RUSSIA'S NATIONAL PERSPECTIVE IN PROMOTING NUCLEAR SECURITY[1]

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An Overview Of The State Of Affairs

Russia as a country possessing one of the largest stockpiles of fissile materials and nuclear warheads in the world attaches great importance to enhancing the systems of their protection, control and accounting (MPC&A). Such improvements are designed to keep these sensitive items secured within the facilities that are authorized to contain them and constitute the "First Line of Defense" against nuclear smuggling, which could lead to nuclear proliferation and/or nuclear terrorism. At the same time as a part of a multi-layered in depth strategy the notion of "Second Line of Defense" was introduced with the view of expanding capabilities of the Russian border protection enforcement authorities to detect and interdict illicit nuclear trafficking over national borders. In addition to these security measures actions were undertaken to reduce the volume of excess weapon grade nuclear materials by converting them into peaceful usage.

In the course of the last two decades huge efforts were undertaken by the Russian Federation to improve the regime of nuclear security on its territory and the results obtained thereupon are spectacular indeed.

At the present time there are no nuclear materials or facilities in Russia the level of protection of which gives concern[3]. In Russia all nuclear materials, their storage sites and associate facilities as well as transportation of nuclear material are protected by relevant security measures at least at the levels recommended by the IAEA in INFCIRC/225/Rev. 5.

Nuclear material accounting for and control of its physical inventory and the effectiveness of physical protection are inspected regularly by the competent security authorities and the nuclear energy regulatory bodies. Work is constantly being carried out on developing and updating regulatory acts in the field of MPC&A taking into account the accumulated national experience and the practice of other States and international organizations including IAEA. In particular, a new version of the federal norms and regulations "The basic rules of accounting for and control of nuclear materials" was approved in 2012.

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[1] A presentation at the XIX Edoardo Amaldi Conference on International Cooperation for Enhancing Nuclear Security, Safety, Safeguards and Non-Proliferation (Rome, Italy, March 30-31).

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[3] Nuclear Security Summit 2014, The Hague, Memorandum of the Russian Federation http://www.nss2014.com/sites/default/files/documents/russian_federation.pdf

One has to acknowledge that the implementation of most of the above mentioned measures in promoting nuclear security in Russia was considerably facilitated by a large-scale US assistance under the so called Nunn-Lugar Cooperative Threat Reduction program launched in 1993. It played an important role especially during the difficult period of transition of Russia to the free market economy in the nineties. With the consolidation of the Russian economy later on the Russian contribution was becoming more tangible and it has been already fixed in the 2015 budget that these activities will be fully financed by the State from now on.

It would be fair to note that the decision by the American side to invest several hundred millions dollars into enhancement of the Russian nuclear security infrastructure apparently was not motivated by charity reasons but may be considered as a purely pragmatic preventive act: mitigation of consequences of sensitive nuclear material's eventual leakage (not to speak about nuclear explosive devices) could cost incomparably more to American budget. For the sake of objectivity one has also to recognize that such a bilateral cooperation was beneficial to Russia as well since it allowed to scale up the pace of national MPC&A systems modernization.

Russia is a party to all major international legal instruments in the field of nuclear security including the Convention on the Physical Protection of Nuclear Material and its 2005 Amendment as well as the Global Initiative to Combat Nuclear Terrorism (GICNT). In September 2012 demonstration exercises "Guardian-2012" on countering nuclear terrorism were conducted in the Moscow region under the auspices of GICNT. Experts from more than 50 countries attended the event. Upon the initiative of the Russian federation a regular meeting of the Nuclear Forensic International Working Group was held in Saint Petersburg in 2013 with participation of the leading experts from five continents.

Russia supports IAEA activities in the sphere of nuclear security, welcomes the Nuclear Security Plan 2014-2017 of the Agency and is paying voluntary contributions to the IAEA Nuclear Security Fund since 2010.

Great importance is also attached to cooperation with the third countries in helping them to start using nuclear energy for peaceful purposes under appropriate nuclear security regulations. In practical terms this means in particular organizing for students from these countries regular courses and workshops on MPC&A at two Russian training institutions (at Obninsk, Kaluga region and at Tomsk in Siberia). Russian experts are also actively engaged in developing and improving the IAEA international instruments on nuclear security and holding the IAEA training courses in the field.

