

South Africa's Past Nuclear Weapons Programme. Onwards to a nuclear weapon free world

Prof Mary-Anne Plaatjies-van Huffel¹

1. Introduction

Thank you the Ambassador and Chairman of the Senate, Mr Tokayev, and Ambassador and Minister of Foreign Affairs Mr Idrissov and the Parliamentarians for Nuclear Disarmament and Non-Proliferation (PNND) for invitation to me as president of the World Council of Churches representing Africa to this conference “Building a Nuclear Weapon Free World”. I also wish to thank the Government of the Republic of Kazakhstan for their hospitality. It is indeed a great honour bestowed on me. In this paper I will attend to South Africa’s past nuclear weapon program, South Africa’s current nuclear activities, Legal instruments and disarmament treaties and juxtapose it with the World Council of Churches stance on nuclear disarmament. The World Council of Churches has long opposed nuclear weapons. From 1948 the WCC raised ecumenical concerns and advocates at various levels of national and international governance for nuclear disarmament, control of the spread of other weapons of mass destruction, and accountability under the international rule of law, and fulfilment of treaty obligations.²

2. South Africa’s Past Nuclear Weapon Program

According to Noel Stott, Senior Research Fellow, Institute for Security Studies (ISS) Pretoria, South Africa a great deal has been written on South Africa’s nuclear weapons programme, given that both the programme’s development and its dismantlement was conducted under a cloud of secrecy, even today, more than twenty-three years later, it is difficult to discern speculative analysis from evidential investigation in many of the written accounts. In 1949 the Atomic Energy Board came into being in South Africa.³ In the meanwhile the World Council of Churches (WCC) raises ecumenical concerns and advocates at various levels of national and international governance for nuclear disarmament, control of the spread of other weapons of mass destruction, and accountability under the international rule of law, and fulfilment of treaty obligations.⁴ For the 68 years of its existence, churches united in the WCC have challenged the arms race and been dedicated to disarmament.⁵ At its first assembly, in Amsterdam, 1948 the WCC said the indiscriminate destruction of atomic weapons and "the part which war plays in our present international life is a sin against God and a degradation of man ... the discovery of atomic and other new weapons renders widespread and indiscriminate destruction inherent in the whole conduct of modern war."⁶ Already in the mid-1950s, the WCC noted that true peace cannot rest on fear. The WCC therefore called for a new international order with the elimination and prohibition of nuclear weapons and a mechanism of effective international inspections and control.

The Apartheid regime had been oblivious to these calls. Instead in apartheid South Africa the development of the nuclear industry was associated with national security.⁷ The citizens of South

¹ Prof Mary-Anne Plaatjies-van Huffel teaches Church Polity and Ecclesiology at the University of Stellenbosch, She is the holder of two PhD’s : one in Systematic Theology and one in Church Polity. South Africa. She is also the president of the World Council of Churches from Africa.

² *Nuclear arms control. Churches engaged for nuclear arms control.* <http://www.oikoumene.org/en/what-we-do/nuclear-arms-control> (Retrieved 12 July 2016.)

³ Fig. David. 2005. *Uranium Road: Questioning South Africa’s Nuclear direction.* Jacana Media: Johannesburg. 2005:39.

⁴ Kobia , Samuel, 2006. Presentation of the WMDC’s Final Report 2006:1

<https://www.oikoumene.org/en/resources/documents/commissions/international-affairs/peace-and-disarmament/nuclear-weapons/presentation-of-the-wmdcs-final-report> (Retrieved 12 July 2016.)

⁵ The Ninth Assembly, meeting in Porto Alegre, Brasil, 14-23 February 2006:1(Retrieved 12 July 2016.)

⁶ C.f. *The WCC concern for nuclear disarmament and non-proliferation* Presentation by Peter Weiderud, Director, CCIA, at the Advocacy Days of the churches in the United States, Washington D.C., March 12, 2005.

<https://www.oikoumene.org/en/resources/documents/commissions/international-affairs/peace-and-disarmament/nuclear-weapons/the-wcc-concern-for-nuclear-disarmament-and-non-proliferation> *WCC Minute on elimination of nuclear arms 23 February 2006.* <http://www.oikoumene.org/en/resources/documents/assembly/2006-porto-alegre/1-statements-documents-adopted/international-affairs/report-from-the-public-issues-committee/nuclear-arms> (Retrieved 12 July 2016.).

