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Annual Report to Congress
on the Safety and Security of Russian
Nuclear Facilities and Military Forces

2011 Report

Scope Note

Congress has directed the Director of National Intelligence (DNI) to submit to the Congressional leadership and intelligence committees an annual, unclassified report assessing the safety and security of the nuclear facilities and military forces in Russia. Congress has requested that each report include a discussion of the following:

- The ability of the Russian Government to maintain its nuclear military forces.
- The security arrangements at Russia's civilian and military nuclear facilities.
- The reliability of controls and safety systems at Russia's civilian nuclear facilities.
- The reliability of command and control systems and procedures of the nuclear military forces in Russia.

This report is the tenth responding to this Congressional request. The report addresses facilities and forces of the Russian Ministry of Defense, the Russian State Corporation for Atomic Energy (Rosatom, formerly the Federal Atomic Energy Agency), and other Russian institutes.

This paper has been prepared under the auspices of the National Intelligence Officer for Weapons of Mass Destruction and Proliferation. Comments or questions should be directed to the DNI's Office of Legislative Affairs on 202-201-1161.

Key Points

The United States continues to work cooperatively with Moscow to increase the safety and security of nuclear-related facilities, infrastructure, and personnel. Russia is upgrading its physical, procedural, and technical measures to secure its *nuclear weapons and materials* against both external and internal threats. Russia's nuclear security has improved over the last several years, but risks remain—particularly vulnerabilities to a determined insider who attempts unauthorized actions as well as to external attacks by potential terrorists.

- An unauthorized launch or accidental use of a Russian nuclear weapon is highly unlikely, as long as current technical and procedural safeguards built into the command and control system remain in place and are effectively enforced.

Russian facilities housing *weapons-usable nuclear material* vary from small research facilities to large fuel cycle facilities and to those involved with nuclear weapons research, development, and production. Small research facilities usually have smaller, static inventories of weapons-usable nuclear material and are easier to secure, whereas large material processing facilities have larger, varying inventories that are more difficult to account for and much harder to secure.

US-funded security upgrades at nuclear facilities, agreed to under the 2005 Bratislava Nuclear Security Initiative, were completed, and additional work is underway. A joint statement by Presidents Medvedev and Obama during the July 2009 US-Russia summit reconfirmed the two nations' commitment to work together on nuclear security issues.

- At the US-hosted Nuclear Security Summit in April 2010, Moscow also signed the Protocol to the 2000 Plutonium Management and Disposition Agreement, announced its intention to shut down the last plutonium-producing reactor in Zheleznogorsk, and noted its plans to continue repatriating fresh and spent highly-enriched uranium (HEU) from Russian-designed research reactors in third countries.

Russia's nuclear material protection, control, and accounting (MPC&A) practices have been slowly improving over the last several years, but vulnerabilities remain. Russian refusal to give US personnel access to the Serial Production Enterprises, where some post-assembly and pre-disassembly warheads are temporarily stored, has precluded US efforts to provide security assistance to those sites. It is also unclear whether Russia will sustain US-provided security upgrades when US assistance is completed because of the overall commitment level and cost, and the technical sophistication of some of the equipment involved.

We assess that undetected smuggling of weapons-usable nuclear material has occurred, but we do not know the total amount of material that has been diverted or stolen since the dissolution of the Soviet Union. We judge it highly unlikely that Russian authorities have been able to recover all of the stolen material.

Russia is taking steps to prevent—or at least mitigate the consequences of—a major accident at one of its nuclear power plants, and to thwart acts of terrorism at such facilities. Russian nuclear officials conducted safety-related tests at all do

mestic nuclear power plants following the accident in March 2011 at Japan's Fukushima Daiichi plant. In June, they announced plans to allocate approximately \$530 million for a safety upgrade program.

- Russia regularly conducts exercises designed to deal with the aftermath of an accident at a nuclear power plant, and has held numerous anti-terrorism exercises at such facilities over the years—including one at the Novovoronezh nuclear power plant in April 2011.
- Even with increased security, however, Russian nuclear power plants—like most nuclear power plants worldwide—almost certainly will remain vulnerable to a well-planned and well-executed terrorist attack. Although such an attack could cause significant damage or radiological release, it would not result in theft of nuclear material.

