported into the air by the explosion and fires. Because of the rain, areas far away from ground zero were contaminated by radioactive fallout.

The soldiers aboard the Enola Gay looked down on Hiroshima after releasing the bomb from the plane. The city had disappeared from sight – all that was seen was a massive cloud of soot and raging flames. The co-pilot, Captain Richard Lewis, gasped ‘Oh my God, what have we done?’ The crew returned to the camp and were received as heroes.

At the end of 1945, more than 230,000 people had died in Hiroshima and Nagasaki due to the immediate and long-term damage of the bombs.

The confusion at the Japanese military headquarters was complete. People reported a “sinister cloud,” an “enormous explosion”, a “terrible flash,” a “heavy roar.” Reports were vague and created more bewilderment than alarm. Finally, from descriptions and a pilot’s report, the Japanese military began to realise that what had happened might have been the result of an atomic bomb. This came as a shock to them, since no one had thought the Americans’ progress in nuclear bomb development was more than in the “scientific investigation” stage.

Before the Little Boy, loaded with the explosive substance U-235, was dropped on Hiroshima, protests came from unexpected sources. The scientist Leo Szilard at the Met Lab in Chicago started a petition against the use of nuclear weapons in Japan. Szilard had led the atomic research since 1939, but discontinued his engagement as the German nuclear weapon threat disappeared. 155 signatures were collected.

The leader of the Manhattan Project, Leslie Groves, conducted a poll among scientists at the Met Lab to prove Szilard wrong. It turned out, however, that 83 per cent favoured a demonstration of the US nuclear capacity before using A-bombs against Japan. Szilard’s poll was classified and not officially published until the 1960's.
The atomic bombing of Hiroshima has always overshadowed that of Nagasaki. The Hiroshima bombing went exactly according to the plans of the US military leadership. Still, it had decided to drop two atomic bombs over Japan, with a few days in between to give the Japanese a chance to surrender.

The second bomb was scheduled for 11 August over the Japanese city of Kokura. The second alternative was Nagasaki. The US military leadership heard bad weather was blowing in and decided to speed up the process. The new date for the second atomic bomb over Japan would be 9 August 1945.

While the crew of Enola Gay was still being celebrated for its success in Hiroshima, the crew of the second mission ran into trouble after trouble. A typhoon threatened Iwo Jima, the proposed starting point, forcing the mission to take off from Yakushima instead. The second bomb was scheduled for 11 August over the Japanese city of Kokura. The second alternative was Nagasaki. The US military leadership heard bad weather was blowing in and decided to speed up the process. The new date for the second atomic bomb over Japan would be 9 August 1945.

As the bomb, Fat Man, was loaded on board the plane Bock’s Car, the crew realised only one of the fuel pumps were operating. This effectively cut Bock’s Car’s fuel supply, and the crew knew this could jeopardise a safe return. But there was no time to lose – to convince the Japanese that Hiroshima was not a one-time occurrence, it was decided to proceed.

Fat Man was a very suitable name for the Nagasaki bomb. It consisted of a plutonium core surrounded by highly explosive material to create a heavy nuclear reaction. Fat Man weighed over 4.5 tonnes, was 3.25 metres tall and measured over one and a half metres in diameter – more than double as fat as Little Boy that detonated over Hiroshima.

When the bomber reached Kokura where the bomb was supposed to be dropped, the crew found haze and smoke obscuring the city as well as the large ammunition arsenal that was the reason for targeting the city. The crew had no other option than to turn towards option two: Nagasaki.

Nagasaki was chosen as a target due to the two huge Mitsubishi war plants situated in the city. Clouds covered Nagasaki when the plane got there, but Bock’s Car was running out of fuel and a decision was made to drop the bomb by radar. At the last minute a small window in the clouds opened just above the war plants. At 10.58am Nagasaki time the bomb Fat Man was dropped.

Fat Man exploded 43 seconds later at 469 metres above Nagasaki. The bomb detonated with an estimated force of 22 megatons of TNT, missing its target by almost 3 kilometres.

The explosion in Nagasaki did not create a massive firestorm as in Hiroshima, but due to the explosive power and the fact that it was dropped over a valley, the destruction in the immediate surroundings of ground zero was worse than in Hiroshima. The destruction of Nagasaki was somewhat limited by the mountainous topography of the city, reducing the worst effects of the explosion.

This in no way means the city was spared, as shown in the two pictures below. The first picture is shot from the air two days prior to the atomic bombing. The second picture shows the same place three days after the atomic bombing: a flat, bare landscape – a city no longer a city.

The area within one kilometre from ground zero was totally destroyed by the shockwave and the thermal pulse. Houses, buildings, plants and living creatures were pulverised. Within another one kilometre radius close to 80 per cent of all buildings collapsed. Compared to the more modern Hiroshima, Nagasaki houses were mainly old wooden houses and weaker constructions.

As far as 15 kilometres from ground zero, windows and doors were broken. Just as in Hiroshima, it is impossible to tell the exact number of injured and killed by the atomic bombing of Nagasaki. The Nagasaki municipal government has officially adopted the number of more than 70,000 death victims.

A few minutes later, the crew of the plane Bock’s Car that dropped the bomb on Nagasaki saw an enormous fireball boiling skyward. The pilot barked sharply to avoid it. Five successive shockwaves shook the plane and the radioactive cloud surged toward it.

After a dramatic landing in Okinawa – with no more than 25 litres of fuel left in the tank – the shaken crew was met by emptiness. No one was there to welcome them; no ceremony was waiting.

Learn About Nuclear Weapons is the English version of web-based educational materials from the Swedish Physicians against Nuclear Weapons and was created in collaboration with the Swedish Peace and Arbitration Society, Women’s International League for Peace and Freedom, Norwegian Physicians against Nuclear Weapons and ICAN Norway, with support from Folke Bernadotte Academy.

At the dawn of the nuclear age, the United States hoped to maintain a monopoly on its new weapon, but the secrets and the technology for making nuclear weapons soon spread.

The United States conducted its first nuclear test explosion in July 1945 and dropped two atomic bombs on the cities of Hiroshima and Nagasaki in August 1945. Just four years later, the Soviet Union conducted its first nuclear test explosion. The United Kingdom (1952), France (1960), and China (1964) followed.

Seeking to prevent the nuclear weapon ranks from expanding further, the United States and other like-minded states negotiated the Nuclear Non-Proliferation Treaty (NPT) in 1968 and the Comprehensive Nuclear-Test-Ban Treaty (CTBT) in 1996.

India, Israel, and Pakistan never signed the NPT and possess nuclear arsenals. Iraq initiated a secret nuclear program under Saddam Hussein before the 1991 Persian Gulf War. North Korea announced its withdrawal from the NPT in January 2003 and has tested nuclear devices since that time. Iran and Libya have pursued secret nuclear activities in violation of the treaty’s terms, and Syria is suspected of having done the same. Still, nuclear non-proliferation successes outnumber failures and dire forecasts decades ago that the world would be home to dozens of states armed with nuclear weapons have not come to pass.

At the time the NPT was concluded, the nuclear stockpiles of both the United States and the Soviet Union/Russia numbered in the tens of thousands. Beginning in the 1970s, US and Soviet/Russian leaders negotiated a series of bilateral arms control agreements and initiatives that limited, and later helped to reduce, the size of their nuclear arsenals.

Today, the United States and Russia each deploy more than 1,500 strategic warheads on several hundred bombers and missiles, and are modernising their nuclear delivery systems.

China, India, and Pakistan are all pursuing new ballistic missile, cruise missile, and sea-based nuclear delivery systems. In addition, Pakistan has lowered the threshold for nuclear weapons use by developing tactical nuclear weapons capabilities to counter perceived Indian conventional military threats.

North Korea continues its nuclear pursuits in violation of its earlier denuclearisation pledges.

**NUCLEAR-WEAPON STATES**

The nuclear-weapon states (NWS) are the five states – China, France, Russia, United Kingdom, and the United States – officially recognised as possessing nuclear weapons by the NPT.

The treaty legitimises these states’ nuclear arsenals, but establishes they are not supposed to build and maintain such weapons in perpetuity. In 2000, the NWS committed themselves to an “unequivocal undertaking...to accomplish the total elimination of their nuclear arsenals.”

Because of the secretive nature with which most governments treat information about their nuclear arsenals, most of the figures below are best estimates of each nuclear-weapon state’s nuclear holdings, including both strategic warheads and lower-yield devices referred to as tactical weapons.

**China**
- About 270 total warheads.

**France**
- About 300 total warheads.

**Russia**
- February 2018 New START declaration: 1,444 strategic warheads deployed on 527 ICBMs, SLBMs and strategic bombers.
- The Federation of American Scientists (FAS) estimates approximately 4,500 stockpiled warheads and 2,510 retired warheads for a total of roughly 7,010 warheads, as of early 2017.

**United Kingdom**
- About 120 strategic warheads, of which no more than 40 are deployed at sea on a nuclear ballistic missile submarine at any given time. The United Kingdom possesses a total of four ballistic missile submarines.
- Total stockpile is estimated up to 215 warheads.

**2017 ESTIMATED GLOBAL NUCLEAR WARHEAD INVENTORIES**

The world’s nuclear-armed states possess a combined total of roughly 15,000 nuclear warheads: more than 90 per cent belong to Russia and the United States. Approximately 9,600 warheads are in military service, with the rest awaiting dismantlement.

United States
- February 2018 New START declaration: 1,350 strategic nuclear warheads deployed on 652 ICBMs, SLBMs and strategic bombers.
- FAS estimates approximately 4,000 stockpiled warheads and 2,550 retired warheads for a total of 6,550 warheads as of February 2018.

NON-NPT NUCLEAR WEAPONS POSSESSORS
- India, Israel, and Pakistan never joined the NPT and are known to possess nuclear weapons.
- India first tested a nuclear explosive device in 1974. That test spurred Pakistan to ramp up work on its secret nuclear weapons program.
- India and Pakistan both publicly demonstrated their nuclear weapon capabilities with a round of tit-for-tat nuclear tests in May 1998.
- Israel has not publicly conducted a nuclear test, does not admit or deny having nuclear weapons, and states that it will not be the first to introduce nuclear weapons in the Middle East. Nevertheless, Israel is universally believed to possess nuclear arms, although it is unclear exactly how many.

The following arsenal estimates are based on the amount of fissile material – highly-enriched uranium and plutonium – that each of the states is estimated to have produced. Fissile material is the key element for making nuclear weapons.

India and Israel are believed to use plutonium in their weapons, while Pakistan is thought to use highly-enriched uranium.
- India: Between 120-130 nuclear warheads.
- Israel: An estimated 80 nuclear warheads, with fissile material for up to 200.
- Pakistan: Between 130-140 nuclear warheads.

STATES OF IMMEDIATE PROLIFERATION CONCERN
Prior to the implementation of the Joint Comprehensive Plan of Action, Iran pursued an uranium-enrichment program and other projects that provided it with the capability to produce bomb-grade fissile material and develop nuclear weapons, if it chose to do so.

Iran’s uranium enrichment program continues, but it is restricted and monitored by the nuclear deal. In contrast, North Korea has the material to produce a small number of nuclear weapons, announced its withdrawal from the NPT, and tested nuclear devices. Uncertainty persists about how many additional nuclear devices North Korea has assembled beyond those it has tested. In September 2005, Pyongyang “committed to abandoning all nuclear weapons and existing nuclear programs.”

Iran
- No known weapons or sufficient fissile material stockpiles to build weapons.
- The International Atomic Energy Agency (IAEA), the institution charged with verifying that states are not illicitly building nuclear weapons, concluded in 2003 that Iran had undertaken covert nuclear activities to establish the capacity to indigenously produce fissile material.
- July 2015: Iran and six world powers negotiated a long-term agreement to verify and significantly reduce Iran’s capacity to produce material for nuclear weapons.
- As part of this agreement, the IAEA and Iran concluded an investigation into Iran’s past nuclear weapons-related activities. The agency concluded that Iran had an organised...
program to pursue nuclear weapons prior to 2003. Some of these activities continued through 2009, but there were no indications of weaponisation activities taking place after that date.

**North Korea**
- Estimated as of January 2018 to have approximately 10-20 warheads and the fissile material for 30-60 nuclear weapons.
- While there is a high degree of uncertainty surrounding North Korea’s fissile material stockpile and production, particularly on the uranium enrichment side, North Korea is estimated to have 20-40 kilograms of plutonium and 250-500 kilograms of highly-enriched uranium. The estimated annual production of fissile material is enough for 6-7 weapons.
- North Korea operates its 5-megawatt heavy-water graphite-moderated reactor used to extract plutonium in the past for nuclear warheads on an intermittent basis since August 2013. There has also been activity at North Korea’s reprocessing facility in 2016, indicating that Pyongyang has likely separated plutonium from the reactor’s spent fuel.
- North Korea unveiled a centrifuge facility in 2010, but it is unclear if Pyongyang is using the facility to produce highly-enriched uranium for weapons.
- By 2020, experts estimate that North Korea could have anywhere between 20-100 nuclear warheads based on the rate of its stockpile growth and technological improvements.

**Syria**
- September 2007: Israel conducted an airstrike on what US officials alleged was the construction site of a nuclear research reactor similar to North Korea’s Yongbyon reactor.
- The extent of Syrian-North Korean nuclear cooperation is unclear, but is believed to have begun in 1997.
- Investigations into US claims uncovered traces of undeclared man-made uranium particles at both the site of the destroyed facility and Syria’s declared research reactor.
- Syria has not adequately cooperated with the IAEA to clarify the nature of the destroyed facility and procurement efforts that could be related to a nuclear program.

**States that had nuclear weapons or nuclear weapons programs at one time**
- Belarus, Kazakhstan and Ukraine inherited nuclear weapons following the Soviet Union’s 1991 collapse, but returned them to Russia and joined the NPT as non-nuclear-weapon states.
- South Africa secretly developed its small number of nuclear warheads and also joined the NPT in 1991.
- Iraq had an active nuclear weapons program prior to the 1991 Persian Gulf War, but was forced to verifiably dismantle it under the supervision of UN inspectors. The US-led March 2003 invasion of Iraq and subsequent capture of Iraqi leader Saddam Hussein definitively ended his regime’s pursuit of nuclear weapons.
- Libya voluntarily renounced its secret nuclear weapons efforts in December 2003.
- Argentina, Brazil, South Korea and Taiwan also shelved nuclear weapons programs.


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**2017 estimated global nuclear warhead inventories**

The world’s nuclear-armed states possess a combined total of roughly 15,000 nuclear warheads: more than 90 per cent belong to Russia and the United States. Approximately 9,600 warheads are in military service, with the rest awaiting dismantlement.

- **Retired:** warheads no longer in the stockpile but remain intact as they await dismantlement.
- **Stockpiled:** warheads assigned for potential use on military delivery vehicles; includes active and inactive warheads.
- **Deployed:** warheads on ballistic missiles and at aircraft bases. Numbers based on New START counting rule which counts operationally deployed ballistic missile warheads and heavy bombers.

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The number of nuclear weapons in the world has declined significantly since the Cold War: down from a peak of approximately 70,300 in 1986 to an estimated 14,200 in early-2018. Government officials often portray that accomplishment as a result of current arms control agreements, but the overwhelming portion of the reduction happened in the 1990s. Moreover, comparing today’s inventory with that of the 1950s is like comparing apples and oranges; today’s forces are vastly more capable.

The pace of reduction has slowed significantly. Instead of planning for nuclear disarmament, the nuclear-armed states appear to plan to retain large arsenals for the indefinite future (see graph below). Despite progress in reducing Cold War nuclear arsenals, the world’s combined inventory of nuclear warheads remains at a very high level: approximately 14,455 warheads as of early-2018. Of these, roughly 9,300 are in the military stockpiles (the rest are awaiting dismantlement), of which more than 3,750 warheads are deployed with operational forces, of which nearly 1,800 US, Russian, British and French warheads are on high alert, ready for use on short notice.

Approximately 93 per cent of all nuclear warheads are owned by Russia and the United States who each have around 4,000 warheads in their military stockpiles; no other nuclear-armed state sees a need for more than a few hundred nuclear weapons for national security (see graph below left).

The United States, Russia and the United Kingdom are reducing their warhead inventories, but the pace of reduction is slowing compared with the past 25 years. France and Israel have relatively stable inventories, while China, Pakistan, India and North Korea are increasing their warhead inventories.