⁷ Already in the 1980s the WCC called all nuclear powers to freeze testing, production and deployment of nuclear weapons and reduce all nuclear weapons stocks.

Africa did not know anything about the nuclear weapons program of the government.⁸ South Africa's nuclear energy programme grew out of its quest for the atomic bomb.⁹ The nuclear industry in South Africa played a huge role in creating nuclear weapons of mass destruction to defend the apartheid regime. In 1970 Voster stressed that the enriched uranium was for peaceful purposes. One should however always keep in mind that the more so called peaceful nuclear energy proliferates, the higher the risk that this technology will be applied to weapons. During 1974 Vorster authorized funding for work on nuclear device and preparation of test site in the Kalahari Desert. Soviet Union and United States detected preparations for the nuclear test and pressured South Africa into abandoning the test.¹⁰

Apartheid politicians and scientist used isiZulu to name the sites where these bombs were produced namely Penlindaba (the end of the matter) and Valindaba (close the matter). At the end of the 1990 the Atomic Energy Cooperation of SA (AEC) set up a secret pilot enrichment plant the plant at the site called Valindaba. However most of the plant enrichment activities were dedicated to weapons instead for the power program.¹¹ The government halted its nuclear weapons program in 1989 and dismantled existing weapons and production equipment. South Africa had built six air-deliverable nuclear weapons of the "gun-type" design.¹² Each of the six nuclear devices contained 55 kilograms of highly enriched uranium (HEU).¹³ South Africa possessed enough HEU for a seventh weapon, but this weapon was never completed.

On February 26, 1990, President Frederik Willem de Klerk ordered the destruction of the six completed nuclear weapons and the seventh partially completed device.¹⁴ South Africa unilaterally disarmed its nuclear arsenal. When the enrichment process was closed down in the 1990 Valindaba facility was closed down and decontaminated.¹⁵ Destruction of many of the major non-nuclear components of the weapons, detailed design drawings, and photos of components began in 1992. The space-launch vehicle (SLV) program was abandoned in 1993. President de Klerk announced to South Africa's Parliament on March 24, 1993 the existence and abandonment of the former nuclear weapons program.¹⁶ By March 24, 1993, when de Klerk announced the program's existence, most of the classified documents had been shredded and the sensitive weapon components destroyed or damaged beyond repair. Destruction of less important components continued into 1994.¹⁷ According to David Fig approximately 12 000 documents on the nuclear program of South Africa had been destroyed in the process. International Atomic Energy Agency (IAEA) inspections between April and August 1993 confirmed the complete dismantlement of the nuclear weapons program.¹⁸ South Africa unilateral dismantled in the 90s a fully mature nuclear arsenal and should be applauded for this courageous step. As Stott says: "The manner in which South Africa dismantled its weapons, joined the Treaty on the Non-proliferation of Nuclear Weapons (NPT), accepted comprehensive safeguards on all its nuclear material and co-operated fully with the International Atomic Energy Agency (IAEA) in its

⁸ Fig, 2005:13,

⁹ Fig, 2005:9.

¹⁰ C.f. Horton, Roy E. 1999. *Out Of (South) Africa: Pretoria's Nuclear Weapons Experience*. <http://www.usafa.edu> (Retrieved 12 July 2016). 1999:17.

¹¹ Fig. 2005:42.

¹² Horton, Roy E. 1999. *Out Of (South) Africa: Pretoria's Nuclear Weapons Experience*, <http://www.usafa.edu> (Retrieved 12 July 2016).

¹³ NPT Non-nuclear Weapon State Formerly Possessed Nuclear Weapons August 14, 2015. <http://nti.org/3388A>

¹⁴ Already at the fourth Assembly of the WCC in Uppsala in 1968 the WCC urged the churches to insist that it is the first duty of governments to prevent such a war, to halt the present arms race, agree never to initiate the use of nuclear weapons, stop experiments concerned with and production of mass destruction... and move away from the balance of terror towards disarmament

¹⁵ Fig 2005:31.

¹⁶ Albright David 1998. *South Africa's Secret Nuclear Weapons*, Institute for Science and International Security, 1 May 1994, <http://www.isis-online.org> (Retrieved 12 July 2016).