Discussion

The United States continues to work cooperatively with Moscow to increase the safety and security of nuclear-related facilities, infrastructure, and personnel. The Russian Ministry of Defense (MOD) is responsible for the nuclear military forces and their nuclear weapons storage system. The Russian State Corporation for Atomic Energy (Rosatom)^a operates the national nuclear weapons complex, conducts weapons-related tests at the MOD nuclear test site, and controls most nuclear-related institutes and industrial facilities. Rosatom and Rosenergoatom, a state-owned nuclear power company, operate Russia's nuclear power reactors.

Increased US-Russia cooperation on security enhancements followed the February 2005 Bratislava summit between then-Presidents Bush and Putin. In the Joint Statement following the summit, the presidents declared that the United States and Russia bear a special responsibility for the security of nuclear weapons and fissile material to ensure such weapons or materials do not fall into terrorists' hands.

- US-funded security upgrades at nuclear facilities, agreed to under the Bratislava Initiative, have been completed, though some additional work is scheduled to continue.

^a The Russian Ministry of Atomic Energy (Minatom) became the Federal Atomic Energy Agency in 2004. In accordance with a federal law signed in December 2007, the agency has been transformed into the Russian State Corporation for Atomic Energy (Rosatom).

A joint statement by Presidents Medvedev and Obama during the July 2009 US-Russia summit reconfirmed the two nations' commitment to work together on nuclear security issues.

- At the US-hosted Nuclear Security Summit in April 2010, Moscow signed the Protocol to the 2000 Plutonium Management and Disposition Agreement, announced its intention to shut down the last plutonium-producing reactor in Zheleznogorsk, and noted its plans to continue repatriating fresh and spent highly-enriched uranium (HEU) from Russian-designed research reactors in third countries. In addition, Moscow pledged at the Summit to contribute \$6.5 million to the International Atomic Energy Agency's Nuclear Security Fund between 2010 and 2015, a move initially announced by the Russian Ambassador to the United Nations in November 2009, according to Russian press reports.

However, it is unclear whether Russia will sustain US-provided security upgrades when US assistance ends because of the overall commitment level and cost, and the technical sophistication of some of the equipment involved.

Ministry of Defense

Nuclear Weapons Inventory

On its own and with US assistance, Russia is upgrading its physical, procedural, and technical measures to secure its weapons against both external and internal threats. Nonetheless, the inventory potentially remains vulnerable to an insider who attempts unauthorized actions and to terrorist attacks.

- An unauthorized launch or accidental use of a Russian nuclear weapon is highly unlikely as long as current technical and procedural safeguards built into the command and control system remain in place and are effectively enforced. Our concerns about possible circumvention of the system would rise if central political authority broke down.

Since the dissolution of the Soviet Union, Moscow has consolidated the former Soviet stockpile into storage sites in Russia. Russian officials stated that thousands of nuclear warheads from the former Soviet stockpile were dismantled since 1991; reportedly over 10,000 warheads were eliminated. Moscow relies on nuclear weapons as a primary means of deterrence, however, and will continue to have thousands of nuclear warheads in its inventory for the foreseeable future.

The Russian Government has repeatedly indicated its determination to maintain a nuclear arsenal sufficient to deter a massive strategic nuclear attack, and nonstrategic nuclear weapons to deter or respond to a large-scale conventional attack. Russian nuclear forces benefit from increased overall defense spending, which has facilitated increases in training, stabilized the personnel system, and allowed slow but steady progress on modernization programs. Problems remain, including rising procurement costs and a weakened defense industrial base, which might complicate or slow Moscow's modernization efforts.

- The New START Treaty will limit Russian strategic nuclear forces after seven years to 1,550 deployed strategic nuclear warheads. Presently, Moscow maintains several thousand nonstrategic nuclear warheads and deployed strategic nuclear warheads on its ICBMs, strategic

submarines, and long-range bomber forces.