All the nuclear weapon states continue to modernise their remaining nuclear forces and appear committed to retaining nuclear weapons for the indefinite future. For an overview of global modernisation programs, see this 2014 article (http://journals.sagepub.com/doi/pdf/10.1177/0096340214540062). Individual country profiles are avail-
## STATUS OF WORLD NUCLEAR FORCES 2018*

<table>
<thead>
<tr>
<th>COUNTRY</th>
<th>DEPLOYED STRATEGIC</th>
<th>DEPLOYED NON-STRATEGIC</th>
<th>RESERVE/ NON-DEPLOYED</th>
<th>MILITARY STOCKPILE&lt;sup&gt;A&lt;/sup&gt;</th>
<th>TOTAL INVENTORY&lt;sup&gt;B&lt;/sup&gt;</th>
</tr>
</thead>
<tbody>
<tr>
<td>Russia</td>
<td>1,600&lt;sup&gt;c&lt;/sup&gt;</td>
<td>0&lt;sup&gt;d&lt;/sup&gt;</td>
<td>2,750&lt;sup&gt;e&lt;/sup&gt;</td>
<td>4,350&lt;sup&gt;f&lt;/sup&gt;</td>
<td>6,850&lt;sup&gt;g&lt;/sup&gt;</td>
</tr>
<tr>
<td>United States</td>
<td>1,600&lt;sup&gt;h&lt;/sup&gt;</td>
<td>150&lt;sup&gt;i&lt;/sup&gt;</td>
<td>2,050&lt;sup&gt;j&lt;/sup&gt;</td>
<td>3,800&lt;sup&gt;l&lt;/sup&gt;</td>
<td>6,450&lt;sup&gt;e&lt;/sup&gt;</td>
</tr>
<tr>
<td>France</td>
<td>280&lt;sup&gt;o&lt;/sup&gt;</td>
<td>n.a.</td>
<td>10&lt;sup&gt;o&lt;/sup&gt;</td>
<td>300</td>
<td>300</td>
</tr>
<tr>
<td>China</td>
<td>0&lt;sup&gt;m&lt;/sup&gt;</td>
<td>?</td>
<td>270</td>
<td>270</td>
<td>270&lt;sup&gt;n&lt;/sup&gt;</td>
</tr>
<tr>
<td>United Kingdom</td>
<td>120&lt;sup&gt;n&lt;/sup&gt;</td>
<td>n.a.</td>
<td>95&lt;sup&gt;n&lt;/sup&gt;</td>
<td>215</td>
<td>215&lt;sup&gt;n&lt;/sup&gt;</td>
</tr>
<tr>
<td>Israel</td>
<td>0</td>
<td>n.a.</td>
<td>80&lt;sup&gt;p&lt;/sup&gt;</td>
<td>80&lt;sup&gt;p&lt;/sup&gt;</td>
<td>80&lt;sup&gt;p&lt;/sup&gt;</td>
</tr>
<tr>
<td>Pakistan</td>
<td>0</td>
<td>n.a.</td>
<td>130-140</td>
<td>130-140&lt;sup&gt;q&lt;/sup&gt;</td>
<td>130-140&lt;sup&gt;q&lt;/sup&gt;</td>
</tr>
<tr>
<td>India</td>
<td>0</td>
<td>n.a.</td>
<td>120-130</td>
<td>120-130&lt;sup&gt;r&lt;/sup&gt;</td>
<td>120-130&lt;sup&gt;r&lt;/sup&gt;</td>
</tr>
<tr>
<td>North Korea</td>
<td>0</td>
<td>n.a.</td>
<td>?</td>
<td>10-20&lt;sup&gt;s&lt;/sup&gt;</td>
<td>10-20&lt;sup&gt;s&lt;/sup&gt;</td>
</tr>
<tr>
<td><strong>Total:</strong></td>
<td>~3,600</td>
<td>~150</td>
<td>~5,525</td>
<td>~9,300</td>
<td>~14,450</td>
</tr>
</tbody>
</table>

How to read this table:

Deployment strategic warheads are those deployed on intercontinental missiles and at heavy bomber bases. Deployed non-strategic warheads are those deployed on bases with operational short-range delivery systems. Reserve/Non-deployed warheads are those not deployed on launchers and in storage (weapons at bomber bases are considered deployed). The military stockpile includes warheads that are in the custody of the military and earmarked for use by commissioned delivery vehicles. The total inventory includes warheads in the military stockpile as well as retired, but still intact, warheads in queue for dismantlement. For additional guidance, see endnotes below.

* Current update: May 2018

All numbers are approximate estimates and further described in our FAS Nuclear Notebooks published in the Bulletin of the Atomic Scientists, and the World Nuclear Forces overview in the SIPRI Yearbook. See also status and 10-year projection of U.S. and Russian forces. Additional reports are published on the FAS Strategic Security Blog. Unlike those publications, this table is updated continuously as new information becomes available.

- Total inventory: Counts warheads in the military stockpile as well as retired, but still intact, warheads awaiting dismantlement.
- Non-deployed reserve includes an estimated 2,000 strategic and 50 non-strategic warheads in central storage.
- All are declared to be in central storage.
- Includes an estimated 920 strategic warheads and all 1,830 non-strategic warheads.
- In addition to the 4,350 in the military stockpile, an estimated 2,500 retired warheads are thought to be awaiting dismantlement. Details are scarce, but we estimate that Russia is dismantling 200-300 retired warheads per year.
- This number is higher than the aggregate data released under the New START treaty because this table also counts bomber weapons at bomber bases as deployed.
- Approximately 150 861 bombs are deployed in Europe at six bases in five countries (Belgium, Germany, Italy, Netherlands and Turkey).
- China is thought to have “several hundred warheads”, far less than the 1,600-3,000 that have been suggested by some. None of the warheads are thought to be fully deployed but kept in storage under control. The existence of a Chinese non-strategic nuclear arsenal is uncertain. The Chinese arsenal is increasing with production of new warheads for DF-31/31A/41 and II-2 missiles.
- The number of British warheads on each submarine has been lowered from 48 to 40. This has lowered the number of “operationally available” warheads from 160 to 120. By the mid-2020s, the stockpile will be reduced to “not more than 180”. This reduction is already underway.
- Although Israel has produced enough plutonium for 100-200 warheads, the number of delivery platforms and estimates made by the U.S. intelligence community suggest that the stockpile might include approximately 80 warheads.
- The information available for each country varies greatly, ranging from the most transparent nuclear weapons state (United States) to the most opaque (Israel). According to the Federation of American Scientists, the estimates for several of the other nuclear weapon states are highly uncertain.
NUCLEAR ARSENALS

An overview provided courtesy of ICAN – International Campaign to Abolish Nuclear Weapons

Nine countries together possess around 15,000 nuclear weapons. The United States and Russia maintain roughly 1,800 of their nuclear weapons on high-alert status – ready to be launched within minutes of a warning.

Most are many times more powerful than the atomic bombs dropped on Japan in 1945. A single nuclear warhead, if detonated on a large city, could kill millions of people, with the effects persisting for decades.

Nine countries together possess around 15,000 nuclear weapons. The United States and Russia maintain roughly 1,800 of their nuclear weapons on high-alert status – ready to be launched within minutes of a warning.

The failure of the nuclear powers to disarm has heightened the risk that other countries will acquire nuclear weapons. The only guarantee against the spread and use of nuclear weapons is to eliminate them without delay.

<table>
<thead>
<tr>
<th>COUNTRY</th>
<th>NUCLEAR PROGRAMME</th>
<th>SIZE OF ARSENAL</th>
</tr>
</thead>
<tbody>
<tr>
<td>United States</td>
<td>The first country to develop nuclear weapons and the only country to have used them in war. It spends more on its nuclear arsenal than all other countries combined.</td>
<td>6,800 warheads</td>
</tr>
<tr>
<td>Russia</td>
<td>The second country to develop nuclear weapons. It has the largest arsenal of any country and is investing heavily in the modernization of its warheads and delivery systems.</td>
<td>7,000 warheads</td>
</tr>
<tr>
<td>United Kingdom</td>
<td>It maintains a fleet of four nuclear-armed submarines in Scotland, each carrying 16 Trident missiles. Its parliament voted in 2016 to overhaul its nuclear forces.</td>
<td>215 warheads</td>
</tr>
<tr>
<td>France</td>
<td>Most of its nuclear warheads are deployed on submarines equipped with M45 and M51 missiles. One boat is on patrol at all times. Some warheads are also deliverable by aircraft.</td>
<td>300 warheads</td>
</tr>
<tr>
<td>China</td>
<td>It has a much smaller arsenal than the US and Russia. Its warheads are deliverable by air, land and sea. It appears to be increasing the size of its arsenal at a slow pace.</td>
<td>270 warheads</td>
</tr>
<tr>
<td>India</td>
<td>It developed nuclear weapons in breach of non-proliferation commitments. It is increasing the size of its nuclear arsenal and enhancing its delivery capabilities.</td>
<td>110-120 warheads</td>
</tr>
<tr>
<td>Pakistan</td>
<td>It is making substantial improvements to its nuclear arsenal and associated infrastructure. It has increased the size of its nuclear arsenal in recent years.</td>
<td>120-130 warheads</td>
</tr>
<tr>
<td>Israel</td>
<td>It has a policy of ambiguity in relation to its nuclear arsenal, neither confirming nor denying its existence. As a result, there is little public information or debate about it.</td>
<td>80 warheads</td>
</tr>
<tr>
<td>North Korea</td>
<td>It has a fledgling nuclear weapons programme. Its arsenal probably comprises fewer than 10 warheads. Recent successful tests confirm it now has the capability to deliver them.</td>
<td>&lt;10 warheads</td>
</tr>
</tbody>
</table>

TOTAL 14,900 WARHEADS

Although the leaders of some nuclear-armed nations have expressed their vision for a nuclear-weapon-free world, they have failed to develop any detailed plans to eliminate their arsenals and are modernising them.

**HOW MANY NUCLEAR WEAPONS ARE THERE IN THE WORLD?**

*The wider problem*

Five European nations host US nuclear weapons on their soil as part of a NATO nuclear-sharing arrangement, and roughly two dozen other nations claim to rely on US nuclear weapons for their security.

Furthermore, there are many nations with nuclear power or research reactors capable of being diverted for weapons production. The spread of nuclear know-how has increased the risk that more nations will develop the bomb.

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Citing growing nuclear risks and unchecked climate dangers, the iconic Doomsday Clock is now 30 seconds closer to midnight, the closest to the symbolic point of annihilation that the Clock has been since 1953 at the height of the Cold War. The decision announced today to move the Doomsday Clock to two minutes before midnight was made by the Bulletin of the Atomic Scientists’ Science and Security Board in consultation with the Board of Sponsors, which includes 15 Nobel Laureates.

The full text of the Doomsday Clock statement is available at www.thebulletin.org and includes key recommendations about how to rewind the Doomsday Clock.


The statement explaining the resetting of the time of the Doomsday Clock notes: “In 2017, world leaders failed to respond effectively to the looming threats of nuclear war and climate change, making the world security situation more dangerous than it was a year ago – and as dangerous as it has been since World War II. The greatest risks last year arose in the nuclear realm. North Korea’s nuclear weapons program appeared to make remarkable progress in 2017, increasing risks for itself, other countries in the region, and the United States. Hyperbolic rhetoric and provocative actions on both sides have increased the possibility of nuclear war by accident or miscalculation ... On the climate change front, the danger may seem less immediate, but avoiding catastrophic temperature increases in the long run requires urgent attention now ... The nations of the world will have to significantly decrease their greenhouse gas emissions to keep climate risks manageable, and so far, the global response has fallen far short of meeting this challenge.”

Fueling concerns about the potential of a nuclear holocaust are a range of US-Russian military entanglements, South China Sea tensions, escalating rhetoric between Pakistan and India, and uncertainty about continued US support for the Iran nuclear deal.

RISING, THEN PULLING BACK FROM A PEAK

Having reached a peak in the late 1980s, the number of nuclear warheads has dropped significantly. But more countries now possess them.

Stockpiled warhead count by year

Contributing to the risks of nuclear and non-nuclear clashes around the globe are the rise of nation-state information technology and internet-based campaigns attacking infrastructure and free elections, according to the statement.

Also highlighted as an overarching global concern: The decline of US leadership and a related demise of diplomacy under the Trump Administration. “...[T]here has also been a breakdown in the international order that has been dangerously exacerbated by recent US actions. In 2017, the United States backed away from its longstanding leadership role in the world, reducing its commitment to seek common ground and undermining the overall effort toward solving pressing global governance challenges. Neither allies nor adversaries have been able to reliably predict US actions or understand when US pronouncements are real, and when they are mere rhetoric. International diplomacy has been reduced to name-calling, giving it a surrealistic sense of unreality that makes the world security situation ever more threatening.”

In January 2017, the Doomsday Clock’s minute hand edged forward by 30 seconds, to two and a half minutes before midnight. For the first time, the Doomsday Clock was influenced by statements from an incoming U.S. President, Donald Trump, regarding the proliferation and the prospect of actually using nuclear weapons, as well as statements made in opposition to U.S. commitments regarding climate change.

Rachel Bronson, president and CEO, Bulletin of the Atomic Scientists, said:

“Because of the extraordinary danger of the current moment, the Science and Security Board today moves the minute hand of the Doomsday Clock 30 seconds closer to catastrophe. It is now two minutes to midnight – the closest the Clock has ever been to Doomsday, and as close as it was in 1953, at the height of the Cold War.”

Lawrence Krauss, director of the Origins Project at Arizona State University, Foundation Professor at School of Earth and Space Exploration and Physics Department, Arizona State University, and chair, Bulletin of the Atomic Scientists’ Board of Sponsors, said:

“The current, extremely dangerous state of world affairs need not be permanent. The means for managing dangerous technology and reducing global-scale risk exist; indeed, many of them are well-known and within society’s reach, if leaders pay reasonable attention to preserving the long-term prospects of humanity, and if citizens demand that they do so. This is a dangerous time, but the danger is of our own making. Humankind has invented the implements of apocalypse; so can it invent the methods of controlling and eventually eliminating them. This year, leaders and citizens of the world can move the Doomsday Clock and the world away from the metaphorical midnight of global catastrophe by taking common-sense action.”

Robert Rosner, William E. Wrather Distinguished Service Professor in the Department of Astronomy and Astrophysics and Physics at the University of Chicago, and chair, Bulletin of the Atomic Scientists’ Science and Security Board, said:

“We hope this resetting of the Clock will be interpreted exactly as it is meant – as an urgent warning of
global danger. The time for world leaders to address looming nuclear danger and the continuing march of climate change is long past. The time for the citizens of the world to demand such action is now: #RewindtheDoomsdayClock.”

Sharon Squassoni, research professor of practice at the Institute for International Science and Technology Policy, Elliott School of International Affairs, The George Washington University, and Bulletin of the Atomic Scientists’ Science and Security Board, said:

“In the past year, US allies have needed reassurance about American intentions more than ever. Instead, they have been forced to negotiate a thicket of conflicting policy statements from a US administration weakened in its cadre of foreign policy professionals, suffering from turnover in senior leadership, led by an undisciplined and disruptive president, and unable to develop, coordinate, and clearly communicate a coherent nuclear policy. This inconsistency constitutes a major challenge for deterrence, alliance management, and global stability. It has made the existing nuclear risks greater than necessary and added to their complexity.”

Sivan Kartha, senior scientist at the Stockholm Environmental Institute and co-leader of SEI’s Gender and Social Equity Program, and Bulletin of the Atomic Scientists’ Science and Security Board, said:

“2017 just clocked in as the hottest year on record that wasn’t boosted by an El Nino. And that matches what we’ve witnessed on the ground: the Caribbean suffered a season of historic damage from exceedingly powerful hurricanes, extreme heat waves struck across the globe, the Arctic ice cap hit its lowest winter peak on record, and the US suffered devastating wildfires. And while this was happening, the Trump administration dutifully carried through on the campaign promise of derailing US climate policy, putting avowed climate denialists in top cabinet positions, and announcing plans to withdraw from the Paris climate Agreement. Thankfully, this didn’t cause global cooperation to unravel, and other countries have reaffirmed their commitment to take action against climate change.”

#RewindtheDoomsdayClock is a major message of the 2018 statement, with the following action steps among those recommended:

- US President Donald Trump should refrain from provocative rhetoric regarding North Korea, recognising the impossibility of predicting North Korean reactions. The US and North Korean governments should open multiple channels of communication.
- The world community should pursue, as a short-term goal, the cessation of North Korea’s nuclear weapon and ballistic missile tests. North Korea is the only country to violate the norm against nuclear testing in 20 years.
- The Trump administration should abide by the terms of the Joint Comprehensive Plan of Action for Iran’s nuclear program unless credible evidence emerges that Iran is not complying with the agreement or Iran agrees to an alternative approach that meets US national security needs.
- The United States and Russia should discuss and adopt measures to prevent peacetime military incidents along the borders of NATO.
- US and Russian leaders should return to the negotiating table to resolve differences over the INF treaty, to seek further reductions in nuclear arms, to discuss a lowering of the alert status of the nuclear arsenals of both countries, to limit nuclear modernization programs that threaten to create a new nuclear arms race, and to ensure that new tactical or low-yield nuclear weapons are not built, and existing tactical weapons are never used on the battlefield.
- US citizens should demand, in all legal ways, climate action from their government. Climate change is a real and serious threat to humanity.
- Governments around the world should redouble their efforts to reduce greenhouse gas emissions so they go well beyond the initial, inadequate pledges under the Paris Agreement.
- The international community should establish new protocols to discourage and penalise the misuse of information technology to undermine public trust in political institutions, in the media, in science, and in the existence of objective reality itself.
THE NUCLEAR THREAT

Despite progress, the nuclear threat is more complex and unpredictable than ever, according to the Nuclear Threat Initiative

If a nuclear weapon exploded in a major city, the blast centre would be hotter than the surface of the sun; tornado-strength winds would spread the flames; and a million or more people could die. Survivors would have no electricity, no transportation, no phones – and hospitals would be overwhelmed if they were still standing.