¹⁷ Albright David 1998. *South Africa's Secret Nuclear Weapons*, Institute for Science and International Security, 1 May 1994, <http://www.isis-online.org> (Retrieved 12 July 2016).

¹⁸ NPT Non-nuclear Weapon State Formerly Possessed Nuclear Weapons August 14, 2015. <http://nti.org/3388A> (Retrieved 12 July 2016)

investigation of the abandoned nuclear weapons programme may serve as a useful future model.”¹⁹ However not much had been done thus far to inform the citizens of South Africa about South Africa’s nuclear disarmament program as well as the ethical imperatives for nuclear disarmament and the urgency of achieving and maintaining a nuclear-weapons-free world.²⁰

3. Current Nuclear activities

The South African Nuclear Energy Corporation (NECSA) was established as a public company in terms of the Nuclear Energy Act, 1999 (Act No. 46 of 1999) and is wholly owned by the State. The main functions of NECSA are to undertake and promote research and development in the field of nuclear energy and radiation sciences and technology; to process source material, special nuclear material and restricted material and to co-operate with persons in matters falling within these functions. Apart from its main operations at Pelindaba, including the SAFARI research reactor, NECSA. The Vaalputs National Radioactive Waste Disposal Facility is presently licensed to receive low & intermediate radioactive waste.²¹ High level radioactive waste is being stored at both Koeberg and Pelindaba. Two mechanisms (Dry and Wet storage) are currently in use in South Africa. At the Koeberg facility used fuel is currently stored in authorised used fuel pools on the site as well as in casks designed and constructed for storage of used fuel. There is enough storage capacity for the current operational lifetime of Koeberg. The used fuel from SAFARI Research Reactor is currently stored at an authorised dry storage facility on the Pelindaba site as well as in the Reactor Pool.²² The Pebble Bed Modular Reactor (Pty) Limited Company is developing a fuel manufacturing plant and a demonstration high temperature gas cooled reactor, which is a low power output reactor designed toward meeting Generation IV requirements, applicable to both electricity generation and process heat applications.²³ Regarding the issue of uranium conversion the *Nuclear Energy Policy for the Republic of South Africa June 2008* makes provision that the government, through NECSA, shall undertake and lead the development of uranium conversion capabilities as part of the beneficiation of uranium. Private sector participation in the conversion process will be promoted. Regarding the issue of uranium enrichment South Africa’s enrichment plant was shut down in the 1990’s and subsequently dismantled. Although there is presently no uranium enrichment infrastructure or economically proven technological capabilities in South Africa, the Government’s intention is to investigate the re-establishment of a uranium enrichment capacity as part of uranium beneficiation for peaceful purposes. *Government, through NECSA, shall investigate the viability of developing its own uranium enrichment capabilities and will simultaneously actively seek to obtain access to establish uranium enrichment programmes to ensure security of supply.*²⁴ The *Nuclear Energy Policy for the Republic of South Africa* makes also provision for the health implication of nuclear waste for future generations.

4. Legal frameworks: Disarmament and Treaty Commitments

South Africa continues to fulfil all its multilateral obligations and commitments under the relevant international non-proliferation instruments. (*Nuclear Energy Policy for the Republic of South Africa June 2008*:20). The South African legislative framework on nuclear energy dates back to 1948, when the predecessor of the present South African Nuclear Energy Corporation (NECSA), namely the Atomic Energy Board (AEB), was established in terms of the provisions of the Atomic Energy Act.²⁵

¹⁹ Stott, Noel 2016. *National prohibition and Nuclear-weapons-free zones: Geography of a sustainable world: Understanding South Africa's Past Nuclear Weapons Programme* presentation at International Conference: Building a Nuclear-Weapon-Free World Astana, Kazakhstan - 28-29 August 2016.

²⁰ *Ethical Imperatives For A Nuclear-Weapons-Free World 2015*. (Retrieved 12 July 2016.).

²¹ *Nuclear Energy Policy For The Republic Of South Africa June 2008*. Department Of Minerals And Energy 2008:13.

²² *Nuclear Energy Policy 2008*:26.

²³ *Ibid.*, 14.

²⁴ *Ibid.*, 14

²⁵ C.f. Horton, Roy E. 1999. *Out Of (South) Africa: Pretoria's Nuclear Weapons Experience* INSS; *South African National Report On The Compliance To Obligations Under The Joint Convention On Safety Of Spent Fuel Management And On The Safety Of Radioactive Waste Management Third Report 2014*. (Retrieved 12 July 2016.)