- In accordance with a 1991 unilateral pledge, Moscow consolidated most of its nonstrategic nuclear warheads in central depots and eliminated a major portion of them. Russian authorities have provided no official figures for the size of its nonstrategic nuclear weapons stockpile, assessed to be the largest in the world. The Russians instead refer to percentage reductions in the stockpile since the end of the Cold War. Further, the Russian Government has not confirmed that it eliminated all nuclear weapons for the ground forces, a key element of the 1991 presidential nuclear initiatives.

The Defense Ministry's 12th Main Directorate (GUMO) is responsible for the physical protection and safety of nuclear weapons. Specialists from the 12th GUMO carry out all maintenance work in close collaboration with warhead designers. The 12th GUMO also is responsible for nuclear warhead shipments throughout Russia.

- All nuclear weapons storage sites fall under the 12th GUMO's responsibility, thus facilitating a uniform policy in matters of operation and physical security.
- In peacetime, all nuclear munitions except those on deployed ICBMs and SLBMs are stored in nuclear weapons storage sites.
- The 12th GUMO employs a multi-layered approach that includes physical, procedural, and technical measures to secure their weapons.

Since the break-up of the Soviet Union, Russian officials have consistently refuted allegations in the press that terrorists could have acquired Russian nuclear weapons or

material and emphasized their dedication to the physical protection of nuclear materials. Of note during the past decade:

- Former Minister of Atomic Energy Yevgeniy Adamov in October 2002 stated, "Neither Bin Ladin nor anyone else could steal a nuclear warhead from anywhere in the former Soviet Union. During my time as minister, I carried out a comprehensive stock-taking of everything we had and had had, and traced the history of all the warheads ever produced. So, everything there was on the territories of the former USSR republics was returned to Russia. ...Nothing was stolen from us. So, neither Bin Ladin, nor Iraq, nor Iran could make use of these explosive devices."
- The Russian Ministry of Foreign Affairs issued a statement sharply rejecting comments by the US Secretary of Defense in October 2008 about the possibility that some Russian nuclear mines and artillery shells from the 1990s were unaccounted for, calling such claims absolutely unfounded. In preparation for the Nuclear Security Summit in Washington DC in April 2010, Russian presidential aide Sergey Prihodko issued a statement stressing the significance of Russia becoming a global leader in efficient national nuclear security systems, stating that "Russia provides relevant physical protection to nuclear material. Russia adheres to international commitments in that sphere and understands that nations are responsible for physical protection of nuclear material within their borders."

Russia previously reported that terrorists have targeted its nuclear weapons storage sites. According to the then-chief of the 12th

GUMO, Igor Valynkin, Russian authorities twice thwarted terrorist efforts to reconnoiter nuclear weapons storage sites in the early 2000s, preventing access to the sites. His successor, Vladimir Verkhovstev, in September 2007 also denied that any unauthorized personnel have gained access to nuclear weapons storage sites, but disputed previous claims of terrorist reconnaissance. Verkhovstev said that during the course of the investigation of Valynkin's allegations, it emerged that terrorists were not involved—only mushroom foragers.

Rosatom

Nuclear Materials Security

Russian facilities housing *weapons-usable nuclear material* include small research facilities, large fuel cycle facilities, and facilities involved in nuclear weapons research, development, and production. Small research facilities usually have smaller, static inventories of weapons-usable nuclear material, which are easier to secure; large fuel fabrication facilities have larger, varying inventories that are more difficult to account for and much harder to secure. All, regardless of inventory size, are vulnerable to insider theft.

Weapons-Usable Nuclear Material

Weapons-Usable Nuclear Material (WUNM) is material that can be used to produce a nuclear yield without the need for further isotopic alteration. WUNM includes uranium with a 20 percent or greater uranium-235 (U235) or uranium-233 (U233) content (defined as highly enriched uranium or HEU) and plutonium with less than an 80 percent plutonium-238 (PU238) content.

With US assistance, Russia's nuclear material protection, control, and accounting (MPC&A) practices have been slowly improving over the last several years, but vulnerabilities remain.

- Russian refusal to give US personnel access to the Serial Production Enterprises, where some post-assembly and pre-disassembly warheads are temporarily stored, has precluded US efforts to provide security assistance to those sites.
- Similar to personnel at other Russian military units, Ministry of Internal Affairs (MVD) guards at Russian nuclear facilities remain vulnerable to suicides and discipline problems, including hazing and accidental shootings.