Today, nine countries – China, India, Israel, France, North Korea, Russia, the United Kingdom and the United States – hold nearly 16,000 nuclear weapons. That’s enough to destroy the planet hundreds of times over.

While it has been more than twenty years since the end of the Cold War, the existence of thousands of nuclear weapons continues to pose a serious global threat. The likelihood of a nuclear war between the United States and Russia has decreased, but the continued presence of large stockpiles makes the accidental or unauthorised use of nuclear weapons a persistent risk.

Many of the countries with smaller nuclear arsenals, such as India and Pakistan, are actively engaged in regional conflicts, making the possibility of regional nuclear war a concern. North Korea illicitly acquired nuclear weapons, and other countries, including Syria, have violated their nuclear safeguards commitments and are suspected of covertly pursuing nuclear weapons capabilities.

Two countries – the United States and Russia – hold the vast majority of the world’s nuclear weapons. The former Cold War foes account for 93 per cent of the total global stockpile. And more than two decades after the end of the Cold War, the two countries still keep nearly 2,000 nuclear weapons on high alert, ready for immediate launch against each other. That leaves both countries too vulnerable to nuclear launch by accident, miscalculation or even cyber attack.

My bottom line – we are in a race between cooperation and catastrophe. This is a race that mankind must win.
Former Senator Sam Nunn

Terrorism

We know that terrorists are seeking nuclear weapons. Today, there are more than 1,800 metric tons of weapons-usable nuclear materials – highly-enriched uranium (HEU) and plutonium – stored in hundreds of sites across 25 countries, some of them poorly secured. To build a bomb, terrorists won’t necessarily look to the biggest stockpiles; they’ll go where nuclear materials are the most vulnerable. That makes global nuclear security only as strong as the weakest link in the chain.

Systems vulnerabilities

Command and control systems are not perfect. People make mistakes. Sabotage can happen. Technology has flaws and systems fail. The possibility of an unauthorised launch – or even an authorised launch without time for due consideration – is simply too high.

Nuclear proliferation

Nuclear technology and the know-how to build a bomb is no longer a monopoly controlled by states. The threat of cyber-terrorism looms large, and experts are working furiously to keep up with cyber vulnerabilities that could be exploited by hackers to initiate a catastrophe.

Regional dangers

Bitter regional rivalries in the Middle East, Northeast Asia, South Asia and elsewhere pose clear and present nuclear dangers to global security. These rivalries raise the risk that a nuclear weapon might be used in a deliberate attack, and the consequences of a regional nuclear exchange would reverberate across the globe.

It’s not all bad news. Ukraine, Belarus and Kazakhstan gave up the weapons they inherited in the breakup of the Soviet Union. South Africa voluntarily dismantled its nuclear weapons. The number of weapons in the United States and Russia has dropped significantly since the height of the Cold War – through diplomacy and cooperation.

More than 50 countries have participated in head-of-state-level Nuclear Security Summits to prevent nuclear terrorism. Most recently, world powers reached an agreement with Iran to implement a stringent monitoring and verification regime to prevent Iran from building a bomb.

Despite progress, however, the nuclear threat – once represented by duck-and-cover drills – is more complex and more unpredictable today than ever.

WINTRY THAW ON THE KOREAN PENINSULA

CAN THE MAJOR POWERS CAPITALISE ON THE SHIFT IN NORTH-SOUTH RELATIONS? AN ‘INSIDE STORY’ ARTICLE BY JINGDONG YUAN

As tensions continued to mount late last year, and Kim Jong-un and Donald Trump traded insults and boasted about the size of their nuclear buttons, the international community was increasingly fearful that a miscalculation could bring the peninsula – and the region with it – to a full-blown military conflict or, worse, a nuclear exchange.

Then came Kim’s New Year message. While the North Korean leader vowed to proceed with his nuclear and missile programs, he also offered to talk with the South, ostensibly about the possibility of the North’s participating in the upcoming Pyeongchang Winter Olympic Games.

When they took place earlier this month, those talks resulted in a number of agreements. North Korea undertook to send athletes, an art troupe, a cheer squad, a Taekwondo demonstration team and a press corps to the Games. The two countries’ sporting teams will walk into the stadium under one flag during the opening ceremony and will form a single women’s ice hockey team to compete. North Korea has also agreed to restoring the military hotline between Pyongyang and Seoul and engaging in further discussions about other bilateral issues.

How long the current rapprochement between the North and the South will last is anyone’s guess.

But the North’s delegation rejected any discussion of nuclear and missile issues, claiming that its weapons are aimed solely at the United States – not at its brothers in the South, or at Russia or China – and so fall outside the bilateral relationship. Nor did the North Korean delegation accept the South’s proposal to open talks on possible reunion of divided families.

So far, the Trump administration has endorsed the inter-Korean dialogue and welcomed the thaw. Washington also accepted Seoul’s proposal that the annual spring joint military exercises be delayed for fear that Pyongyang could regard them as a provocation and withdraw from the Games. Trump went further, taking credit for the resumption of the talks and claiming that his firm stance had contributed to the current thaw.

In turn, South Korea’s president Moon Jae-in praised Trump for his role in the run-up to the talks. He also pledged to work with the United States, and with the other major powers in the region – China, Russia and Japan – to bring about denuclearisation and ensure stability on the peninsula.

The reduced tension, the momentum generated by the talks, and the prospect of future meetings on a range of issues – all are welcome developments that could also open the door for multilateral talks about the North’s nuclear weapons. But a number of difficult issues – emerging as well as outstanding – remain.

There is already concern that Kim Jong-un’s charm offensive is designed not only to gain breathing space to deal with the devastating impact of UN sanctions but also to drive a wedge into the US-South Korea alliance. As analysts have pointed out, the pattern is a familiar one: determined pursuit of nuclear and missile programs punctuated by occasional pauses and extending of the olive branch.

But the concern over a potential split in the US-South Korea alliance may be unfounded. After all, South Korea’s security remains deeply anchored in the alliance, both militarily and in diplomatic terms.

The concern over a potential split in the alliance is partly fuelled by the widely shared perception that President Moon is more inclined towards reconciliation and stability on the Korean Peninsula than towards a more hard-edged drive to dismantle the North’s nuclear program, at least to the extent that the latter threatens the former objectives.
As one of the brains behind the “Sunshine Policy” of the early 2000s under then president Kim Dae-jung, Moon places greater emphasis on carrots than on sticks in dealing with Pyongyang.

And with good reason. Despite its rather precarious position, North Korea presents a reckless and at times rather irrational posture to outside observers in order to conceal its deep fear of external threats. Internally, its “military first” strategy is seen as crucial for the regime’s survival. And threats to attack its stronger enemies using more or less suicidal means do serve as strong deterrence to attacks on the North.

Its conventional capabilities – let alone its chemical and biological arsenals, and emerging nuclear capacity – could inflict enormous damage on South Korea. The Moon administration faces the same dilemma as its more conservative predecessors: what would be the acceptable cost – and likelihood of success – of an armed attempt to neutralise Pyongyang’s nuclear program?

Until recently, Washington’s calculus has been different. For the best part of the last twenty-five years, the United States has not seriously considered striking a grand bargain under which North Korea would feel sufficiently safe that it would willingly trade nuclear weapons for peace and the security of the regime.

Half-measures have failed to convince Pyongyang to give up its nuclear weapons, and the regime’s own repeated breaking of pledges has only reinforced the perception that it can never be trusted. In the absence of such a deal, the North continues to improve its nuclear weapons and missile systems and is getting closer to (or perhaps is already capable of) posing a direct nuclear threat to the United States.

Washington’s other options are limited. Notwithstanding some of the more outlandish suggestions about how to subdue Kim Jong-un, military options are no longer viable, and would certainly be extremely costly. Trump’s sometimes bombastic rhetoric has not helped; indeed, his ridiculing of Kim Jong-un and his irresponsible reference to “totally destroying” North Korea have backfired spectacularly, prompting Congress to question his authority to wage nuclear war.

How long the current rapprochement between the North and the South will last is anyone’s guess. Seoul’s apparently enthusiastic embrace of Kim’s Olympic proposal has touched off strong opposition at home. Already, violent protests in South Korea have led President Moon to plea for understanding – and Pyongyang to demand apologies and, later, withdraw from the planned pre-Olympic cultural event.

The more pertinent question now is how to seize the opportunity created by the cooling of tensions and work with the other key powers to bring about a long-term solution to the North Korean nuclear issue.

But the concern over a potential split in the US-South Korea alliance may be unfounded. After all, South Korea’s security remains deeply anchored in the alliance, both militarily and in diplomatic terms.

The more pertinent question now is how to seize the opportunity created by the cooling of tensions and work with the other key powers to bring about a long-term solution to the North Korean nuclear issue.

It’s hard to see Australia taking any role in making the thaw more permanent, especially when Canberra seems so closely aligned with Washington on security matters at the moment, but the international community can ill afford to miss out on yet another chance.

Jingdong Yuan is Associate Professor of International Security at the University of Sydney.

US-North Korea summit agreement is most revealing for what it leaves out

North Korean Chairman Kim Jong-un and US President Donald Trump were all smiles at their historic summit in Singapore, but a meaningful agreement is still a long way off, observes Benjamin Habib

In my preview of the historic US-DPRK summit in Singapore, I asked where Trump and Kim might find lowest common denominator points of agreement to potentially unlock a confidence-building pathway.

That this summit has even taken place at all could be seen as an achievement, given where US-DPRK relations were in 2017. We should therefore be unsurprised that despite Trump’s hype in the lead-up to the event, the common denominators of agreement amounted to promises of a new relationship and little else of substance.

However, it is not so much what is in the joint statement as much as what has been left out that is the big story.

To tease this out, let’s consider the four specific points of agreement articulated in the joint statement released by US President Donald Trump and North Korean Chairman Kim Jong-un at the conclusion of today’s summit.

### A NEW RELATIONSHIP?

In the first article of the agreement, the two parties committed to establishing “new US-DPRK relations.” What might a new relationship between the two countries look like?

The leader-to-leader summit between the two countries was unprecedented and potentially could represent a tentative first step on the road to rapprochement. Symbolism is the obvious place to begin, given the low base the relationship between these two countries is starting from.

If we jump to article four, both parties have committed to the process of recovering the remains of UN forces prisoners of war and soldiers missing-in-action from the Korean War, along with the immediate repatriation of the remains of those already identified.

In a similar way to the family reunion program articulated in the inter-Korean Panmunjom Agreement, the repatriation of POW/MIA remains is a relatively easy confidence-building measure on which to base a longer-term pathway of more substantive measures. It is also of great importance as a mark of respect to the families of those military personnel who can find closure with the return of their deceased loved ones.

The second article refers to joint efforts “to build a lasting and stable peace regime on the Korean Peninsula”. As I’ve argued previously, a settlement to formally conclude the Korean War could be potential common interest around which to develop an engagement pathway.

Prior to the summit, Trump hinted that the “signing of a document” to close hostilities was a possibility. The closest the joint statement comes to this is a passage in the second paragraph, which reads:

*President Trump committed to provide security guarantees to the DPRK.*

It is not immediately clear from the text what these security guarantees might be, but it certainly falls short of any kind of non-aggression pact or peace treaty. Such an outcome was always unlikely at this summit and would be the product of a longer negotiating process should it come to pass.

### THE END OF ‘COMPLETE, VERIFIABLE, IRREVERSIBLE DENUCLEARISATION’?

The joint statement gets interesting in article three, in which “the DPRK commits to work toward the complete denuclearisation of the Korean Peninsula”.

The wording around “complete denuclearisation of the Korean Peninsula” reflects the North Korean interpretation of the concept, which has been...
well-documented in the lead-up to the summit.

Tellingly, there is no mention of “complete, verifiable, irreversible denuclearisation” (CVID) in the statement text, which is a clear departure from longstanding US policy.

There are a couple of ways this could be interpreted. On the one hand, it is possible that Trump lived up to the pre-summit fears of some domestic critics and gave away too much for too little in the negotiation. From this perspective, the master negotiator Trump was played by Kim into signing off on the North Korean position, through which Kim gets international legitimacy and domestic prestige from attending the summit without having to make any concessions.

On the other hand, Trump’s omission of CVID could be a calibrated strategy accompanied by a clearly articulated and wide-ranging engagement strategy, scaffolded around a formal peace treaty. If so, it could prove to be the circuit-breaker that opens the pathway toward the aforementioned “new US-DPRK relations” and the collective management of North Korea as a nuclear power.

Either way, this will become clearer if and when follow-up negotiations take place. Either way, there are factions of the international political spectrum who will be unhappy with the outcome.

It is significant that article three pays homage to the Panmunjom Agreement, which may be the key to understanding how the US-South Korea-DPRK engagement triangle may unfold.

The Panmunjom Agreement, for all its ambiguity, does have an articulation of economic and security confidence-building measures, based on a shared vision for a permanent Korean Peninsula peace regime.

If we assume a calibrated strategy in deferring to the Panmunjom Agreement, the US-DPRK joint statement may indicate the bulk of the heavy lifting with regard to confidence-building measures will be handled as an inter-Korean affair, with Trump’s apparent non-aggression promise providing space for engagement initiatives to evolve.

WHERE TO NOW?

My take-home message from the omission of CVID from the joint statement is confirmation that North Korea under Kim Jong-un is never going to willingly denuclearise.

In “working toward complete denuclearisation”, North Korea may agree to a nuclear weapons and ballistic missile testing moratorium, decommission obsolete nuclear facilities, or even promise to freeze production of new nuclear weapons, without ever having to compromise its nuclear weapons capability.

We should not be surprised if one or both parties back-pedals from the joint statement at some stage. Seasoned North Korea watchers will be expecting North Korea to backtrack from the joint statement to extract concessions, or add new conditions to their continued commitment to the “new US-DPRK relations”, as we have seen several times previously.

We are also likely to see Trump sustain considerable political heat domestically for his perceived capitulation on CVID and for omitting human rights from the discussion, as well as from the Japanese government for selling out their security interests.

This pressure may be sufficient to prompt a recalibration of the US interpretation of the joint statement. Backpedalling from either side will change the position of the other and blow the whole engagement process out of the water.

The final paragraph of the joint statement commits US Secretary of State Mike Pompeo to meet with an as yet unidentified high-level North Korean official. It will be at these meetings and beyond where the “new US-DPRK relations” will start to take shape.

DISCLOSURE STATEMENT

Benjamin Habib does not work for, consult, own shares in or receive funding from any company or organisation that would benefit from this article, and has disclosed no relevant affiliations beyond his academic appointment.

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President Donald J Trump of the United States of America and Chairman Kim Jong-un of the State Affairs Commission of the Democratic People’s Republic of Korea (DPRK) held a first, historic summit in Singapore on June 12, 2018.

President Trump and Chairman Kim Jong-un conducted a comprehensive, in-depth, and sincere exchange of opinions on the issues related to the establishment of new US-DPRK relations and the building of a lasting and robust peace regime on the Korean Peninsula.

President Trump committed to provide security guarantees to the DPRK, and Chairman Kim Jong-un reaffirmed his firm and unwavering commitment to complete denuclearisation of the Korean Peninsula.

Convinced that the establishment of new US-DPRK relations will contribute to the peace and prosperity of the Korean Peninsula and of the world, and recognising that mutual confidence-building can promote the denuclearisation of the Korean Peninsula, President Trump and Chairman Kim Jong-un state the following:

1. The United States and the DPRK commit to establish new US-DPRK relations in accordance with the desire of the peoples of the two countries for peace and prosperity.
2. The United States and the DPRK will join their efforts to build a lasting and stable peace regime on the Korean Peninsula.
3. Reaffirming the April 27, 2018 Panmunjom Declaration, the DPRK commits to work towards complete denuclearisation of the Korean Peninsula.
4. The United States and the DPRK commit to recovering POW/MIA remains, including the immediate repatriation of those already identified.

Having acknowledged that the US-DPRK summit – the first in history – was an epochal event of great significance and overcoming decades of tensions and hostilities between the two countries and for the opening of a new future, President Trump and Chairman Kim Jong-un commit to implement the stipulations in this joint statement fully and expeditiously.

The United States and the DPRK commit to hold follow-on negotiations led by the US Secretary of State, Mike Pompeo, and a relevant high-level DPRK official, at the earliest possible date, to implement the outcomes of the US-DPRK summit.

President Donald J Trump of the United States of America and Chairman Kim Jong-un of the State Affairs Commission of the Democratic People’s Republic of Korea have committed to cooperate for the development of new US-DPRK relations and for the promotion of peace, prosperity, and security of the Korean Peninsula and of the world.