On July 10, 1991, South Africa became a member of the Nuclear Non-Proliferation Treaty (NPT).²⁶ Hence on nuclear activities in SA took place within the framework of the NPT and other international obligations and commitments *inter alia* Comprehensive Safeguards Agreement with the International Atomic Energy Agency (IAEA) and an Additional Protocol. As of 2015 South Africa still possessed approximately 185 lbs. of HEU in a central facility under IAEA safeguards.²⁷ The NPT is the cornerstone in the international work for nuclear disarmament and non-proliferation. In the NPT, the five recognized nuclear weapons states in 1968 committed themselves not to share this plague and to disarm and ultimately eliminate their arsenals. In return, all other state parties agreed not to obtain nuclear weapons, and to open themselves for inspections.²⁸ The WCC rightly stated in 2001 that the global threat posed by the existence of nuclear weapons did not disappear with the end of the Cold War that the post-Cold War opportunity to make major advances toward the elimination of nuclear weapons is being lost due to the failure of states to honor their unambiguous obligations under the Nuclear Non-Proliferation Treaty (NPT) and the undertakings solemnly agreed to in the May 2000 NPT Review Conference.²⁹ The NPT affords the WCC an opportunity to reinvigorate nuclear disarmament commitments and efforts. The NPT Review Conference 2001, adopted by consensus, incorporated a substantive set of principles and measures to guide future nuclear disarmament activities. These included "an unequivocal undertaking by the nuclear weapon states to accomplish the total elimination of their nuclear arsenals" (though without specifying when that might be accomplished), and support for a number of interim steps such as "concrete agreed measures to further reduce the operational status of nuclear weapons systems" (commonly known as "de-alerting"), and "a diminishing role for nuclear weapons in security policies to minimize the risk that these weapons ever be used and to facilitate the process of their total elimination." The WCC reiterates its deep and long-standing concern at the continued risk to creation posed by the existence of nuclear weapons, calls upon the member states of NATO and NATO itself to ensure that their nuclear weapons policies conform to the obligations undertaken by states in the Non-Proliferation Treaty and are consistent with pursuit of the global nuclear disarmament agenda, and in particular: to affirm NATO's support for the rapid global elimination of nuclear weapons and to commit the Alliance to take programmatic action to advance this goal; to commit NATO to reducing the alert status of nuclear weapons possessed by NATO members, and to pursuing effective arrangements for the rapid de-alerting of all nuclear weapons possessed by all states; and to renounce the first-use of nuclear weapons by any NATO member under any circumstances, and to commit NATO to the pursuit of equivalent commitments from other states possessing nuclear weapons; encourages the member states of NATO and NATO itself to provide greater transparency and public access to NATO's decision-making processes on nuclear weapons issues. The Executive Committee of the World Council of Churches, meeting in Geneva from 17-20 February, 2004, affirmed that the only ultimate protection against nuclear weapons is their total elimination.³⁰

On 11 April 1996 South Africa joined with other African nations to sign the Treaty of Pelindaba to create a Nuclear Free Zone on the African continent. On 24 September 1996 South Africa signed the Comprehensive Nuclear Test Ban Treaty (CTBT) ratified in 1999).³¹ South Africa is a member of the New Agenda Coalition in support of a nuclear weapons free world.³²

²⁶ *Treaty on the Non-Proliferation of Nuclear Weapons*, United Nations Office for Disarmament Affairs, <http://www.disarmament.un.org> (Retrieved 12 July 2016.).

²⁷ NPT Non-nuclear Weapon State Formerly Possessed Nuclear Weapons August 14, 2015. <http://nti.org/3388A> (Retrieved 12 July 2016.)

²⁸ *The WCC concern for nuclear disarmament and non-proliferation* . by Peter Weiderud, (Retrieved 12 July 2016.).

²⁹ *Statement on Nuclear Disarmament" of the WCC Central Committee (29 January - 6 February 2001*. (Retrieved 12 July 2016.).

³⁰ *The Nuclear Non-Proliferation Treaty (NPT) 20 February 2004 Statement by the WCC Executive Committee, Geneva, 17-20 February, 2004* (Retrieved 12 July 2016.).