The Federal Service for Environmental, Technological, and Nuclear Oversight—known as Rostekhnadzor (RTN)—acquired its independent status in June 2010, but it is unclear what effect, if any, this will have on nuclear material security. Following accidents at the Sayano-Shushenskaya hydroelectric power plant in August 2009 and the Rospadskaya coal mine in May 2010,

President Dmitriy Medvedev on 23 June 2010 issued a decree making RTN directly subordinate to the Russian Government rather than the Ministry of Natural Resources and Ecology. RTN's authority was also reportedly expanded—including the creation of a specialized mining oversight directorate—but it is unclear whether the nuclear portion of the organization has also gained power and resources. Former First Deputy Minister of Atomic Energy Valentin Ivanov in September 2008 claimed that RTN had an inadequate budget and few specialists.

Nuclear Smuggling

Russia's vast stockpile of nuclear material, scattered across multiple facilities, continues to present an attractive theft target. Security of this material has improved since the fall of the Soviet Union, but we lack information on the extent of recent thefts, and vulnerabilities remain. Probable Russian-origin weapons-usable nuclear material has continued to circulate on the black market. For example, a sting operation in 2006 caught a Russian citizen attempting to sell approximately 100 grams of HEU on Georgian territory. An Armenian citizen carrying approximately 170 grams of HEU that was allegedly obtained in Russia was arrested on Georgian territory in 2003 and was also implicated as the supplier of 18 grams of HEU seized in March 2010 in Georgia.

- The Georgian cases suggest that Russian authorities have been unable to recover all the material stolen since the fall of the Soviet Union.

There have been other press reports about materials seized in Russia, but we have no further information because Russia typically does not reveal the results of its investigations. Initial press reports, however, sometimes mischaracterize stolen material by

saying or implying that depleted, natural, or low-enriched uranium is weapons-grade or weapons-usable material, further complicating efforts to scope the problem.^b

We assess that undetected smuggling has occurred, and we do not know the total amount of material that has been diverted since the dissolution of the Soviet Union.

Safety and Security at Russian Civilian Nuclear Power Plants

Western assistance has been improving the safety systems and operating procedures at Soviet-designed nuclear reactors. However, inherent design deficiencies in RBMK and older model VVER reactors will prevent those reactors from ever meeting Western safety standards.

- The most notable design flaw in these reactors is the lack of a Western-style containment structure to prevent the release of fission products in the event of a serious accident.
- Russia's 11 operating RBMK-1000 reactors are scheduled to be shut down before 2030, and Rosatom has no plans to build additional RBMK units.

Russia is taking steps to prevent—or at least mitigate the consequences of—a major accident at one of its nuclear power plants, and to thwart acts of terrorism at such facilities. Russian nuclear officials conducted safety-related tests at all domestic nuclear power plants following the accident in March 2011 at Japan's Fukushima Daiichi plant and in June announced plans to allocate approximately \$530 million for a safety upgrade program.

- Russia regularly conducts exercises designed to deal with the aftermath of an accident at a nuclear power plant, and has held numerous anti-terrorism exercises at such facilities over the years—including one at the Novovoronezh nuclear power plant in April 2011.
- Rosatom head Sergey Kiriyenko claimed in October 2007 that, "There are no better protected facilities in the country [than nuclear power stations], at least not in the civilian sector."
- Even with increased security, however, Russian nuclear power plants—like most such plants worldwide—almost certainly will remain vulnerable to a well-planned and well-executed terrorist attack. Such an attack could cause significant damage or even a radiological release, but would not result in the theft of nuclear material.

^b In contrast, thefts of non-fissionable radiological material, particularly containers of such radionuclides as cesium-137, cobalt-60, or strontium-90, have been frequent and well documented. Although terrorists could use these radionuclides to build a radiological dispersal device—designed to disperse radioactive material to cause injury and contamination by means of the radiation—we assess that in the majority of these cases thieves were seeking the metal used in the containers shielding the radioisotopes rather than the radioisotopes themselves.