Security has been upgraded at civilian and military nuclear sites throughout the Russian Federation
(source : "Out of Harm's Way," LLNL publication, S&TR December 2007, https://str.llnl.gov/str/Dec07/pdfs/12.07.1.pdf).

First Line Of Defense

From the picture[4] composed at the Laurence Livermore National Laboratory on the basis of experience accumulated during many years of interaction of four US National laboratories (including Los Alamos, Oak Ridge and Sandia) with Russian partners one can comprehend the scope of activities in the field of MPC&A enhancement during last years. It shows that about 90 Russian nuclear sites became subject to modernization measures.

Under an executive agreement between the Russian Ministry of Defense and the US Department of Energy signed in 2001 upgrading of MPC&A systems has been carried out at Russian Navy sites in the Far East and at the Kola Peninsula (11 submarine nuclear fuel storages and 39 nuclear warheads depositories), Strategic Rocket Forces (25 nuclear warheads storages) and at the MOD 12-th main Directorate, responsible for maintenance of Russian nuclear arsenal (9 sites)[5]. In addition to that two Technical Centers were established for training of maintenance staff.

Under another executive agreement between the Russian Ministry for Atomic Energy and the DOE signed in 1999 security and accounting upgrades were accomplished at more than 200 buildings containing highly enriched uranium or plutonium and belonging in particular to such establishments as Kurchatov National Research Center, Mayak Production Association (The Urals region), Defense nuclear research centers at Snezhinsk and Sarov.[6]

In all these projects Russian facilities were equipped with electronic seals and tamper-indicating devices, modern alarm fences, electronic access control systems, vehicle inspection facilities, alarm control and display consoles, accounting and control systems[7].

Second Line of Defense

US-Russian project "Second Line of Defense" got its official status in 1998 after the signature of a Protocol by the State Customs Committee of Russia and the US Department of Energy. In the course of the follow up consultations an agreement was reached that the US side would render financial assistance in equipping Russian border crossing points with radiation monitoring hardware which would be produced in the Russian Federation in accordance with the Russian and American standards.

It is important to note that by this time successful joint tests of a Russian nuclear materials detecting stationary system "Amber" (designed and produced by a scien-

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[4] "Out of Harm's Way," LLNL publication, S&TR December 2007, https://str.llnl.gov/str/Dec07/pdfs/12.07.1.pdf

[5] Information received from S. Hecker, Senior Fellow at the Center for International Security and Cooperation at Stanford University.

[6] M.Bunn and M.Malin " Advancing Nuclear Security: Evaluating Progress and security and Setting New Goals" p.25, Belfer Center for Science and International Affairs, Harvard Kennedy School of Business, 2014.

[7] LLNL publication "Out of Harm's Way," S&TR, December 2007

tific center in the Moscow region) were carried out at Los Alamos National Laboratory.

Due to the common US-Russian effort in the "Second Line of Defense" project with the equal sharing of financial burden it became possible to equip 200 Russian border crossing points with radiation monitoring hardware. The total number of "Amber" systems of different modifications installed exceeds six thousand. Noteworthy is the fact that the number of the yearly recorded cases of illicit trafficking of nuclear and radioactive materials over the Russian borders has increased hundredfold since the beginning of the Project.[8]

The type of radioactive monitoring system used at Russian borders is actively introduced in other countries. "Amber" systems have been installed at the post-Soviet area (in Armenia, Kazakhstan, Uzbekistan, Ukraine) as well as in Austria, Qatar, Lebanon, South Africa. After successful testing of the system at the IAEA in 1997-2000 they are actively used in different countries within the framework of the international program for the assessment of nuclear materials illicit trafficking threat.

Reducing The Bulk Of Weapon Grade Materials

1) HEU-LEU Deal

Under the terms of the US-Russian agreement (signed in 1993) on disposition of highly enriched uranium (HEU) extracted from Russian nuclear weapons Russia undertook to down-blend over a 20-year period 500 tons of HEU, enough to build 20 thousand nuclear warheads. The two sides agreed that the resulting low-enriched uranium (LEU) would be used as fuel by nuclear power plants in the United States, hence the informal name of the deal, "Megatons to Megawatts."

The deal contributed significantly to the enhancement of nuclear security of Russian sensitive material due to substantial reduction of its stocks. At the same time the agreement was beneficial to both countries from economic point of view.