CHAPTER 2
Nuclear disarmament

WHY IS DISARMAMENT IMPORTANT?
The United Nations Office for Disarmament Affairs explains in this extract from its recent publication, Disarmament: A Basic Guide

“We travel together, passengers on a little spaceship, dependent on its vulnerable reserves of air and soil; all committed, for our safety, to its security and peace; preserved from annihilation only by the care, the work and the love we give our fragile craft.”


The nature of conflict and the weaponry used to fight it have changed dramatically in the past 100 years. Before the twentieth century, few countries maintained large armies and their weapons – while certainly deadly – mostly limited damage to the immediate vicinity of battle. Most of those killed and wounded in pre-twentieth century conflicts were active combatants.

By contrast, twentieth-century battles were often struggles that encompassed entire societies and, in the case of the two world wars, engulfed nearly the entire globe. World War I left an estimated 8.5 million soldiers dead and 5 to 10 million civilian casualties. In World War II, some 55 million died. Weapons with more and more indiscriminate destructive power – weapons of mass destruction – were developed and used, including chemical and biological weapons and, for the first time, nuclear weapons, which were dropped on Hiroshima and Nagasaki, Japan, in 1945.

The second half of the twentieth century was dominated by the Cold War and its attendant “proxy wars”, wars of national liberation, intra-state conflicts, genocides and related humanitarian crises. Although experts vary on their estimates of the number of people who have died as a result of these conflicts, there is general agreement that the number is upwards of 60 million and perhaps as much as 100 million people, many of them non-combatants. States engaged in an all-out arms race, spending US$ 1 trillion annually by the mid-1980s to build arsenals capable of inflicting massive destruction anywhere on the globe.

Then the fall of the Berlin Wall in 1989 brought a lessening of tensions between the two superpowers, and military budgets – and the number of conflicts – fell. Unfortunately, the shrinking of military budgets was short-lived, coming to an end in the late 1990s.

Between 2001 and 2009, military spending increased by an average of 5.1 per cent annually. These expenditures generally fell or remained steady from 2010 to 2016 due to the global economic crisis, but worldwide military spending rose slightly in 2016 as a result of increases by states in Asia, Europe and North America. This recent global uptick underscores the possibility that military expenditures will resume their previous upward trend, particularly as a number of states have discussed new multi-year spending increases. (Stockholm International Peace Research Institute (SIPRI)).

WAR IN THE TWENTY-FIRST CENTURY
The overwhelming majority of violent conflicts today are fought within states, their victims mostly civilians. Certain marginalised populations – women, children, the elderly, the disabled, the poor – are particularly vulnerable in conflict and bear the brunt of its harm globally. Most conflicts are fought primarily with small arms and light weapons.

The past decade has seen an uptick in the number of armed conflicts, people dying in conflict and refugee flows. Global forced displacement hit a record high in 2015 with more than 65 million people displaced from their homes by conflict and persecution. Military interventions in internal conflicts of other states have also become more common in the past two decades, often making conflicts deadlier, prolonging fighting and complicating peace efforts. (Small Arms Survey; SIPRI; Office of the United Nations High Commissioner for Refugees)

The number of deaths from terrorism has increased sharply since 2000. Terrorist activity remains highly concentrated in just eight countries – Afghanistan, Egypt, Iraq, Nigeria, Pakistan, Somalia, Syria and Yemen – but in recent years it has also spread. Although the Middle East remains the region most affected, the West has experienced significant attacks but far fewer deaths overall. The global cost of terrorism is also significant: nearly $53 billion in 2014, according to one estimate. Over the past 25 years, the overwhelming majority of terrorist attacks have occurred in countries involved in violent conflicts. (Institute for Economics and Peace)
More than 2.5 billion people globally (about one third of the world’s population) live in dangerous places, in countries with a high incidence of violent death. Dangerous places account for more than 60 per cent of the world’s poverty and 98 per cent of refugees come from such places.

The development of new weapons and technologies, including unmanned autonomous vehicles (also known as drones), lethal autonomous weapons (sometimes called “killer robots”) and cyberweapons, has outpaced efforts at regulation.

It is not only conflict that endangers human security. Increasingly, climate change is also a factor. It is a “threat multiplier”, compounding existing risks and increasing the likelihood of instability. People living in places affected by conflict are particularly vulnerable to climate change.

With the upward trend in conflict, total world military expenditures climbed slightly from 2015 to reach $1.686 trillion in 2016, representing 2.2 per cent of global gross domestic product or $227 for each person in the world. (However, this is down from a peak of $1.699 trillion in 2011.) The United States accounts for just over 36 per cent of total global military expenditures, and the top five global spenders together account for 60 per cent of military expenditures worldwide.

The economic drain associated with defence spending, particularly in a time of global economic crisis, is dramatic, and nowhere more so than in the developing world, where the poor suffer disproportionately because of conflict. For many of the world’s poor people, war and criminal violence are directly impeding their chances of development. The United Kingdom Department for International Development has estimated that half of the world’s poorest people could be living in states that are experiencing, or are at risk of, violent conflict. On average, armed conflict shrinks an African nation’s economy by 15 per cent. (International Action Network on Small Arms, Oxfam International and Saferworld)

The world is awash in weapons. An estimated 875 million or more small arms are in circulation, according to the Small Arms Survey.

At the beginning of 2016, nuclear-weapon states possessed nearly 15,400 nuclear warheads, more than 4,100 of which were deployed and ready for use; approximately 1,800 of these were kept on high alert, ready to be launched within minutes.

Women and children continue to be targeted in armed conflict, and tens of thousands of boys and girls under the age of 18 are still used in conflicts worldwide. In recent years, thousands of women and girls have been sexually enslaved as a tactic of war and terrorism, and hundreds of thousands have been raped in conflict situations. Smaller but significant numbers of men have also been the targets of sexual violence in armed conflict.

Still, amidst this turmoil, there is also good news. There has been progress in ending the use of children in conflict; 65,000 children have been released from armed forces and armed groups in the past 10 years (United Nations Children’s Fund).

Membership in the Convention on Cluster Munitions and the Mine Ban Convention, which has effectively halted the global trade in landmines, continues to grow. As of late 2016, 93 per cent of all declared stockpiles of cluster munitions globally had been destroyed (Cluster Munition Coalition). Declared stockpiles...
of chemical weapons in Syria and Libya were also destroyed (nevertheless, chemical-weapon attacks in Syria persist). Although the Russian Federation and the United States missed deadlines to complete destruction of their chemical-weapon stockpiles, the two countries continue to work towards this end.

It is a moment of challenge for many arms control regimes. The Comprehensive Nuclear-Test-Ban Treaty, which bans all nuclear testing, has yet to enter into force, awaiting ratification by key nuclear-weapon states and others. The Treaty on the Non-Proliferation of Nuclear Weapons (NPT), which has proven durable and largely effective at containing proliferation, is nonetheless under stress. Notably, the treaty's nuclear- and non-nuclear-weapon states parties continue to differ over the basic aims and goals of the NPT.

Nuclear-weapon states, nearly 50 years after the NPT entered into force, have not held up their end of the nuclear bargain to pursue “in good faith” negotiations on nuclear disarmament, as mandated by the NPT. On the flip side of that coin, nuclear proliferation is a concern. Still, there have been positive developments. After an intensive three-year process, in 2015, Iran and the so-called E3/EU+3 (China, France, Germany, the Russian Federation, the United Kingdom and the United States, as well as the European Union) reached agreement on the Joint Comprehensive Plan of Action, which led to the restoration of international confidence in the exclusively peaceful nature of Iran's nuclear programme and the lifting of economic sanctions and other restrictions.

Beginning in 2013, a group of United Nations member states and non-governmental organisations launched a humanitarian initiative to reframe the nuclear disarmament debate by emphasising the devastating effects of a nuclear detonation. The initiative culminated in the adoption of the Treaty on the Prohibition of Nuclear Weapons on 7 July 2017, the first multilateral, legally-binding instrument for nuclear disarmament to have been negotiated in 20 years.

The spokesperson for United Nations Secretary-General António Guterres asserted that the treaty “represents an important step and contribution towards the common aspirations of a world without nuclear weapons”.

In 2016, global military spending reached nearly $1.7 trillion, including billions to modernise nuclear arsenals. By contrast, today's United Nations peacekeeping budget is less than half of one per cent of global military spending ...

There have also been steps forward in conventional arms control. The Arms Trade Treaty, the first-ever global treaty to establish standards for regulating the international trade in conventional arms, went into effect in 2014.

Global cooperation has also resulted in the Paris Agreement, which entered into force in 2016. The agreement is an ambitious global effort to combat climate change and strengthen the ability of countries to deal with its impacts. Climate change and security are inextricably linked in that climate change is thought to contribute to the likelihood of conflict. Those experiencing conflict are also particularly vulnerable to its effects. Despite a recent decision by the United States to pull back from the agreement, it remains a formidable tool for encouraging norms and spurring action worldwide.

United Nations member states have also agreed to the 2030 Agenda for Sustainable Development, a set of 17 global goals to combat global poverty and promote sustainable development. To that end, Sustainable Development Goal 16 aims to promote peaceful and inclusive societies, including by significantly reducing illicit arms flows (Target 16.4).

NEW UNDERSTANDINGS OF PEACE AND SECURITY

“The world is over-armed and peace is underfunded.”

Ban Ki-moon, United Nations Secretary-General (2007-2016)

As the nature of conflict has changed, so has the understanding of peace and security. For many years, peace meant the absence of violence and the renewal of governance. Ceasefires and demobilisation were mainstays of peace processes. Today, however, it is widely recognised that peace is much more than the absence of war. Sustainable peace is possible only as part of an inclusive process that pays attention to human
rights, justice, reconciliation and broad participation, including the inclusion of women, youth, indigenous peoples and others.

Today, security is also seen in “a far more expansive way that is not only limited to containing physical violence” (Coomaraswamy).

The Global Study on the implementation of United Nations Security Council resolution 1325 (2000) explains: Security also has political, economic and social dimensions. It is both public and private. It means absence of fear but also absence of want. It also implies active agency, to be allowed to participate in the decisions that are made on your behalf. While security in the old paradigm was linked to ensuring the survival of individuals, in recent times it is recognised as a broader term aimed at securing the well-being of individuals and their communities.

New security concerns arise from demographic trends, chronic poverty, economic inequality, environmental degradation, pandemic diseases, organised crime, repressive governance and other developments.

Yet, national policies and budgets have been slow to reflect the shifting understanding. As former United Nations Secretary-General Ban Ki-moon has noted, “massive military spending and new investments in modernising nuclear arsenals have left the world over-armed – and peace underfunded”.

In 2016, global military spending reached nearly $1.7 trillion, including billions to modernise nuclear arsenals. By contrast, today’s United Nations peacekeeping budget is less than half of one per cent of global military spending, meaning too often that peace operations face a gap between their goals and the means to achieve them.

At the most basic level, arms control and disarmament are about accounting for, controlling and eliminating weapons. But more broadly, efforts at arms control and disarmament are also about rethinking our sense of ourselves as nations in community with one another.

The economic burden of military spending is especially high for the most vulnerable within our societies. When governments choose armaments over much-needed social programmes – such as access to clean water and sanitation, and high-quality education and healthcare – the human cost is often high. One result can be that individuals and communities, and ultimately states, are less secure.

At the most basic level, arms control and disarmament are about accounting for, controlling and eliminating weapons. But more broadly, efforts at arms control and disarmament are also about rethinking our sense of ourselves as nations in community with one another.

The United Nations, as its charter reminds us, was meant to be a place where the peoples of the world could come together to “save succeeding generations from the scourge of war [and] ... to practise tolerance and live together in peace with one another as good neighbours”. It was envisioned as a place where people would “unite our strength to maintain international peace and security and ... ensure ... that armed force shall not be used, save in the common interest”.

Member states of the United Nations have often fallen short of these visions and goals. The organisation has been hampered by a Cold War, by competing regional blocs, and by obstructionist nations. Yet states have come together to achieve impressive ends – treaties banning chemical, biological and nuclear weapons, landmines and cluster munitions; regulating the trade in conventional arms; and curbing the proliferation of nuclear weapons and calling for nuclear disarmament. And there are important forums to discuss threats to international peace and security and the promulgation of new arms control treaties.

We live in a time of formidable challenges. The global world order is seeing profound and sometimes unpredictable shifts. It is a key moment that will test the durability of traditional alliances and present important tests for international organisations such as the United Nations. In an evermore globalising world, the efforts of such organisations to foster cooperation are vital to meet global crises and promote the common good.

Within these challenges are dangers, but also opportunities – not only to reduce the world’s armaments and military spending, but also to think about disarmament and security in new ways, making the security of the world’s people central to the disarmament and security agenda.


NUCLEAR WEAPONS TREATIES
A timeline of nuclear disarmament treaties, compiled by The Spinney Press

1959: Antarctic Treaty
The treaty prohibits nuclear explosions and the disposal of radioactive wastes on Antarctica, subject to future agreements, and states that the Antarctic shall only be used for peaceful purposes. There are twelve original signatories, but since 1959 thirty-eight other countries have acceded to the treaty.

1963: Partial Test Ban Treaty
The PTBT was negotiated in 6 weeks to ban all but underground nuclear explosions. The United States, USSR and United Kingdom are signatories.

1967: Outer Space Treaty
This treaty has been signed and ratified by the US, UK, USSR, France, India and 58 others to prohibit nuclear or other weapons of mass destruction from being placed in space, including Earth’s orbit.

1967: Treaty of Tlatelolco
Conventional name for the Treaty for the Prohibition of Nuclear Weapons in Latin America. It prohibits testing, production, possession, or acquisition of nuclear weapons in the Latin American nuclear-weapon-free zone. In Protocol II, nuclear weapons states party to the treaty cannot use or threaten to use nuclear weapons against parties to the protocol. This was the first treaty to exclude nuclear weapons from an inhabited region of the globe.

1968: Nuclear Non-Proliferation Treaty
The NPT contains the only binding commitment to nuclear disarmament in a multilateral treaty on the part of the nuclear-weapon states, in which they pledge to disarm, whilst non-nuclear-weapons states pledge never to acquire nuclear weapons. 190 governments have ratified the treaty although North Korea withdrew from the treaty after it ratified it (making 189 states parties).

1971: Seabed Treaty
This treaty prohibits the placement of nuclear weapons or weapons of mass destruction on the seabed and ocean floor beyond a 12-mile coastal zone. It entered into force in 1972 and multiple review conferences have upheld the treaty. Sixty-six states have ratified it, including the US, UK, USSR, China, but not France.

1972: Strategic Arms Limitation Treaty (SALT I)
The United States and Soviet Union engaged in talks from 1969 to 1972, during which they negotiated the first agreements to place limits and restraints on some of their central and most important armaments, such as the Anti-Ballistic Missile Treaty, and the Interim Agreement on strategic offensive arms.

1972-2002: Anti-Ballistic Missile Treaty
The ABMT was an arms control agreement between the United States and Soviet Union on the limitation of the anti-ballistic missile systems used in defending areas against ballistic missile-delivered nuclear weapons. The US withdrew from the ABM in 2002, despite enormous national and international objections.

1974: Threshold Test Ban Treaty
Signed by the US and USSR, the Threshold Test Ban Treaty limited nuclear explosions to 150 kilotons.

1975: Biological and Toxin Weapons Convention
The BTWC entered into force in 1975 and has over 125 signatories. It builds on the protocols of the Geneva conventions that banned the use of gas in war. It is the first treaty to ban an entire category of mass destruction weapons, however it has no verification provisions.

1977: Environmental Modification Convention
The Convention on the Prohibition of Military or Any Other Hostile Use of Environmental Modification Techniques attempts to prohibit military or any other hostile use of environmental modification techniques. These techniques are defined as “changing – through the deliberate manipulation of natural processes – the dynamics, composition or structure of the Earth, including its biota, lithosphere, hydrosphere, and atmosphere, or of outer space”. Changes in weather or climate patterns, in ocean currents, or in the state of the ozone layer or ionosphere, or an upset in the ecological balance of a region are some of the effects which might result from the use of environmental modification techniques.

1979: Strategic Arms Limitation Treaty II (SALT II)
The second Strategic Arms Limitation Treaty increased limits on intercontinental ballistic missiles (ICBMs), submarine-launched ballistic missiles (SLBMs) and heavy bombers. Other limits were placed on multiple re-entry vehicles and bombers with intermediate-range missiles. SALT II was to remain in effect through 1985, but was never ratified, and was then supplanted by the START negotiations.

1980: Convention on the Physical Protection of Nuclear Material
The convention, signed in Vienna and in New York on 3 March 1980, entered into force on 8 February 1987. It provides a legal basis to physical protection measures for nuclear material that have been evolved over time by the International Atomic Energy Agency. It provides a framework for international cooperation against theft or unauthorised diversion of nuclear materials and obliges states parties to ensure physical protection of nuclear material during international transport. To date, there are 70 countries which are participating member states.