³¹ Comprehensive Nuclear Test Ban Treaty Organization, <http://www.ctbto.org> (Retrieved 12 July 2016.).

³² C.f. *Advancing Nuclear Non-Proliferation And Disarmament, And Securing The Entry Into Force Of The Comprehensive Nuclear-Test-Ban Treaty: The Role Of Parliaments Resolution adopted by consensus * by the 120th IPU Assembly (Addis Ababa, 10 April 2009)*. Already in the 1960s, the WCC urged governments "never to contemplate first use of nuclear weapons" and to "move away from a balance of terror". Between 1954 and 1961 the Commission of the Churches on International Affairs spoke and worked intensively on the need for an international instrument to control nuclear testing. At the New Delhi Assembly in 1961 the churches called for both no-first use and nuclear arms-free zones: *Christians must*

In 2005 the government accepted a *Radioactive Waste Management Policy and Strategy for the Republic of South Africa*. Before 2005 radioactive waste in South Africa had been managed without a common framework. The premise of the SA government is that that all nuclear resources of South Africa are a national asset and the heritage of its entire people, and should be managed and developed for the benefit of present and future generations in the country as a whole. Radioactive waste contains materials that emit ionising radiation, which has been recognised as a potential hazard to human health since the beginning of the 20th century. Radioactive waste is produced during the operational and decommissioning phases of facilities associated with the following activities.³³ As Stott say: *It is our hope that the South African case will go some way to achieving further steps needed to rid the world of nuclear weapons and prevent others from seeking them and how those like Kazakhstan and South Africa who gave up these weapons now play global leadership role in disarmament and non-proliferation matters.* The Republic of South Africa acceded to the *Joint Convention on the Safety of Spent Fuel Management and on the Safety of Radioactive Waste Management* (Joint Convention) on 15 November 2006, and South Africa's obligations under the convention entered into force on 13 February 2007.³⁴ The International Atomic Energy Agency (IAEA) developed a comprehensive set of principles for the safe management of radioactive waste. These basic principles are applicable to all countries parties to the IAEA and applied to all types of radioactive waste, regardless of its physical and chemical characteristics or origin. According to Stott another reason for looking at the South African case is to examine the future role of the IAEA in the verification of dismantlement given that in our view nuclear disarmament will need to be done multilaterally, South Africa as a member state of the IAEA should adhere to these principles which entails the following:

- i. *Protection of Human Health:* Radioactive waste shall be managed in such a way as to secure an acceptable level of protection for human health.
- ii. *Protection of the Environment:* Radioactive waste shall be managed in such a way as to provide an acceptable level of protection of the environment.
- iii. *Protection beyond National Borders:* Radioactive waste shall be managed in such a way as to assure that possible effects on human health and the environment beyond national borders will be taken into account.
- iv. *Protection of Future Generations:* Radioactive waste shall be managed in such a way that predicted impacts on the health of future generations will not be greater than relevant levels of impact that are acceptable today.
- v. *Burden on Future Generations:* Radioactive waste shall be managed in such a way that will not impose undue burdens on future generations.
- vi. *National Legal Framework:* Radioactive waste shall be managed within an appropriate national legal framework, including clear allocation of responsibilities and provision for independent regulatory functions.
- vii. *Control of Radioactive Waste Generation:* Generation of radioactive waste shall be kept to the minimum practicable.
- viii. *Radioactive Waste Generation and Management Interdependencies:* Interdependencies among all steps in radioactive waste generation and management shall be appropriately taken into account.
- ix. *Safety of Facilities:* The safety of facilities for radioactive waste management shall be appropriately assured during their lifetime. Radioactive waste is managed in SA under such Authority as provided for in the Nuclear Energy Act, 1999 (Act No. 46 of 1999), the National Environmental Management Act, 1998 (Act No. 107 of 1998) (NEMA) Act and the National Nuclear Regulatory Act, 1999 (Act No. 47 of 1999).³⁵

press most urgently upon their governments, as a first step towards the elimination of nuclear weapons, never to get themselves into a position in which they contemplate the first use of nuclear weapons. Total disarmament is the goal, but it is a complex and long-term process in which the churches must not underestimate the importance of first steps. There maybe possibilities of experimenting with limited geographical areas...of neutralizing certain zones. (The WCC concern for nuclear disarmament and non-proliferation 12 March 2005 Presentation by Peter Weiderud, Director, CCIA, at the Advocacy Days of the churches in the United States, Washington D.C., March 12, 2005) (Retrieved 12 July 2016.).

