Russia

In April 2009, Russian President Dmitry Medvedev and U.S. President Barack Obama issued a joint statement committing their "two countries to achieving a nuclear free world". The attitude of Russia's government toward achieving this goal was outlined by Russian Foreign Minister Sergei Lavrov at a Plenary Meeting of the Conference on Disarmament in Geneva on March 7, 2009:[265]

> "Russia appreciates the focus of these initiatives on solving global security issues on a multilateral basis and is willing to positively contribute to their consideration.
>
> "However, progress towards 'global zero' can only be achieved through strengthened strategic stability and strict adherence to the principle of equal security for all. In its turn this suggests the need to carry out a set of measures required for a sustainable and consistent disarmament process. Among such measures:
>
> - advancement of nuclear disarmament by all nuclear-weapon states, with their 'gradual' engagement in efforts already being undertaken by Russia and the United States;
> - to prevent weaponization of outer space;
> - to prevent operational deployment of conventionally tipped strategic offensive weapons, i.e. the building of the so-called 'compensatory' potential;
> - to ensure that states do not possess a 'nuclear upload' potential;
> - to prevent attempts aimed at using membership of the nuclear Nonproliferation Treaty to implement military nuclear programs; and
> - to ensure verifiable cessation of conventional capabilities' development coupled with efforts to resolve other international issues, including settlement of regional conflicts…"

The Russian Foreign Minister also underscored the importance of limiting strategic defenses, saying:

> "I would like to draw particular attention to the relationship between offensive and defensive arms. Real progress in nuclear disarmament cannot be achieved in a situation where unilateral efforts to develop strategic ABM [Anti-Ballistic Missile] systems undermine this relationship. This is fraught with erosion of strategic stability and disbalancing of the system of checks and balances that ensures global parity."

Russia's Ambassador to the United States, Sergei Kislyak, characterized the complexity of the issues to be resolved in moving towards eliminating nuclear weapons:[266]

> "in order to achieve this goal, a lot of things need to be done. Certainly the lower you go, the more complex the situation becomes, I think for the United States, and that would definitely be important to Russia. It is important that if we go down, we need to be sure that nuclear weapons are not going to appear in other countries. You need to work toward increasing the guarantees of nonproliferation at first. Secondly, we need to have all others on board. Third, while we are moving toward this goal, we need to know what are the components of security to be assured? It is complex. It is a very, very complex goal, but it is a noble goal. We can work toward this goal. It has always been our commitment in the nuclear Nonproliferation Treaty."

Below, we analyze in more detail the views of Russian decision makers on the role of nuclear weapons in the international security regime and on the conditions necessary for their elimination.

Role of nuclear weapons in Russia's national security

On February 5, 2010, President Medvedev approved a new military doctrine for Russia. It reserves the right to use nuclear weapons in response to the use of nuclear and other types of weapons of mass destruction against it and (or) its allies, and also in the event of aggression against the Russian Federation involving the use of conventional weapons when the very existence of the state is under threat.[267]

While the new Russian military doctrine limits the scope of the use of nuclear weapons, the prevailing view in Russia's political-military leadership is that nuclear weapons play a key role in ensuring Russia's security. This is because Russia's general-purpose forces continue to degrade as a result of the deep economic crisis and the incompetent reforms of the 1990s. The relative weakness in Russia's conventional forces is likely to persist for the next 15 to 20 years. The main reason is Russia's limited ability to equip its military with modern weapons at a time when the United States and other leading powers are integrating information technologies and high-precision weapons into their militaries.[268] To some extent, possession of nuclear weapons allows Russia to delay the costly process of equipping its military with such systems until its economic situation improves.

Russia's leadership regards a large-scale conflict with the United States or NATO as extremely unlikely. At the same time, the new Russian military doctrine identifies NATO expansion as a major danger that might evolve into a threat to national security.

Russia's armed forces are considerably inferior to those of NATO, which has three to four times the quantity of conventional arms of Russia. NATO's qualitative superiority is even more significant. With the incorporation of the Central and East European states, NATO's armed forces are within range of Russia.[269] Since there are well-grounded doubts that Russia's general-purpose forces could deter such potential threats, reliance on nuclear weapons seems to be the logical alternative.

Some Russian experts also believe that the importance of non-strategic nuclear weapons is growing because of Russia's geo-strategic position and an increased threat of regional conflicts involving the use of weapons of mass destruction.[270] In particular, there is a widely shared opinion that, in case of a large-scale military conflict between the Russian Federation and China, Russia would not today be able to guarantee the security of its Far East without nuclear weapons. Given the rapid growth in China's economic and military capabilities and the rising imbalance in populations in the frontier territories, the situation will get worse for the next 20 to 30 years.