1983: Convention on Certain Conventional Weapons
The Convention on Prohibitions or Restrictions on the Use of Certain Conventional Weapons which may be Deemed to be Excessively Injurious or to have Indiscriminate Effects entered into force in 1983. The CCW and its five protocols restrict or prohibit the use of conventional weapons whose effects are deemed to be excessively cruel or indiscriminate in their targeting. The convention contains only general provisions, while the protocols – optional agreements annexed to the convention – contain prohibitions or restrictions on the use of specific weapons or weapon systems. In order to become party to the CCW, states parties have to accept at least two of the protocols.

1985: Treaty of Rarotonga
The South Pacific Nuclear-Free Zone prohibits manufacture, possession, or testing of nuclear devices, and prohibits dumping of nuclear waste. It entered into force in 1986.

The INF Treaty seeks to eliminate the US and Russia’s land-based intermediate- and shorter-range missiles with ranges of 500 to 5,500 kilometres. By the treaty’s deadline in 1991, the US and Russia had destroyed a total of 2,692 missiles.
The START I treaty between the US and the USSR limits the number of heavy bombers, ICBMs, SLBMs, launchers and warheads. The treaty prohibits both states from deploying more than 6,000 nuclear warheads on a total of 1600 delivery systems, and the ballistic missile throw-weight (lifting power) is limited to 3600 metric tonnes.

1992: **Treaty on Conventional Forces in Europe**
The CFE limited conventional armaments in Europe to under 40,000 battle tanks, 60,000 armoured combat vehicles, 40,000 pieces of artillery, 13,600 combat aircraft and 4,000 helicopters. There are now 29 states parties, after Russia suspended its observance of its treaty obligations in 2007.

1993: **Strategic Arms Reduction Treaty II (START II)**
The second START between the US and Russia limits their strategic arsenals to 3,000-3,500 warheads on delivery systems (tactical weapons and spares not included in counts). It also prohibits multiple re-entry vehicles (MIRVs) on intercontinental ballistic missiles and limits the number of warheads deployable on submarine-launched ballistic missiles to 1,700-1,750. START II has not entered into force – when the US withdrew from the ABM Treaty in 2002, Russia declared START null and void the following day. It was replaced by SORT in 2002.

1993: **Chemical Weapons Convention**
The CWC opened for signature in 1993 and entered into force in April 1997. It bans the development, production, stockpiling, acquisition, transfer and use of chemical weapons by states parties (note: earlier agreements only banned the use). The treaty contains an extensive list of banned chemicals and precursors and provides for an elaborate and intrusive verification regime. It has 190 member states, including the US, Russia and China.

1995: **Treaty of Bangkok**
The Southeast Asia Nuclear-Weapons-Free Zone entered into force in 1997 and prohibits the development, testing, stationing, transport, manufacture and possession of nuclear weapons, and prohibits the dumping of waste in the region. It does however allow nuclear energy. The US, UK, Russia, France and China do not support this treaty.

1996: **Treaty of Pelindaba**
The African Nuclear-Weapon-Free Zone was finally ratified in 2009, thirteen years after its opening. Burundi was the last country to ratify it as the 28th and final instrument required for the treaty to go into force. It prohibits all nuclear weapons in NWFZ and requires destruction of any nuclear devices. It calls on nuclear weapons states to provide assurances that they will not use nuclear weapons against the states which are party to the treaty.

1996: **Comprehensive Nuclear-Test-Ban Treaty**
The CTBT bans all nuclear weapon test explosions or any other nuclear explosions, establishes an extensive International Monitoring System, and allows for short-notice on-site inspections. Opened for signature in 1996, it has not yet entered into force. There are 183 member states, of which 163 have ratified, however all 44 countries with nuclear power plants must sign and ratify before it enters into force.

1997: **Ottawa Convention**
Formally known as the Convention on the Prohibition of the Use, Stockpiling, Production and Transfer of Anti-Personnel Mines and on Their Destruction the convention opened for signature in December 1997 and entered into force on 1 March 1999 – the most rapid ratification process of any major arms control treaty. It is the first treaty to ban a class of weapon in wide use; it combines elements of humanitarian and arms control law and came about as a result of a coalition of NGOs and mid-size governments without the participation of the major military powers. Major landmines producers including the US, Russia, China and Pakistan have not signed the treaty.

2002: **Strategic Offensive Reductions Treaty**
Also known as the Moscow Treaty, SORT limits the nuclear arsenal of both the US and Russia to 1,700-2,200 warheads each. It does not specify which warheads are to be reduced or how reductions should be made, nor does it include any verification provisions. It was in force from June 2003 until February 2011 when superseded by the New START Treaty.

2007: **Strategic Arms Reduction Treaty III (START III)**
Discussions began between the US and Russia in 2007 to further reduce nuclear arsenals to 2,000-2,500 each.

2008: **Convention on Cluster Munitions**
The convention opened for signature in Oslo in December 2008, and bans the use, production, stockpiling and transfer of cluster munitions and places obligations on countries to clear affected areas, assist victims and destroy stockpiles.

2010: **New Strategic Arms Reduction Treaty (New START)**
A new START was signed by Russia and the United States in 2010 to further limit and reduce their strategic offensive arms in accordance with the provision of this treaty.

2013: **Arms Trade Treaty**
After a seven-year process at the United Nations, this treaty was adopted by the UN General Assembly on 2 April 2013. It regulates the international trade in conventional weapons with a view to preventing and reducing human suffering.

2017: **Treaty on the Prohibition of Nuclear Weapons**
Also known as the Nuclear Weapon Ban Treaty, the TPNW was passed on 7 July 2017, and is the first legally-binding international agreement to comprehensively prohibit nuclear weapons, with the goal of leading towards their total elimination. For those nations that are party to it, the treaty prohibits the development, testing, production, stockpiling, stationing, transfer, use and threat of use of nuclear weapons, as well as assistance and encouragement to the prohibited activities. For nuclear-armed states joining the treaty, it provides for a time-bound framework for negotiations leading to the verified and irreversible elimination of its nuclear weapons programme.

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Compiled by The Spinney Press.
NUCLEAR-WEAPON-FREE ZONES

A FACT SHEET FROM THE UNITED NATIONS OFFICE FOR DISARMAMENT AFFAIRS

“The only world that is safe from the use of nuclear weapons is a world that is completely free of the nuclear weapons themselves.”

Secretary General’s remarks on the International Day for the Total Elimination of Nuclear Weapons, 26 September 2017

Nuclear-Weapon-Free Zones (NWFZ) are an important regional approach to strengthening the global nuclear non-proliferation and disarmament norms and consolidating international efforts towards peace and security.

The treaties establishing NWFZs ban nuclear weapons within the respective territories of the zones, including the acquisition, possession, placement, testing and use of such weapons.

The following treaties govern the 5 existing NWFZ:
- Treaty of Tlatelolco Treaty for the Prohibition of Nuclear Weapons in Latin America and the Caribbean (1967)
- Treaty of Rarotonga South Pacific Nuclear Free Zone Treaty (1985)

In 1992, Mongolia declared its nuclear-weapon-free status, which has been recognised internationally through UN General Assembly resolution 55/33S on “Mongolia’s international security and nuclear-weapon-free status” (adopted on 20 November 2000).

Other treaties that deal with the denuclearisation of geographical regions are:
- Antarctic Treaty (1959)
- Outer Space Treaty: Treaty on Principles Governing the Activities of States in the Exploration and Use of Outer Space, including the Moon and Other Celestial Bodies (1967)
- Moon Agreement: Agreement Governing the Activities of States on the Moon and Other Celestial Bodies (1970)
Establishment of NWFZ

Article VII of the Nuclear Non-Proliferation Treaty (NPT) states: “Nothing in this treaty affects the right of any group of states to conclude regional treaties in order to assure the total absence of nuclear weapons in their respective territories.”

General Assembly resolution 3472 B (1975) defined a Nuclear-Weapon-Free Zone as:

“... any zone recognised as such by the General Assembly of the United Nations, which any group of states, in the free exercises of their sovereignty, has established by virtue of a treaty or convention whereby:

a. The statute of total absence of nuclear weapons, to which the zone shall be subject, including the procedure for the delimitation of the zone, is defined;
b. An international system of verification and control is established to guarantee compliance with the obligations deriving from that statute.”

The UN Disarmament Commission in its report of 30 April, 1999, recommended a set of principles and guidelines for the establishment of a nuclear-weapon-free zone, including:

- Nuclear-weapon-free zones should be established on the basis of arrangements freely arrived at among the states of the region concerned.
- The initiative to establish a nuclear-weapon-free zone should emanate exclusively from states within the region concerned and be pursued by all states of that region.
- The nuclear-weapon states should be consulted during the negotiations of each treaty and its relevant protocol(s) establishing a nuclear-weapon-free zone in order to facilitate their signature to and ratification of the relevant protocol(s) to the treaty, through which they undertake legally-binding commitments to the status of the zone and not to use or threaten to use nuclear weapons against states parties to the treaty.
- A nuclear-weapon-free zone should not prevent the use of nuclear science and technology for peaceful purposes and could also promote, if provided for in the treaties establishing such zones, bilateral, regional and international cooperation for the peaceful use of nuclear energy in the zone, in support of socio-economic, scientific and technological development of the states parties.

As of 2018, the above five regional NWFZ in populated areas around the world are in effect. Some of the treaties related to these zones are at different stages with regard to the signature, ratification and entry into force.

Each NWFZ treaty contains associated protocols seeking security assurances from the five nuclear-weapon states that they will not use or threaten to use nuclear weapons against NWFZ member states. Signature and ratification of these protocols by the nuclear-weapon states are also at varying stages of completion.

For more information please visit: www.un.org/disarmament/WMD/Nuclear/NWFZ.shtml

ARGUMENTS FOR NUCLEAR ABOLITION

The following arguments in favour of banning nuclear weapons are from ICAN – International Campaign to Abolish Nuclear Weapons

THE HUMANITARIAN CASE

The abolition of nuclear weapons is an urgent humanitarian necessity. Any use of nuclear weapons would have catastrophic consequences.

No effective humanitarian response would be possible, and the effects of radiation on human beings would cause suffering and death many years after the initial explosion.

Prohibiting and completely eliminating nuclear weapons is the only guarantee against their use.

Even if a nuclear weapon were never again exploded over a city, there are intolerable effects from the production, testing and deployment of nuclear arsenals that are experienced as an ongoing personal and community catastrophe by many people around the globe.

This humanitarian harm, too, must inform and motivate efforts to outlaw and eradicate nuclear weapons.

 Tibow of nuclear weapons is unique in their destructive power, in the unspeakable human suffering they cause, in the impossibility of controlling their effects in space and time, and in the threat they pose to the environment, to future generations, and indeed to the survival of humanity."

International Committee of the Red Cross, 2010

THE SECURITY CASE

Nuclear weapons pose a direct and constant threat to people everywhere. Far from keeping the peace, they breed fear and mistrust among nations. These ultimate instruments of terror and mass destruction have no legitimate military or strategic utility, and are useless in addressing any of today’s real security threats, such as terrorism, climate change, extreme poverty, overpopulation and disease.

While many thousands of nuclear weapons have been dismantled since the end of the cold war, the justifications for maintaining them remain largely unchanged.

Myth vs. Reality Table:

<table>
<thead>
<tr>
<th>Myth</th>
<th>Reality</th>
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<tbody>
<tr>
<td>It’s OK for some countries to possess nuclear weapons.</td>
<td>When it comes to nuclear weapons, there are no safe hands. So long as any country has these weapons, others will want them, and the world will be in a precarious state.</td>
</tr>
<tr>
<td>It’s unlikely that nuclear weapons will ever be used again.</td>
<td>Unless we eliminate nuclear weapons, they will almost certainly be used again, either intentionally or by accident, and the consequences will be catastrophic.</td>
</tr>
<tr>
<td>Nuclear weapons can be used legitimately in war.</td>
<td>Any use of weapons would violate international humanitarian law because they would indiscriminately kill civilians and cause long-term environmental harm.</td>
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Myth Realities:

- It’s OK for some countries to possess nuclear weapons.
  - When it comes to nuclear weapons, there are no safe hands. So long as any country has these weapons, others will want them, and the world will be in a precarious state.

- It’s unlikely that nuclear weapons will ever be used again.
  - Unless we eliminate nuclear weapons, they will almost certainly be used again, either intentionally or by accident, and the consequences will be catastrophic.

- Nuclear weapons can be used legitimately in war.
  - Any use of weapons would violate international humanitarian law because they would indiscriminately kill civilians and cause long-term environmental harm.
Nations still cling to the misguided idea of “nuclear deterrence”, when it is clear that nuclear weapons only cause national and global insecurity. There have been many documented instances of the near-use of nuclear weapons as a result of miscalculation or accidents.

**THE ENVIRONMENTAL CASE**

Nuclear weapons are the only devices ever created that have the capacity to destroy all complex life forms on Earth. It would take less than 0.1% of the explosive yield of the current global nuclear arsenal to bring about devastating agricultural collapse and widespread famine. The smoke and dust from fewer than 100 Hiroshima-sized nuclear explosions would cause an abrupt drop in global temperatures and rainfall.

*Climate disruption and nuclear famine*

“Climate change may be the global policy issue that has captured most attention in the last decade, but the problem of nuclear weapons is at least its equal in terms of gravity – and much more immediate in its potential impact.”

International Commission on Nuclear Non-Proliferation and Disarmament, 2009

**THE ECONOMIC CASE**

Nuclear weapons programmes divert public funds from health care, education, disaster relief and other vital services.

The nine nuclear-armed nations spend many tens of billions of dollars each year maintaining and modernising their nuclear arsenals. Funding allocated to disarmament efforts is minuscule by comparison.

It is time to redirect money towards meeting human needs.

AUSTRALIA MUST SIGN THE PROHIBITION ON NUCLEAR WEAPONS: HERE’S WHY

All countries – including Australia – should join the new Treaty on the Prohibition of Nuclear Weapons, argues Tilman Ruff

On Wednesday a historic ceremony will take place in the UN General Assembly – the opening for signature of the Treaty on the Prohibition of Nuclear Weapons.

The treaty will enter into force 90 days after 50 countries have ratified it. More than 40 are expected to sign today, and more will sign over the coming weeks and months. As it was adopted by a vote of 122 to one, it can be expected that close to 100 countries will sign before year’s end and it will enter into force in 2018.

The agreement is long overdue. It is 72 years since the nuclear bombings of Hiroshima and Nagasaki, and 71 years since the first resolution of the newly formed UN General Assembly called for “the elimination from national armaments of the atomic weapons”.

It comes at a time of deeply disturbing resurgent nuclear threats and risks of nuclear war, which are considered by most experts – such as the 15 Nobel laureates among the custodians of the Doomsday Clock – to be as high as they have ever been.

It will provide the first comprehensive and categorical prohibition of the world’s most destructive weapons. The treaty makes clear that the catastrophic humanitarian consequences of any use of these weapons means they can never be used again, and consequently should be eliminated. It affirms that as the risks concern the security of all humanity, all countries share this responsibility.

Countries that join the treaty must not develop, test, produce, possess, transfer, receive, station, deploy, use or threaten to use nuclear weapons. There are provisions outlining a pathway for those that have nuclear weapons now, had them in the past, or host nuclear weapons, if they can verify they are rid of their nuclear weapons, related programs and facilities.

The treaty is carefully crafted to complement other disarmament treaties, in particular the Nuclear Non-Proliferation Treaty (NPT).

Countries that join the treaty must not develop, test, produce, possess, transfer, receive, station, deploy, use or threaten to use nuclear weapons ...

Not only is the content of the nuclear weapons treaty historic, but the process of its genesis has also transformed the moribund nuclear disarmament landscape. For the first time, a nuclear disarmament treaty has been led by the countries without the weapons, and has an unequivocal humanitarian basis.

The level of involvement of civil society was unprecedented, particularly Japanese hibakusha (those who survived the atomic bombs) and nuclear test survivors, including from Australia.

The UN was used for the first time in 21 years to negotiate a nuclear disarmament treaty, because it’s most inclusive and democratic forum, the General Assembly, is able to adopt substantive measures by vote.

This is in stark contrast to the NPT conferences and the Conference on Disarmament, which are paralysed by a requirement for consensus.

The treaty was able to be completed from negotiating mandate to adoption in eight months, with only four weeks of actual negotiations. This was because of a widespread determination to seize this landmark opportunity on the part of many states, who were more willing to put aside parochial agendas than I have ever witnessed in a nuclear forum over the past 35 years.

Fierce opposition came from nuclear-armed and
nuclear-dependent countries (including Australia), as a US document to its NATO allies demonstrates. Strong political and economic pressure exerted on many countries by the US, UK, France and Russia, despite peeling off some smaller and weaker countries, proved ineffective.

Pressure on countries not to sign, most publicly US Secretary of Defence James Mattis’ admonition to Sweden, will likely ramp up. However, the treaty is a triumph of the interests of common humanity, and is not going away.

... There are provisions outlining a pathway for those that have nuclear weapons now, had them in the past, or host nuclear weapons, if they can verify they are rid of their nuclear weapons, related programs and facilities.