³³ *Radioactive Waste Management Policy And Strategy For The Republic Of South Africa* 2005:7(Retrieved 12 July 2016.).

³⁴ *Radioactive Waste Management Policy* 2005:1. (Retrieved 12 July 2016.).

³⁵ C,F, *Radioactive Waste Management Policy And Strategy For The Republic Of South Africa* 2005 [Department Of Minerals And Energy](#); (Retrieved 12 July 2016.) *South African National Report On The Compliance To Obligations Under The Joint Convention On Safety Of Spent Fuel Management And On The Safety Of Radioactive Waste Management Third Report 2014.* (Retrieved 12 July 2016.)

Other secondary legislation that govern nuclear energy related matters are the Hazardous Substances Act, 1973 (Act No. 15 of 1973), the Non- Proliferation of Weapons of Mass Destruction Act, 1993 (Act No. 87 of 1993), the Mine Health & Safety Act (Act No. 29 of 1996), the Mineral and Petroleum Resources Development Act, (Act No. 28 of 2002), the National Environmental Management Act (Act No. 107 of 1998), the National Water Act (Act No. 36 of 1998), the Electricity Regulation Act, 2006 (Act No. 4 of 2006) and the National Energy Regulator Act, 2004 (Act No. 40 of 2004).

South Africa tabled a resolution at the United Nations General Assembly 2015 called the *Ethical Imperatives for a Nuclear-Weapons-Free World*.³⁶ South Africa calls for the complete elimination of nuclear weapons on ethical grounds and moral principles. The proposal driven by South Africa had been approved unanimously by member states. Amongst others the resolution stresses that all States share an ethical responsibility to act with urgency and determination in cooperation with all relevant stakeholders to take the effective measures necessary to eliminate and prohibit all nuclear weapons, including legally-binding measures, given their catastrophic humanitarian consequences and associated risks.³⁷ The resolution tabled by South Africa crush any arguments for possessing and relying on nuclear weapons and move discussing from the unacceptability of any use of nuclear weapons and the risk they pose to the ethical and moral grounds for the prohibition and elimination nuclear weapons.³⁸ The resolution for the complete elimination of nuclear weapons on ethical grounds and moral principles, the dismantling of the nuclear weapon program of South Africa as well as the vision for a nuclear-weapon-free world should be highlighted in South Africa in the same vain as in Kazakhstan.

5. Concern for nuclear disarmament and non-proliferation

The following call should be made to states and civil society:

- 5.1. Urges States to pursue the unequivocal elimination of nuclear weapons under the terms of the Nuclear Non-Proliferation Treaty and to uphold and strengthen the multilateral framework for disarmament and non-proliferation.
- 5.2. Urges States to abandon all uranium enrichment and plutonium extraction efforts and to halt to all nuclear weapons research and development on ethical and moral grounds.
- 5.3. Encourages civil society to continue to monitor nuclear weapons issues and developments;
- 5.4. Calls on civil society to renew their witness for peace and disarmament through education, public awareness building and advocacy to overcome the continuing threat of nuclear weapons
- 5.5. Urges civil society to continue research and public advocacy in support of the objective of eliminating nuclear weapons on ethical and moral grounds.

We should say loud and clear: ***Nuclear weapons do not and cannot guarantee our security.***

³⁶ *Ethical Imperatives For A Nuclear-Weapons-Free World 2015*. (Retrieved 12 July 2016.)

³⁷ *Ethical Imperatives For A Nuclear-Weapons-Free World* (Retrieved 12 July 2016.).

³⁸ South Africa tables resolution on ethical imperatives to prohibit and eliminate nuclear weapons <http://www.icanw.org/campaign-news/south-africa-tables-resolution-on-the-ethical-imperatives-to-prohibit-and-eliminate-nuclear-weapons/> (Retrieved 12 July 2016.).

³⁸ *Ethical Imperatives For A Nuclear-Weapons-Free World* (Retrieved 12 July 2016.).

³⁸ South Africa tables resolution on ethical <http://www.icanw.org/campaign-news/south-africa-tables-resolution-on-the-ethical-imperatives-to-prohibit-and-eliminate-nuclear-weapons/> (Retrieved 12 July 2016.).