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Minimizing and eliminating highly enriched uranium in civilian stocks and use

Working paper submitted by the Netherlands, Norway and the Republic of Korea

Summary

Nuclear disarmament and non-proliferation cannot be viewed in isolation from nuclear security. Efforts to minimize and eventually eliminate stocks of highly enriched uranium are a form of permanent threat reduction and a fundamental element in our shared efforts to strengthen nuclear security. This working paper highlights efforts undertaken in the review cycle leading up to the tenth Review Conference of the Parties to the Treaty on the Non-Proliferation of Nuclear Weapons. It further emphasizes the need to continue to share experiences, enabling future removal activities to gain from the experience of those already accomplished.

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Introduction

1. In the Final Document of the 2010 Review Conference of the Parties to the Treaty on the Non-Proliferation of Nuclear Weapons, the Conference welcomed "the efforts by State parties on a voluntary basis to minimize the use of highly enriched uranium in the civilian sector" and furthermore adopted action 61 to "encourage States concerned, on a voluntary basis, to further minimize highly enriched uranium in civilian stocks and use, where technically and economically feasible".[1]

2. Fully acknowledging the right of all States parties to peaceful uses, we emphasize that measures to enhance nuclear security are a common good that increase public confidence and facilitate international cooperation and the promotion of the peaceful uses of nuclear energy.

On nuclear security

3. Nuclear disarmament and non-proliferation cannot be viewed in isolation from nuclear security. Efforts to reduce stocks of highly enriched uranium and to minimize and eventually eliminate the use of highly enriched uranium are a form of permanent threat reduction and a fundamental element in our shared efforts to strengthen nuclear security.

4. The constantly evolving threat of nuclear and radiological terrorism and the risk of the acquisition of materials by non-State actors highlight a need for measures to identify and address new and evolving challenges and threats to the security of nuclear and radioactive material and related facilities.

5. High-level attention has been focused on the threat of nuclear terrorism through a series of Nuclear Security Summits, the last of which was held in 2016. Minimization of the use of highly enriched uranium was established as a key nuclear security goal.

6. The International Atomic Energy Agency (IAEA) has a key role in supporting countries to minimize the use of highly enriched uranium. Upon request by Member States, IAEA can support their efforts to this end. Further minimization requires sustained technical, financial and political commitment. International cooperation is crucial.

7. We also recognize the fundamental role and efforts of the United Nations, in particular Security Council resolution 1540 (2004) and its key role in responding to any use or threat of use by non-State actors.

8. We emphasize the importance for all States, in particular those with nuclear facilities, to become parties to all conventions and agreements relevant to nuclear safety and security, and to support the further development, as necessary, of legally binding instruments to ensure a better global safety and security framework.

On international efforts

9. Most countries and regions of the world today are free of highly enriched uranium. During the tenth review cycle, concerted international efforts have made the regions of South America and South-East Asia free of highly enriched uranium, while

[1] *2010 Review Conference of the Parties to the Treaty on the Non-Proliferation of Nuclear Weapons, Final Document*, vol. I NPT/CONF.2010/50 (Vol.I).

in Africa all facilities requiring highly enriched uranium for their continued operation have been successfully removed.

10. IAEA has played a significant role in supporting international highly enriched uranium minimization efforts for more than 20 years.

11. Countries across the globe have worked with the People's Republic of China, the Russian Federation and the United States of America to repatriate highly enriched uranium to the country of origin or to downblend it in-country. Together, these repatriation programmes have succeeded in removing or confirming the disposition of more than 7,100 kg of highly enriched uranium.

12. The conversion of the miniature neutron source reactor prototype at the China Institute of Atomic Energy in 2016 and the GHARR-1 miniature neutron source reactor in Ghana in 2017 clearly demonstrated the steps necessary to convert remaining miniature neutron source reactors,[2] which were subsequently applied to the NIRR-1 in Nigeria in 2018.

13. Nearly all Russian-supplied research reactors outside of Russia have been converted to low enriched uranium. The WWR-K reactor in Kazakhstan was converted to run on low enriched uranium fuel in 2016. Future cooperation efforts will be needed to advance the conversion of the remaining research reactors.

14. In a collaborative effort, Argentina and the United States of America were able to eliminate Argentina's remaining highly enriched uranium in 2016. The United States of America is currently working on a Mobile-Melt Consolidate concept that allows for the downblending of highly enriched uranium without significant transportation of the nuclear material itself. The application of this system is intended for demonstration in Norway.

15. Many countries are still facing the challenge of how best to manage their inventories of irradiated highly enriched uranium or other waste containing highly enriched uranium. Countries, such as Argentina (recovery, purification and downblending), Canada (target residue material repatriation) and Indonesia (downblending) have been able to deal with their waste inventories. Other countries still have significant highly enriched uranium inventories coming from radioisotope production, reactor operations or research and development, which have yet to be addressed.

16. With the ultimate goal of minimizing and eliminating the use of highly enriched uranium in civilian applications, multilateral cooperation on high-density low enriched uranium fuel development among Belgium, France, Germany, the Republic of Korea and the United States of America has yielded positive results. These and other ongoing efforts, along with continued international cooperation, are necessary to ensure an acceptable performance of new low enriched uranium fuels for high-performance research reactors.

17. There are political, economic and technical challenges that need to be overcome in order to make further progress on eliminating excess highly enriched uranium around the world.

18. To further minimize highly enriched uranium stocks and to further minimize their use, States should consider, inter alia, converting radioisotope production to low enriched uranium fuel and targets or using other non-highly enriched uranium technologies, taking into account the need for an assured and reliable supply of medical isotopes.

[2] Ghana Research Reactor-1 (GHARR-1); Nigeria Research Reactor-1 (NIRR-1).

Recommendations

19. We welcome efforts by States parties to minimize and eliminate the use of highly enriched uranium in the civilian sector.

20. To keep up the momentum, we must continue to share experiences, take stock of status and provide updates on the progress made. States may consider aligning with existing mechanisms, inter alia, the Joint Statement on Strengthening Nuclear Security Implementation (INFCIRC/869), and subscribing to and implementing the reporting mechanism provided for in the Joint Statement on Minimising and Eliminating the Use of Highly Enriched Uranium in Civilian Applications (INFCIRC/912).[3]

21. Future removal activities must utilize the experience gained from those already accomplished. In some cases, further technological developments and funding will be required to succeed. Many facilities have yet to be converted to low enriched uranium. Inventories arising from these new conversions will have to be addressed.

22. States parties should continue ongoing efforts and encourage international cooperation and new commitments to minimize and eliminate highly enriched uranium in civilian stocks and use.

[3] International Atomic Energy Agency, Joint Statement on Strengthening Nuclear Security Implementation, available at www.iaea.org/sites/default/files/publications/documents/infcircs/infcirc869.pdf; and Joint Statement on Minimising and Eliminating the Use of Highly Enriched Uranium in Civilian Applications, available at www.iaea.org/sites/default/files/publications/documents/infcircs/2017/infcirc912.pdf.