The dangerous brinkmanship and extreme threats traded between Donald Trump and Kim Jong-un are only the latest explicit threats to use nuclear weapons by a succession of leaders, including Theresa May, Vladimir Putin, and leaders in India and Pakistan.

Relations between the US and Russia are at their worst in 30 years, with a resurgent Cold War escalating. Relations between the US and China are at their lowest point in decades. Pakistan and India are expanding their nuclear arsenals faster than anywhere else. Both sides are implementing deployments and policies for early use of nuclear weapons if war erupts.

North Korea’s escalating development and testing of both nuclear weapons and long-range ballistic missiles demonstrate that any determined nation can develop both.

The fundamental problem is what South African ambassador Abdul Minty described as “nuclear apartheid”, with the countries possessing nuclear weapons busy modernising and determined to retain them, rather than fulfil their obligation to disarm. This is an inevitable driver of nuclear proliferation.

As former UN secretary-general Ban Ki-moon said: There are no right hands for the wrong weapons.

No human should have the power to end the world in an afternoon. If nuclear weapons are retained they will eventually be used. The crisis relating to North Korea, for which there is no military solution, highlights again that our luck could run out any day.

The countries that have forewarned biological and chemical weapons now need to do the same for nuclear weapons. The Treaty on the Prohibition of Nuclear Weapons provides a credible pathway to the verified, time-bound elimination of weapons posing the most acute existential threat to people everywhere.

All countries – including North Korea, the US and Australia – should join the treaty.

**DISCLOSURE STATEMENT**

Tilman Ruff does not work for, consult, own shares in or receive funding from any company or organisation that would benefit from this article, and has disclosed no relevant affiliations beyond his academic appointment.

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**THE CONVERSATION**


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**ICAN AND THE NOBEL PEACE PRIZE**

- The International Campaign to Abolish Nuclear Weapons (ICAN) was awarded the Nobel Peace Prize on 10 December 2017.
- ICAN is a coalition of grassroots non-government groups in more than 100 nations. It originated in Australia and was then launched internationally in Vienna in 2007 and has been pivotal in promoting adherence to and implementation of the Treaty on the Prohibition of Nuclear Weapons (TPNW).
- ICAN has advocated at the United Nations and in parliaments around the world, bringing the stories of those impacted by nuclear testing and survivors of the Hiroshima and Nagasaki bombings to a world stage.
- The treaty was adopted by 122 countries (not including Australia) in New York on 7 July 2017.
- The document is somewhat symbolic because it remains opposed by all nuclear powers and many of their allies, including Australia. According to ICAN, the treaty’s significance lies in its power to influence governments: those that actually support nuclear disarmament will sign it; while those that do not support it will be shown to be insincere in their disarmament rhetoric.
- Anti-nuclear activists have attacked the Turnbull Government for not formally congratulating ICAN for receiving the peace prize. The Australian government has long argued that banning nuclear weapons outright will not lead to any meaningful reduction in nuclear weapons.
- Australian officials have said the move to ban nukes could offend nuclear powers and also distract attention from existing treaties aimed at preventing nuclear proliferation. It is also argued that Australia benefits from the deterrence umbrella the large US nuclear arsenal provides, particularly in the face of possible threats such as recent provocations from North Korea.
Steps towards a nuclear-weapons-free world

Department of Foreign Affairs and Trade outlines the Australian Government’s promotion and support of key non-proliferation and disarmament initiatives

Much progress has been made since the end of the Cold War in reducing nuclear arsenals, strengthening the global nuclear security architecture, and strengthening non-proliferation mechanisms.

All five Nuclear Non-Proliferation Treaty (NPT) nuclear-weapon states remain committed to a world free of nuclear weapons through the treaty’s “grand bargain”: disarmament in exchange for non-proliferation.

Without the NPT it is likely there would have been many more countries with nuclear weapons today. However, to prepare the conditions for eliminating nuclear weapons altogether, much more needs to be done, including addressing the nuclear-weapon possessor states outside the NPT. Australia has actively been promoting and supporting some key initiatives.

Non-Proliferation and Disarmament Initiative (NPDI)

The 2010 NPT Review Conference agreed on a 64-point action plan which includes most of the steps required to advance the disarmament and non-proliferation objectives encapsulated in the NPT.

In July 2010, Australia and Japan jointly established the Non-Proliferation and Disarmament Initiative (NPDI) with the key objective of promoting the implementation of this action plan.

The NPDI is a cross-regional group of 12 countries: Australia, Canada, Chile, Germany, Japan, Mexico, Nigeria, the Netherlands, the Philippines, Poland, Turkey and the United Arab Emirates.

The NPDI is a prominent and pragmatic voice in the international community and has been active in promoting practical actions and maintaining pressure on the nuclear-weapon states and nuclear-weapon possessor states to meet their commitments.

The NPDI’s current thematic priorities include:

- Encouraging greater transparency surrounding nuclear disarmament efforts
- Increasing support for and conclusion of key legal instruments that safeguard and govern nuclear activities, and
- Strengthening the NPT regime.

There have been 8 Ministerial meetings of the NPDI:

- Eighth NPDI Ministerial Meeting, 12 April 2014
- Seventh NPDI Ministerial Meeting, 24 September 2013
- Sixth NPDI Ministerial Meeting, 9 April 2013
- Fifth NPDI Ministerial Meeting, 26 September 2012
- Fourth NPDI Ministerial Meeting, 16 June 2012
- Third NPDI Ministerial Meeting, 21 September 2011
- Second NPDI Ministerial Meeting, 30 April 2011
- First NPDI Ministerial Meeting, 22 September 2010
The Dutch Foreign Minister delivered an opening statement on behalf of the NPDI at the 2015 NPT Review Conference.

**Comprehensive Nuclear Test Ban Treaty (CTBT)**

Australia was instrumental in pushing for a comprehensive ban on nuclear tests. As a result, the Comprehensive Nuclear Test-Ban-Treaty (CTBT) was adopted by the United Nations General Assembly in 1996. Australia signed the CTBT on 24 September 1996 and ratified the treaty on 9 July 1998.

The CTBT bans all nuclear test explosions: a practical step toward nuclear disarmament and an effective non-proliferation measure which limits the technological development of nuclear weapons. For more than twenty years, the CTBT has underpinned the global norm against nuclear testing and developed a world-class verification system which allows real-time monitoring for nuclear tests across the globe.

Without the NPT it is likely there would have been many more countries with nuclear weapons today. However, to prepare the conditions for eliminating nuclear weapons altogether, much more needs to be done, including addressing the nuclear-weapon possessor states outside the NPT.

The treaty contains a specific list of countries that must ratify in order for the CTBT to enter into force. Of these 44 countries, listed in Annex II to the treaty, three (DPRK, India and Pakistan) are yet to sign and five (China, Egypt, Iran, Israel and United States) have signed but are yet to ratify the treaty.

Australia continues to be a leading supporter of the treaty. Australia and Japan co-chair the ‘Friends of the CTBT’ Foreign Ministers’ Meeting. The Friends group also includes Canada, Germany, Finland and the Netherlands. For over a decade, Australia, Mexico and New Zealand have alternated as lead sponsor of the UN General Assembly resolution on the CTBT. Germany delivered a statement on behalf of the NPDI on Strengthening the Norm against Nuclear Testing at the 2016 Comprehensive Nuclear-Test-Ban Treaty Organization (CTBTO) Preparatory Commission meeting in Vienna commemorating the 20th anniversary since the treaty was opened for signature.

The CTBT’s International Monitoring System (IMS) comprises more than 300 facilities around the globe. The IMS has already demonstrated its effectiveness by promptly detecting all of North Korea’s nuclear test explosions. Australia hosts 21 IMS facilities – the third largest number of any country.

Australia also makes a leading contribution to the development of on-site inspection procedures which could be used to investigate concerns about a possible nuclear test. The Australian Safeguards and Non-Proliferation Office (ASNO) is Australia’s National Authority for implementation of the CTBT and coordinates Australia’s contribution to the development of its verification system. Reliable and real-time monitoring data from the CTBT’s IMS offers additional civil and scientific benefits. Data from IMS stations makes a valuable contribution to tsunami warning systems including, the Australian Tsunami Warning System covering both the Pacific and Indian Oceans.

**Fissile Material Cut-Off Treaty (FMCT)**

Australia has been a prominent advocate of the practical “building blocks” approach to nuclear disarmament. A Fissile Material Cut-off Treaty (FMCT) is a priority next step in advancing nuclear non-proliferation and disarmament efforts and a key element of this approach.

With the Conference on Disarmament not yet able to agree to negotiate an FMCT, a Group of Governmental Experts (GGE) established under a UN mandate undertook a detailed assessment in 2014 and 2015 of possible aspects of a future treaty and identified useful signposts that could guide future negotiations toward agreement that could contribute to a treaty. Australia participated in the GGE. The GGE produced a robust consensus report reflecting the most in-depth discussions on the topic to date.

In 2016, the UN mandated in a resolution “Treaty banning the production of fissile material for nuclear weapons or other nuclear explosive devices” to establish a 25-member High-Level FMCT Expert Preparatory Group. Australia is playing a constructive role in participating in this group. The group will build on the 2015 GGE report and consider relevant factors in greater detail.

Fissile material (highly-enriched uranium and plutonium) is the central component to the manufacture of nuclear weapons. We believe an FMCT would be an indispensable step on the way towards a nuclear-free world.
Verification for nuclear disarmament

Much international debate on nuclear disarmament focuses on building the necessary political will for progress toward a world without nuclear weapons, and on fostering a security environment for that political will to succeed.

To make headway, we also need to understand better how practical steps toward disarmament could actually work, and how the international community can have appropriate confidence in them. The negotiation of future nuclear disarmament arrangements could be greatly aided if verification tools are available.

The International Partnership for Nuclear Disarmament Verification (IPNDV) is an informal partnership of more than 25 countries, working jointly since 2015 to develop technical solutions for monitoring and verification challenges across the nuclear weapons lifecycle. Research into verifying nuclear disarmament has been pursued since the 1990s by a few countries, including through bilateral cooperation. However, IPNDV is the first international dialogue in this field among a substantial number of states, including those with and without nuclear weapons.

Australia (DG ASNO) co-chairs IPNDV’s Working Group 2 whose focus is the development of processes and procedures under which international inspectors could gain some assurance that an item presented for verification is a nuclear explosive device and then reliably track the device and its components through the disassembly process.

Australia is very supportive of the Norwegian-led First Committee Resolution titled “Nuclear disarmament verification” and views this initiative as a practical and important step forward in increasing knowledge and understanding of verification.

Nuclear-Weapon-Free Zones (NWFZ)

A number of regions around the world have set up NWFZs. These ban the development, deployment and use of nuclear weapons. Australia is party to the

South Pacific Nuclear Free Zone (SPNFZ) Treaty (Treaty of Rarotonga or SPNFZT) which entered into force on 11 December 1986, becoming the second treaty in the world to establish a nuclear-weapon-free zone in a populated region (the first being the Treaty for the Prohibition of Nuclear Weapons in Latin America and the Caribbean, or the Treaty of Tlatelolco).

Australia strongly supports the creation of NWFZs and believes their establishment, freely arrived at among the states in the region concerned, contribute to the implementation of the NPT. They also serve as a security-enhancing interim step pending the total elimination of nuclear weapons.

Australia implements its obligations under the SPNFZT through the South Pacific Nuclear Free Zone Treaty Act 1986, which, inter alia, prohibits the manufacture, production or acquisition of nuclear explosive devices; prohibits research and development relating to their manufacture or production; prohibits the possession or control over such devices; prohibits the stationing of nuclear explosive devices in Australia; and prohibits the testing of nuclear explosive devices.

Department of Foreign Affairs and Trade.
Steps towards a nuclear-weapons-free world (3 May 2017).
AUSTRALIA’S NUCLEAR NON-PROLIFERATION AND DISARMAMENT POLICY

Australia strongly supports nuclear disarmament and action towards the goal of a world free of nuclear weapons, according to the Department of Foreign Affairs and Trade.

For more than 45 years, the Treaty on the Non-Proliferation of Nuclear Weapons (NPT) has provided important security benefits to all states. Our collective commitment to the treaty has prevented a global nuclear arms race, contained the proliferation of nuclear weapons and facilitated the peaceful uses of nuclear energy and technology. It has strengthened the “taboo” against nuclear-weapons use in conflict and has established nuclear non-proliferation as a powerful norm. Upholding this norm is a crucial component of ensuring global stability and security.

Australia strongly supports nuclear disarmament and action towards the goal of a world free of nuclear weapons. As a non-nuclear-weapon state, Australia can make a difference through active engagement with like-minded countries to advocate for a practical “building blocks” approach to disarmament which includes as priorities the entry into force of the Comprehensive Nuclear-Test-Ban Treaty (CTBT), negotiations on a Fissile Material Cut-off Treaty (FMCT), work by nuclear-weapon states and non-nuclear-weapon states on nuclear disarmament verification, transparency and confidence-building.

This is not a quick or an easy task – it will require sustained, practical and incremental steps. Ultimately, however, nuclear disarmament will only be effective with the involvement of all states with nuclear weapons.

Australia has played a creative and dynamic role in promoting the three pillars of the NPT. We have been instrumental in establishing the Nuclear Non-Proliferation and Disarmament Initiative (NPDII) consisting of 12 cross-regional states with a focus on pillar one (disarmament) and pillar two (non-proliferation) issues, as well as playing a prominent role in shaping pillar three (peaceful uses) issues through our leadership role within the Vienna Group of Ten.

Australia is also a strong supporter of international efforts to prevent the proliferation of nuclear weapons, including through our participation in the Nuclear Suppliers Group and Zangger Committee export control regimes, and role as a member of the IAEA Board of Governors.

Why don’t we just “ban the bomb”? There has been growing international focus on the humanitarian consequences of nuclear weapons, and as a result a number of countries and civil society groups have argued that the only response to the existence of nuclear weapons is a near-term nuclear weapons ban treaty.

There is no doubt about the horrific consequences to humanity from a nuclear war. Countless studies since the advent of nuclear weapons have made this clear, including those undertaken by the UN Scientific Committee on the Effects of Atomic Radiation since it was established in 1955.

Australia has always taken the humanitarian consequences of nuclear weapons very seriously. This is the reason why, over the past decades, Australia has been a prominent and active advocate of nuclear disarmament and non-proliferation and why we have participated constructively in the Humanitarian Impact of Nuclear Weapons (HINW) Conferences in Oslo, Nayarit and Vienna.

In late 2016, the United Nations General Assembly adopted a resolution titled “Taking forward multilateral nuclear disarmament...
Nuclear Arms Control

This resolution contains a decision to convene a United Nations conference to negotiate a legally-binding instrument to prohibit nuclear weapons, leading towards their total elimination.

The Australian Government does not share the view that simply banning nuclear weapons will lead to their elimination or will change the current, real, security concerns of states with nuclear weapons or those states, like Australia, that rely on extended deterrence as part of their security doctrine.

To be effective, disarmament efforts must engage all the nuclear-armed states and must focus on practical measures that recognise both the humanitarian and security dimensions of this issue. The NPT already contains hard-won commitments to eliminate nuclear weapons, and the Action Plan from the 2010 NPT Review Conference provides a roadmap to this goal.

Creating the conditions and confidence necessary for nuclear-armed states to negotiate down and ultimately eliminate their arsenals is complex and difficult but there are no shortcuts.

The Australian Government is not participating in the abovementioned UN Conference to negotiate a treaty to ban nuclear weapons.

This approach is consistent with our clear and longstanding position on the proposed treaty to ban nuclear weapons which recognises that such a treaty does not offer a practical path to effective disarmament or enhanced security.

A ban treaty which does not include key states which possess nuclear weapons and is disconnect-ed from the international security environment would be counterproductive and would not rid us of a single nuclear weapon.

In fact, a ban treaty risks undermining the NPT which Australia rightly regards as the cornerstone of the global non-proliferation and disarmament architecture. A ban treaty could create parallel obligations and thus ambiguity and confusion and would deepen divisions between nuclear and non-nuclear-weapons states.

With a simple prohibition treaty, there would also be no effective verification measures to ensure compliance.

Australia will continue to push hard to build that political will, and to promote the practical steps that will be necessary to bring about the elimination of nuclear weapons.

**The Joint Comprehensive Plan of Action (JCPOA)**

The conclusion of the Joint Comprehensive Plan of Action (JCPOA) agreement in July 2015 by the five permanent members of the Security Council and Germany (the “P5+1” or “E3+3”) and Iran has enabled the IAEA to conduct more intrusive inspections and provide verifiable assurances to the international community that Iran’s nuclear activities will be exclusively peaceful.

Australia welcomed the IAEA announcement on 16 January 2016 that Iran had implemented key nuclear-related measures of the JCPOA; triggering ‘Implementation Day’ under the agreement and the lifting of a number of UN sanctions on Iran and many of the sanctions imposed by the United States and the EU. Australia’s autonomous sanctions were also eased.

**Challenges: North Korea (DPRK)**

There are ongoing proliferation challenges to the NPT regime, particularly the DPRK’s nuclear weapons and missile programs.