The economic importance of the HEU-LEU arrangement for the USA can be illustrated by the fact that during 20 years about 10 percent of the US electricity was generated from the Russian enriched uranium. The overall Russian revenue from the deal amounted to $17 billion, which was used to finance programs to safety at Russian nuclear plants, convert closed nuclear cities to peaceful uses and clean up radioactively contaminated areas.

2) Plutonium Reactors Shutdown

Opposite to uranium, which is found in nature, plutonium is an artificial element obtained by irradiation of U-238 isotope in specially designed plutonium production reactors.

[8] N. Kravchenko "On the history of the Russian Customs radioactive materials monitoring system" (in Russian), Nuclear Club Quarterly N1 (8), January-February, 2011.

In the heyday of the Cold War the USA operated 14 such installations and Russia-13. By 1993 all American plutonium reactors were shutdown but three Russian ones – two in Seversk (Tomsk region) and one in Zheleznogorsk (Krasnoyarsk region) – still remained in operation producing annually about 1.5 tons of weapon grade plutonium enough to make up to 300 nukes. This material had to be accumulated at local storage facilities since the Russian Ministry of Defense did not need it any more.

But these reactors could not be shut down because simultaneously with the production of plutonium they have been the primary source of heat and electric power to the surrounding cities located in a bitterly cold Siberian region where no equivalent utility sources existed.

In 2003 a US-Russian agreement was signed allocating American assistance for the construction of replacement facilities, which would provide heat and electricity currently produced by plutonium reactors. Subsequently two contracts for $460 million were awarded to two US companies to carry out this work.[9]

In 2008 a refurbishment of a coal fired plant in Seversk was completed and two plutonium production reactors were pulled from the grid. The Zheleznogorsk reactor was switched off in 2010 after the completion of the replacement coal plant. The weapon grade plutonium accumulated so far at these two sites is slated to be converted into mixed oxide (MOX) fuel to be burned in Russian fast neutron reactors in accordance with the terms of the US-Russian agreement on disposition of excess military plutonium.

3) Repatriation Of Russian Research Reactors HEU Fuel

In 2002 the Russian Federation, the USA and IAEA launched a joint program of return to Russia of Soviet or Russian-supplied HEU fuel currently used at foreign research reactors.

Trilateral discussions in Vienna have identified more than 20 such reactors in 17 countries most of which use at least some HEU fuel and have stocks of both fresh and irradiated fuel.

The goal the program was to provide financial, technical and organizational support to Russia in accepting the return of fresh and spent HEU fuel and in developing new fuels that will allow conversion of such reactors to LEU.

So far all fuel has been removed from nine countries and partly – from five states. Overall since the beginning of the program 790 kg of fresh and 1270 kg of spent HEU fuel have been returned from 14 countries.[10] All this material is being stored at Russian special depositories awaiting reprocessing.

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[9] "U.S., Russia Agree to Step Toward Closing Plutonium Reactors, DOE Press Release," 18 July 2003, http://www.globalsecurity.org/wmd/library/news/russia/2003/russia-030718-usia01.htm

[10] Nuclear Security Summit 2014, The Hague, Memorandum of the Russian Federation http://www.nss2014.com/sites/default/files/documents/russian_federation.pdf

An assessment of six research reactors located in Russia has been conducted and the technical possibility of their conversion to LEU fuel was confirmed. At present efforts are concentrated on developing and certifying a new high-density LEU fuel for conversion of HEU research reactors at Kurchatov National Research Center and at Tomsk University.

Conclusion

This paper is in no way an attempt to present a farfetched idealized picture of the state of affairs in the sphere of nuclear security in Russia and the quoted above data from independent sources testify that this was not the case. In particular a report from the renowned Belfer Center for Science and International Affairs at Harvard University states that "Russia have dramatically improved nuclear security and accountability in the last two decades" (figuratively speaking, night and day difference in the level of MPC&A systems of yesterday and today). [11]

Notwithstanding such a positive assessment there is a clear understanding in Russia that there remains much work to be done, especially in the field of sustainability i.e. in maintaining and continually improving the effectiveness of MPC&A systems for decades to come.

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[11] M. Bunn, M. Malin, "Advancing nuclear security: Evaluating progress and setting new goals," p.24.