Disturbing recent developments by the DPRK, including the two nuclear tests and over 20 ballistic missile launches undertaken in 2016, pose a grave threat to regional security and a serious challenge to international non-proliferation efforts.

The DPRK’s nuclear tests violate unanimously agreed UN Security Council Resolutions, as well as the de facto global moratorium on nuclear tests which all nuclear-armed states have maintained pending the entry into force of the Comprehensive Nuclear-Test-Ban Treaty (CTBT).

Australia, as a co-sponsor, welcomes the UN Security Council’s unanimous adoption of UNSCR 2231 in response to North Korea’s fifth nuclear test. The new resolution brings to bear the toughest set of sanctions imposed on North Korea to date. Australia implements UN Security Council sanctions against the DPRK, and supplements these through its autonomous sanctions legislation.

Australia continues to work closely with the United Nations, the Republic of Korea (ROK), the United States, Japan, China and other countries in support of international efforts to bring about an end to the DPRK’s nuclear weapons and missile programs.
NUCLEAR WEAPONS AND AUSTRALIA’S DEFENCE WHITE PAPER

John Tilemann assesses Australia’s latest strategic defence policy direction in relation to the threat of nuclear weapons

Australia’s recently released 2016 Defence White Paper is premised on a strategic outlook that overlooks the nuclear threat in our own backyard.

The Indo-Pacific region is the global vortex of nuclear weapon threats with six of the world’s nine nuclear-armed states involved. India, Pakistan and China are trapped in a three-way nuclear weapons relationship that had no parallel in the Cold War strategic rivalry, which makes Australia’s strategic region that much more dangerous and unpredictable. North Korea continues to defy international opinion by developing nuclear weapon and ballistic missile delivery systems. The established nuclear powers (China, Russia and the US) ultimately back their regional strategies with nuclear deterrence.

The White Paper says little about these threats presumably on the grounds that Australian Defence Force capabilities are not able to deal with them. We learn two thirds of the way through the White Paper in Chapter 5.20 that Australia’s only defence against nuclear threats is ANZUS and US extended deterrence. However there is a growing body of opinion that questions the reliability of deterrence and extended deterrence. To put unquestioned reliance in the US nuclear umbrella deprives Australia of policy flexibility and the moral right to lead efforts to fashion an alternative world order where mutually assured destruction is not the ultimate guarantor of our existence. Australia would be wise to acknowledge regional nuclear threats and do more to help mitigate them.

SOUTH ASIA

The US umbrella has no relevance to our nearest nuclear threat in South Asia. The White Paper acknowledges that “tensions” between India and Pakistan could affect Australia’s security, however references to cooperation with Pakistan and India in Chapters 5.70 and 5.72 make no mention of nuclear issues. With the deployment of tactical as well as strategic weapons in the region and the past history of conflicts, Australia and the world should become more engaged.

Defence engagement should support broader security and foreign policy interests in managing and restraining nuclear tensions between China, India and Pakistan. An officials-level ‘strategic dialogue’ is not sufficient. Instead of brushing off the issue as it was in the recent rush by nuclear suppliers – including Australia – to access India’s nuclear power program, Australia should attempt to make the matter more mainstream.

NORTH ASIA

The situation in North Asia is equally fraught given the significant likelihood of Australia being drawn into conflicts.

The White Paper in Chapter 5.67 refers to cooperation with South Korea on non-proliferation but does not touch on the weapons of mass destruction (WMD) threats that Australian forces would face in any but the most optimistic scenarios for conflict in the region.

The world has struggled for decades to avert conflict on the Korean Peninsula and with the added nuclear element the risks are higher than ever. Containing DPRK nuclear and missile threats and dampening a seemingly growing – if still small – interest in nuclear weapons in Japan and South Korea must remain one of Australia’s highest security priorities.

NON-PROLIFERATION NORMS AND THE RULES-BASED GLOBAL ORDER

The White Paper’s comments on cooperation with South Korea highlight the perception amongst Australian defence strategists that non-proliferation, disarmament and arms control measures are simply tools to uphold the rules-based global order. Rather, the highly-developed and highly-effective global counter-proliferation regime should be seen as a critical component of the global order that the White Paper asserts so frequently and properly. Indeed, it should be a central objective of Australia’s defence posture.
COUNTERING NUCLEAR THREATS: POLICY AND CAPABILITIES

The White Paper foreshadows in Chapter 2.106 that Australia will continue to do its ‘part’ in countering nuclear threats; the Indo-Pacific strategic outlook dictates it do more. Australia has historically been a prominent supporter of global efforts to contain and end WMD proliferation, but its reputation is eroding. Resource pressures have reduced the effort and expertise across government, while the international response to WMD threats is becoming more complex and harder-edged.

Despite Australian WMD expertise and personnel playing an important role in assessing the WMD inventories of Saddam’s Iraq, no such contribution was made to the UN-led and US-backed international project to destroy Syria’s chemical weapon stockpile. Australia has a WMD response capability to support domestic situations and for the development of chemical, biological and radiological protection equipment for the armed forces (Chapter 3.15). This expertise should be enhanced and made available to properly-mandated interventions. The expertise could also be used for strengthening the international WMD control machinery.

In elaborating the role of one of Australia’s key intelligence facilities, the White Paper notes its contribution to intelligence on ‘priorities’ such as terrorism and the proliferation of weapons of mass destruction (Chapter 5.24). Good intelligence is vital to the detection and disruption of proliferation supply networks. What the paper does not discuss however is the use made of this intelligence.

As Australia appears to be downgrading the priority of WMD issues, it is likely that proliferation intelligence will only be used for the purposes of information trading. Instead, Australia should be making a greater contribution to regional counter-proliferation efforts including by utilisation of all available intelligence sources and expertise across all government agencies.

FACING THE REALITIES

Considering the range of security threats that Australia will be facing over the next twenty years, it would be wise to recall how different the strategic outlook might have been if not for the game-changing commitments of Australia and its regional partners in the 1970s to forego nuclear weapons and sign the Nuclear Non-Proliferation Treaty (NPT). If not for those decisions, the White Paper would have had a very different starting point.

With the UN Security Council now committed to stronger sanctions on North Korea, including inspection of shipping, Australia will be expected to contribute, either by offering assets of its choosing or waiting until asked. It would be quite consistent with Australia’s commitment to increase the tempo of regional defence engagement for a share of that increase to have a WMD focus, through the Proliferation Security Initiative and bilaterally. For a tiny outlay in the context of overall defence spending Australia could help reclaim its reputation for leadership on global WMD arms control and non-proliferation efforts.

John Tilemann is a former diplomat whose postings included the International Atomic Energy Agency and as Ambassador to Jordan. He is currently the Director of Research for the Asia Pacific Leadership Network on Nuclear Non-Proliferation and Disarmament at the Australian National University.

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We learn two thirds of the way through the White Paper ... that Australia’s only defence against nuclear threats is ANZUS and US extended deterrence. However there is a growing body of opinion that questions the reliability of deterrence and extended deterrence.
Australia, extended nuclear deterrence, and what comes after

Over recent years, the Australian government has had little to say about nuclear deterrence in general and extended nuclear deterrence in particular. Rod Lyon explores Australia’s defence policy options in light of recent nuclear tensions on the Korean Peninsula.

Recent media reports suggest senior US officials have told Julie Bishop that if North Korea’s nuclear weapon program can’t be reversed, South Korea and Japan will likely pursue their own indigenous nuclear arsenals.

In fact, the proliferation chain might not be quite that straightforward – in every proliferating country strategic logic has to coexist with a permissive political environment. But the strategic logic is certainly becoming more compelling. Compelling enough, at least, that Australia should be considering two important issues: what South Korea’s and Japan’s crossing of the nuclear threshold would say about the continuing credibility of the US doctrine of extended nuclear deterrence; and how Australia’s own nuclear identity might shift in a more densely-proliferated world.

Both questions are so important that they merit some discussion during Monday’s AUSMIN dialogue, despite the already-crowded agenda.

Let’s start with the first – and simplest – question. If South Korea and Japan were to decide they needed their own nuclear arsenals, their decisions would suggest, strongly, that the age of the US nuclear umbrella was drawing to a close.

The credibility of US nuclear assurances would face a challenge as fundamental as that posed by French proliferation back in the 1960s, but in an environment marked by greater anxiety over Washington’s constancy. US allies around the world would re-visit their own degree of faith in such commitments – and any such reassessment would, of course, be influenced by the fact that two of their number, both essentially status quo powers, had already abandoned the church.

True, Japan’s and South Korea’s particular strategic motivations wouldn’t necessarily be replicated among all US allies and partners. Nor would all enjoy the opportunity to cross the nuclear Rubicon in relatively short order – an option that exists for Tokyo and Seoul because of their extensive civil nuclear capabilities. But the honest assessment must be that defection by two principal US allies would be grievously felt, and might even precipitate the collapse of the broader doctrine of extended nuclear deterrence.

If that was to happen, we could easily find ourselves living through an age of sudden, intense nuclear proliferation. Current geopolitical uncertainties – already disruptive and disintegrative – might crystallise in an unpleasant fashion. The Taiwanese, the Poles, the Germans, the Saudis, the Turks and the Egyptians, for example, might follow the South Koreans and the Japanese. Holding Iran away from a bomb would become much more difficult. Within a decade or two we could be living in a world with around 20 nuclear-weapon powers, not just the current nine.

In relation to the second question – about Australia’s nuclear identity – it’s important to confront the central question right up front. If South Korea and Japan decide they’re unable to rely upon US extended nuclear deterrence, does it make sense for Australia to continue to do so? For it to add up, we’d need to have a convincing argument about why we were more strategically important to Washington than the two allies in the North Pacific – so making it more credible that the US would run nuclear risks on our behalf that it might not on theirs. That’s going to be a challenging argument to make, and it would only become more challenging in the wake of further defections from the current nuclear order.

Extended nuclear deterrence makes most sense in a low-proliferation world where the nuclear-weapon states are risk-averse great powers, because the risks the guarantor runs on behalf of its allies are few and unlikely. But it makes less sense in a densely-proliferated world, where guaranteeing to run risks on behalf of others is a much more fraught enterprise.

Each new proliferator tears at the plausibility...
Extended nuclear deterrence makes most sense in a low-proliferation world ... But it makes less sense in a densely-proliferated world, where guaranteeing to run risks on behalf of others is a much more fraught enterprise.

of extended nuclear deterrence, but risk-tolerant proliferators do particular damage. The upshot is that the concepts of extended deterrence and assurance make good sense in a world of five nuclear-weapon states, less sense in a world of ten, and almost no sense at all in a world of twenty.

Over recent years, Australian government ministers and official documents have had little to say about nuclear deterrence in general and extended nuclear deterrence in particular.

Still, it’d be wrong to conclude from that limited evidence that Australia would be indifferent to the folding of the US nuclear umbrella. On the contrary, any such development would excite the most serious reconsideration of alternative strategic options since Australia signed the NPT in 1970. In a densely-proliferated world, the costs of remaining a conventionally-armed middle power would probably rise steeply.

In his chess-themed novel, The Queen’s Gambit, Walter Tevis brutally describes the Caro-Kann Defence as ‘all pawns and no hope’. Future Australian governments – of whatever persuasion – would be reluctant to allow their defence policies to be described in similar fashion.

Rod Lyon is a senior fellow at the Australian Strategic Policy Institute (ASPI).

Australia’s stance on nuclear deterrence leaves it on the wrong side of history

Instead of blindly following US nuclear policies, Australia should carefully consider its non-nuclear defence, caution Dimity Hawkins and Julie Kimber

There has been much hand-wringing at the thought of Donald Trump becoming US president*. If, by some miracle, Trump succeeds in November, he will have his hand on the nuclear trigger. But this concern, while great political fodder, is dangerously simplistic. It presupposes there are “safe hands” when it comes to nuclear weapons. There are not.

The US has around 7,000 nuclear weapons. Hundreds of these can be launched within minutes. While the global community has outlawed other indiscriminate weapons of mass destruction, nuclear weapons are yet to be banned.

The Cold War’s MAD (Mutually Assured Destruction) doctrine has morphed over the years into a framework of nuclear deterrence. Many governments globally have played a double game: supporting nuclear disarmament on the one hand, while relying on a nuclear defence on the other.

One such government is Australia’s. Despite consecutive governments insisting they support nuclear disarmament, Australia’s reliance on Extended Nuclear Deterrence (END) means it is frustrating attempts at a total ban.

END is based on the assumption the US would offer a nuclear response to Australia as a select protégé ally in the event of a nuclear threat or attack. These arrangements are publicly documented between the US and NATO states, Japan and South Korea.

The first official articulation of the position in Australia is in its 1994 Defence White Paper. This professes a reliance on, and support for, a US nuclear capability to “deter any nuclear threat or attack on Australia”.

Despite consecutive governments insisting they support nuclear disarmament, Australia’s reliance on Extended Nuclear Deterrence (END) means it is frustrating attempts at a total ban.

Importantly, the paper also noted that reliance on END was an “interim” measure until a total ban on nuclear weapons could be achieved. Each subsequent defence white paper has continued to assert this reliance on US nuclear weapons.
The 2016 Defence White Paper created more ambiguity about the END arrangement. It claimed:

Only the nuclear and conventional military capabilities of the United States can offer effective deterrence against the possibility of nuclear threats against Australia.

After 22 years of White Paper reliance on END, it is no longer a temporary aberration. The risk is we normalise both the need for and use of nuclear weapons.

Australian defence White Papers offer no clarification on the conditions under which nuclear weapons would be used on our behalf. Given the known humanitarian, environmental and cultural devastation caused by their use, significant questions remain – including under what circumstances policymakers and defence experts would consider justifying the deployment of nuclear weapons in Australia’s name.

The global trend of nuclear renewal

Anyone watching US President Barack Obama’s speech in Hiroshima in March 2016 might be mistaken for thinking his pledges to end the nuclear weapon threat were sincere. He said:

Among those nations like my own that hold nuclear stockpiles, we must have the courage to escape the logic of fear and pursue a world without them.

This would seem to undermine the utility of nuclear deterrence, but the reality is different.

The Stockholm International Peace Research Institute (SIPRI) has claimed the US:

... plans to spend US$348 billion during 2015-24 on maintaining and comprehensively updating its nuclear forces. Some estimates suggest that the USA's nuclear weapon modernisation program may cost up to $1 trillion over the next 30 years.

Despite Trump’s assertion that countries under the US END umbrella should be developing their own nuclear capacity, neither Trump nor his Democratic presidential rival, Hillary Clinton, are likely to continue the nuclear renewal programs.

For Australia, the change in the US presidency provides an opportunity to rethink defence relationships, especially those relating to nuclear weapons.

Instead of blindly following US nuclear policies into whatever a future president might envisage, Australia should carefully consider its non-nuclear defence and challenge all claims, surrogate or otherwise, to nuclear weapons.

An opportunity to re-evaluate our stance

With some arguing a Trump presidency would undermine alliance relationships, Australia has a chance to strike a new path. The uncomfortable presumption of END in our defence policies is one area we should be actively challenging.

While Australia is a highly militarised middle power in the region, it has few, if any, discernible nuclear threats of its own to counter. It has forewarned such weapons through international law agreements and has at times been a strong voice on efforts to eliminate nuclear weapons.

The revival of concern about the humanitarian impacts of these weapons is shifting old assumptions. Growing impatience with the slow pace of change and continual delays in meeting even the most basic of expectations in relation to nuclear disarmament have meant support for a ban on such weapons has grown internationally to include the majority of UN member countries.

Australia’s reliance on END keeps us on the wrong side of history. And it has led previous governments and the current government to actively oppose the growing calls for a ban on nuclear weapons.

Instead of blindly following US nuclear policies into whatever a future president might envisage, Australia should carefully consider its non-nuclear defence and challenge all claims, surrogate or otherwise, to nuclear weapons.

* Editor’s note: On 8 November 2016, Donald Trump was subsequently elected as President of the United States, taking office on 20 January 2017.

DISCLOSURE STATEMENT

Dimity Hawkins has been involved in activism and advocacy around nuclear disarmament for many years, including as a Board Member of the International Campaign to Abolish Nuclear Weapons (ICAN) Australia. Julie Kimber does not work for, consult, own shares in or receive funding from any company or organisation that would benefit from this article, and has disclosed no relevant affiliations beyond her academic appointment.

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EXPLORING ISSUES

WORKSHEETS AND ACTIVITIES

The Exploring Issues section comprises a range of ready-to-use worksheets featuring activities which relate to facts and views raised in this book.

The exercises presented in these worksheets are suitable for use by students at middle secondary school level and beyond. Some of the activities may be explored either individually or as a group.

As the information in this book is compiled from a number of different sources, readers are prompted to consider the origin of the text and to critically evaluate the questions presented.

Is the information cited from a primary or secondary source? Are you being presented with facts or opinions?

Is there any evidence of a particular bias or agenda? What are your own views after having explored the issues?

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MULTIPLE CHOICE 54
Brainstorm, individually or as a group, to find out what you know about nuclear arms control.

1. Explain what a nuclear weapon is, and briefly describe the two main types of nuclear weapon.

2. What is nuclear proliferation? Which nations are currently nuclear-armed states and how many nuclear weapons do they each possess?

3. What is nuclear disarmament, and what is involved in achieving it?

4. What are the likely effects of nuclear weapons on human health and on the natural environment?
Complete the following activity on a separate sheet of paper if more space is required.

Extended nuclear deterrence (END) is based on the assumption the United States would offer a nuclear response to Australia as a select ally in the event of a nuclear threat or attack. These arrangements are publicly documented between the US and NATO states, Japan and South Korea.

Research Australia’s historical involvement in global nuclear arms control and explore the nation’s current defence stance in relation to nuclear weapons, particularly in light of recent developments such as the establishment of the Treaty on the Prohibition of Nuclear Weapons and the ongoing nuclear tensions and negotiations with North Korea over its nuclear weapons testing program.

What is Australia’s existing nuclear non-proliferation and disarmament policy; is the nation doing enough to contain and control the global threat of nuclear proliferation and conflict?

In a letter addressed to the Prime Minister of Australia, use your research findings to state your case for either endorsing Australia’s current nuclear weapons policy, or advocating for greater involvement in nuclear arms control. In drafting your letter, be clear, logical and realistic in expressing your objective; explain your understanding of what the national defence policy is, and what you are asking the Prime Minister to do about the issue.
Complete the following activity on a separate sheet of paper if more space is required.

Organise a classroom debate to explore the risk of nuclear weapons being deployed. Divide your class up into groups of six plus one adjudicator per group. Allocate each of the groups one of the topics below. Divide each group of six debaters into two teams of three to argue for the affirmative and negative in relation to the topic’s proposition.

Using the space provided below compile a list of arguments that you have brainstormed to support your position; divide these arguments between the first and second speakers, leaving the third speaker to do the final rebuttals and summarise the team’s conclusions for the affirmative or negative. Allocate two minutes per speaker, alternating between the teams for speakers 1, 2 and 3, starting with the first speaker for the affirmative. With guidance from the teacher, take a class poll to decide which team won the debate and discuss why.

1. That nuclear weapons keep the peace against major conflict, as long as they are in the right hands.
2. That it is only a matter of time before nuclear weapons are used again.
3. That nuclear weapons pose a more serious threat to the world than climate change.
Complete the following activity on a separate sheet of paper if more space is required.

“Nine countries together possess around 15,000 nuclear weapons. The United States and Russia maintain roughly 1,800 of their nuclear weapons on high-alert status – ready to be launched within minutes of a warning.

Most are many times more powerful than the atomic bombs dropped on Japan in 1945. A single nuclear warhead, if detonated on a large city, could kill millions of people, with the effects persisting for decades.”

ICAN (International Campaign to Abolish Nuclear Weapons), *Nuclear arsenals*.

Which nine countries currently possess nuclear weapons? Briefly describe the size of each nation’s nuclear weapons arsenals, and explain their stance in relation to nuclear proliferation and their respective status as signatories (or non-signatories) of the major nuclear weapons treaties.

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Complete the following multiple choice questionnaire by circling or matching your preferred responses. The answers are at the end of page 56.

1. How many times have nuclear weapons been used in warfare?
   a. 1
   b. 2
   c. 5
   d. 10
   e. 12

2. Which is the only nation to have ever developed nuclear weapons and then to have voluntarily dismantled all of them?
   a. Germany
   b. Australia
   c. Japan
   d. South Africa
   e. Argentina

3. What does the Nobel Peace Prize-winning group ICAN stand for?
   a. International Coalition for Abolishing Nuclear Weapons
   b. International Campaign to Abolish Nuclear Weapons
   c. Incident Control Against Nuclear Weapons
   d. International Calls Against Nuclear Weapons

4. The nuclear-weapons-free zone treaty for which continent entered into force in 2009?
   a. Antarctica
   b. Latin America and the Caribbean
   c. South Africa
   d. Africa
   e. Australia

5. Which of the following three countries voluntarily gave up their inherited Soviet-era nuclear arsenals in the 1990s?
   a. Belarus
   b. Georgia
   c. Kazakhstan
   d. Ukraine
   e. Uzbekistan

6. The world’s first nuclear-weapon-free zone, established in 1959, covered which geographical region?
   a. Arctic
   b. Australia
   c. Antarctica
   d. Outer space
   e. New Zealand
7. What infamous clock was created in 1947 by the board of directors of the *Bulletin of the Atomic Scientists*?
   a. Armageddon Clock
   b. Doom Clock
   c. Death Clock
   d. Doomsday Clock
   e. Countdown Clock

8. In reference to the use of nuclear weapons, what does the term ‘MAD’ stand for?
   a. Mutual accidental destruction
   b. Multiple atomic deaths
   c. Mutually assured destruction
   d. Multiple accidental detonations
   e. Massive atomic disaster

9. The explosive power of an atomic bomb is created from which of the following processes:
   a. Nuclear fusion
   b. Nuclear fission
   c. Nuclear confusion
   d. Nuclear flashpoint
   e. Nuclear reaction

10. What are the names used for the two atomic bombs dropped on the Japanese cities of Hiroshima and Nagasaki by the United States in 1945?
    a. *Smiling Buddha* (city bombed): ............................
    b. *Mini Man* (city bombed): ............................
    c. *Fat Man* (city bombed): ............................
    d. *Bad Man* (city bombed): ............................
    e. *Little Boy* (city bombed): ............................

11. On the Doomsday Clock, how many minutes is it to midnight (as at January 2018)?
    a. 1 minute
    b. 2 minutes
    c. 4 minutes
    d. 8 minutes
    e. 9 minutes

12. Which country is widely believed to be the sixth nation in the world to have successfully developed nuclear weapons, in spite of its longstanding refusal to confirm this?
    a. Iran
    b. Iraq
    c. Israel
    d. North Korea
    e. France
13. Select all nine countries which currently possess nuclear weapons.
   a. United States
   b. Iraq
   c. Russia
   d. Britain
   e. France
   f. China
   g. Iran
   h. Israel
   i. India
   j. Pakistan
   k. North Korea

14. Name all five nuclear-armed countries which are parties to the Nuclear Non-Proliferation Treaty and which have a veto power in the UN Security Council.
   a. United States
   b. India
   c. Russia
   d. Pakistan
   e. Britain
   f. France
   g. Germany
   h. China

15. Which country is the only signatory to have withdrawn from the Nuclear Non-Proliferation Treaty?
   a. United States
   b. Russia
   c. Israel
   d. North Korea
   e. South Korea

16. Respond to the following statements by circling either ‘True’ or ‘False’:
   a. There are more nuclear weapons today than at the height of the cold war. True / False
   b. Nuclear weapons are routinely used in warfare. True / False
   c. Most countries that have made nuclear weapons have now given them up. True / False
   d. The use of nuclear weapons is considered illegal under international law. True / False
   e. Several dozen countries currently possess nuclear weapons. True / False
   f. Most nuclear weapons are in the arsenals of Russia and the United States. True / False

MULTIPLE CHOICE ANSWERS

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There are two main types of nuclear weapons: atom bombs which use fission as the main reaction, i.e. the atoms are split; hydrogen bombs which use fusion as the main reaction, i.e. the atoms are fused together (Nuclear Age Peace Foundation, *Nuclear weapons: the basics*). (p.2)

A nuclear explosion produces several distinct forms of energy that have damaging effects: blast, thermal radiation, electromagnetic pulse, direct nuclear radiation and fallout. The extent of damage will depend on various factors, including the size of the nuclear weapon, the height at which it is detonated and the geography of the target (ibid). (p.3)

In August 1945, the US dropped two nuclear weapons over the Japanese cities Hiroshima and Nagasaki. At the end of 1945, more than 230,000 people had died in Hiroshima and Nagasaki due to the immediate and long-term damage of the bombs (Swedish Physicians against Nuclear Weapons, *Hiroshima and Nagasaki*). (p.8)

Seeking to prevent the nuclear weapon ranks from expanding further, the United States and other like-minded states negotiated the *Nuclear Non-proliferation Treaty* (NPT) in 1968 and the *Comprehensive Nuclear-Test-Ban Treaty* (CTBT) in 1996 (Arms Control Association, *Nuclear weapons: who has what at a glance*). (p.10)

There are a total of 9 states which are confirmed to have nuclear weapons. The 'nuclear-weapon states' are the five states – China, France, Russia, United Kingdom and the United States – officially recognised as possessing nuclear weapons by the *Nuclear Non-Proliferation Treaty*. The Non-NPT nuclear weapons possessors are India, Israel, Pakistan and North Korea (ibid). (pp. 10-11)

Belarus, Kazakhstan, and Ukraine inherited nuclear weapons following the Soviet Union’s 1991 collapse, but returned them to Russia and joined the NPT as non-nuclear-weapon states. South Africa secretly developed but subsequently dismantled its small number of nuclear warheads and also joined the NPT in 1991 (ibid). (p.12)

Iraq had an active nuclear weapons program prior to the 1991 Persian Gulf War, but was forced to verifiably dismantle it under the supervision of UN inspectors. The US-led March 2003 invasion of Iraq and subsequent capture of Iraqi leader Saddam Hussein definitively ended his regime’s pursuit of nuclear weapons. Libya voluntarily renounced its secret nuclear weapons efforts in December 2003. Argentina, Brazil, South Korea and Taiwan also shelved nuclear weapons programs (ibid). (p.12)

The number of nuclear weapons in the world has declined significantly since the Cold War: down from a peak of approximately 70,300 in 1986 to an estimated 14,200 in late-2018 (Federation of American Scientists, *Status of world nuclear forces*). (p.13)

Approximately 93 per cent of all nuclear warheads are owned by Russia and the United States who each have roughly 4,000 warheads in their military stockpiles; no other nuclear-armed state sees a need for more than a few hundred nuclear weapons for national security (ibid). (p.13)

All the nuclear weapon states continue to modernise their remaining nuclear forces and appear committed to retaining nuclear weapons for the indefinite future (ibid). (p.13)

The United States and Russia maintain roughly 1,800 of their nuclear weapons on high-alert status – ready to be launched within minutes of a warning (International Campaign to Abolish Nuclear Weapons, *Nuclear arsenals*). (p.15)

If a nuclear weapon exploded in a major city, the blast centre would be hotter than the surface of the sun; tornado-strength winds would spread the flames; and a million or more people could die. Survivors would have no electricity, no transportation, no phones – and hospitals would be overwhelmed … if they were still standing (Nuclear Threat Initiative, *The nuclear threat*). (p.20)

Today, nine countries – China, India, Israel, France, North Korea, Russia, the United Kingdom and the United States – hold nearly 16,000 nuclear weapons. That’s enough to destroy the planet hundreds of times over (ibid). (p.20)

Nuclear technology and the know-how to build a bomb is no longer a monopoly controlled by states. The threat of cyber-terrorism looms large, and experts are working furiously to keep up with cyber vulnerabilities that could be exploited by hackers to initiate a catastrophe (ibid). (p.20)

Also known as the *Nuclear Weapon Ban Treaty*, the *Treaty on the Prohibition of Nuclear Weapons* was passed on 7 July 2017, and is the first legally binding international agreement to comprehensively prohibit nuclear weapons, with the goal of leading towards their total elimination. (The Spinney Press, *Nuclear weapons treaties*). (p.31)

The *Treaty on the Prohibition of Nuclear Weapons* was adopted by 122 countries (not including Australia) in New York on July 7 2017. The document is somewhat symbolic because it remains opposed by all nuclear powers and many of their allies, including Australia (Ruff, T, *Australia must sign the prohibition on nuclear weapons: here's why*). (p.37)

Australia’s only defence against nuclear threats is ANZUS and US extended deterrence. However there is a growing body of opinion that questions the reliability of deterrence and extended deterrence. (Tilemann, J, *Nuclear weapons and Australia’s Defence White Paper*). (p.43)

Despite consecutive governments insisting they support nuclear disarmament, Australia’s reliance on Extended Nuclear Deterrence (END) means it is frustrating attempts at a total ban (Hawkins, D and Kimber, J, *Australia’s stance on nuclear deterrence leaves it on the wrong side of history*). (p.47)
Arms control
Measures (bilateral or multilateral) taken to control or reduce weapon systems or armed forces. Such limitations or reductions are typically taken to increase stability between countries, reducing the likelihood or intensity of an arms race. Arms control measures include monitoring and verification provisions, and may include provisions to increase transparency between the parties.

Ballistic missile
Missile that is lifted into space by a booster rocket and then descends toward its target in a free-falling ballistic trajectory.

Ballistic missile defence (BMD)
All active and passive measures designed to detect, identify, track and defeat incoming ballistic missiles, in both strategic and theatre tactical roles, during any portion of their flight trajectory (boost, post-boost, mid-course, or terminal phase), or to nullify or reduce their effectiveness in destroying their targets.

Conventional weapons
Weapons and military equipment, including small arms and light weapons, tanks, artillery rockets, aircraft, torpedoes, mines and cluster munitions that do not use biological agents, chemical agents, nuclear explosives, or kinetic energy weapons to damage targets.

Cruise missile
Unmanned self-propelled guided vehicle that sustains flight through aerodynamic lift for most of its flight path. There are subsonic and supersonic cruise missiles currently deployed in conventional and nuclear arsenals, while conventional hypersonic cruise missiles are currently in development. These can be launched from the air, submarines or the ground. Although they carry smaller payloads, travel at slower speeds, and are shorter range than ballistic missiles, cruise missiles can be programmed for customised flight paths and to evade missile defence systems.

Deterrence
Actions of a state or group of states to dissuade a potential adversary from initiating an attack or conflict through the credible threat of retaliation. To be effective, a deterrence strategy should demonstrate to an adversary that the costs of an attack would outweigh any potential gains. Extended deterrence is when a country protected from potential adversaries by the nuclear weapons’ backed security guarantee of an ally is said to be under a nuclear umbrella. Mutual deterrence is a condition of deterrence which exists between two adversaries.

Dismantlement
Taking apart a weapon, facility, or other item so that it is no longer functional.

Fallout
Process of the descent to the Earth’s surface of particles contaminated with radioactive material from a radioactive cloud. The term is also applied in a collective sense to the contaminated particulate matter itself.

Fissile material
Type of fissionable material capable of sustaining a chain reaction by undergoing fission upon the absorption of low-energy (or thermal) neutrons. Uranium-235, Plutonium-239, and Uranium-233 are the most prominently discussed fissile materials for peaceful and nuclear weapons purposes.

Mutually Assured Destruction (MAD)
A term originating in the Cold War, which described the deterrence relationship between the United States and the Soviet Union beginning in the 1950s. MAD assumed that both sides possessed an assured second-strike capability such that a nuclear first-strike by either side would provide no strategic advantage – because both states would suffer unacceptably high damage in the ensuing nuclear war.

Non-proliferation
Measures to prevent the spread of biological, chemical, and/or nuclear weapons and their delivery systems. See also Nuclear proliferation.

Nuclear disarmament
Refers to both the act of reducing or eliminating nuclear weapons and to the end state of a nuclear-weapons-free world, in which nuclear weapons are completely eliminated.

Nuclear weapon
Device that releases nuclear energy in an explosive manner as the result of nuclear chain reactions involving fission, or fission and fusion, of atomic nuclei. Such weapons are also sometimes referred to as atomic bombs (a fission-based weapon); or boosted fission weapons (a fission-based weapon deriving a slightly higher yield from a small fusion reaction); or hydrogen bombs/ thermonuclear weapons (a weapon deriving a significant portion of its energy from fusion reactions).

Nuclear proliferation
The spread of nuclear weapons, fissionable material, and weapons-applicable nuclear technology and information to nations not recognised as ‘nuclear-weapon states’ by the Treaty on the Non-Proliferation of Nuclear Weapons. Proliferation has been opposed by many nations with and without nuclear weapons, which fear that more countries with nuclear weapons may increase the possibility of nuclear warfare, destabilise international or regional relations, or infringe upon the national sovereignty of states.

Nuclear-Weapon-Free Zone (NWFZ)
Geographical area in which nuclear weapons may not legally be built, possessed, transferred, deployed, or tested.
Websites with further information on the topic

Arms Control Association  www.armscontrol.org
Bulletin of the Atomic Scientists  www.thebulletin.org
Department of Foreign Affairs and Trade  www.dfat.gov.au
Federation of American Scientists  https://fas.org
Greenpeace Australia Pacific  www.greenpeace.org.au
International Campaign to Abolish Nuclear Weapons (ICAN)  www.icanw.org
International Partnership for Nuclear Disarmament Verification  www.ipndv.org
International Physicians for the Prevention of Nuclear War  www.ippnw.org
Medical Association for the Prevention of War  www.mapw.org.au
Nuclear Abolition Forum  www.abolitionforum.org
Nuclear Age Peace Foundation  www.wagingpeace.org
Nuclear Threat Initiative  www.nti.org
Reaching Critical Will  www.reachingcriticalwill.org
Swedish Physicians against Nuclear Weapons  http://laromkarnvapen.se/en

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