Russia's views on further cuts in nuclear weapons

As evidenced by the 2010 New START agreement with the United States, Russia's government is willing to make further cuts in its nuclear arms.[271] Going into the negotiations, Russia sought a treaty that treats both sides equally and respected Russia's security concerns. Its position has been that such a treaty should be legally binding and should limit not only warheads, but also strategic delivery systems: intercontinental ballistic missiles (ICBMs), submarine launched ballistic missiles (SLBMs) and heavy (long-range) bombers. Russia insists on limiting delivery means because, unlike Russia, the United States did not eliminate its excess strategic launchers under the 2002 Strategic Offensive Reductions Treaty (SORT). This left the United States with the ability to relatively quickly re-deploy its deactivated nuclear forces.

Over the past few years, Russia has also become concerned about the growing counterforce capability of *conventional* strategic weapons.[272] These concerns increased after the U.S. Department of Defense decided to develop the capability for a "Prompt Global Strike" with precision-guided conventionally-armed land and submarine based ballistic missiles. Russia also insists on banning possible deployment of strategic offensive arms on the territories of other nations. Finally Russia made it clear that its willingness to conduct further reductions will strongly depend on setting up limits on ballistic missile defenses. Russia views the 2001 U.S. abrogation of the ABM Treaty and plans to deploy missile defenses in Europe as potentially harmful to Russian security.[273]

Preliminary analysis of the New START agreement shows that some of Russia's demands have been taken into consideration. In particular, the United States has agreed to limit strategic delivery vehicles and their launchers as well as strategic warheads. However, a more careful investigation of the documents signed in Prague suggests that Russia is unlikely to achieve many of its objectives.[274] This fact, in turn, could create obstacles for involving Russia into the next round of negotiations on nuclear weapons reduction.

Limits on the U.S. upload potential. U.S. ability to quickly build up its number of deployed nuclear weapons (upload potential) has been long a major concern of opponents of the START and START-II agreements in Russia. Analysis of New START suggests that the U.S. will retain such a capability. Moreover, the recently released U.S. Nuclear

Posture Review considers such a capability as important, claiming it offers a "*technical hedge against any future problems with U.S. delivery systems or warheads, or as a result of a fundamental deterioration of the security environment…*"[275]

The New START sets the following limits:

a) 700, for deployed ICBMs, deployed SLBMs and deployed heavy bombers;

b) 1550, for warheads on deployed ICBMs, warheads on deployed SLBMs and nuclear warheads counted for deployed heavy bombers;

c) 800, for deployed and non-deployed ICBM launchers, deployed and non-deployed SLBM launchers and deployed and non-deployed heavy bombers.

According to the START data exchange, as of July 1, 2009, the United States had 5916 warheads on 1188 deployed strategic delivery vehicles: 550 deployed ICBMs and their associated launchers, 432 deployed SLBMs and their associated launchers, and 206 deployed heavy bombers. New START will count all of these systems. However, in contrast to the existing START agreement, the new treaty counts actually deployed warheads for ICBMs and SLBMs (START counted the maximum number of warheads assigned to each type of strategic missile). The new Treaty counts heavy bombers equipped for nuclear armaments as one deployed warhead each, though the actual number of weapons carried by a bomber can be up to 20.[276] Finally, the new Treaty has relatively "relaxed" provisions for excluding items from being counted, that allows reconstitution of the force over the period from a few days to several months.

In particular, a possible configuration of future U.S. strategic force could consist of 400 deployed Minuteman-3 ICBMs carrying one warhead each, 264 deployed Trident SLBMs carrying four warheads each and 36 deployed heavy bombers. Such a force would be counted as 1492 warheads, which is below the level permitted by New START. At the same time the United States would retain a capability to upload up to 2540 nuclear warheads (800 on Minuteman-3, 1056 on Tridents and up to 684 on bombers), if need be. Moreover, the remaining 58 B-2 and B-52H heavy bombers,[277] as well as some B-1Bs could be converted back to nuclear missions relatively rapidly, significantly contributing to the numbers above. Thus, the new Treaty does not achieve the Russian goal of setting any limit on "upload potential." Also, the new counting rules generate doubts that Russia and the United States are really going to reduce their nuclear forces.

Limits on U.S. conventionally-armed strategic delivery vehicles. During New START negotiations Russia raised a concern that the United States is going to deploy some of its excess strategic ballistic missiles with precision guided conventional warheads. Such missiles, unless limited, could be used to attack Russia's strategic launchers. The existing START agreement does limit such conventionally-armed missiles because it does not differentiate between nuclear or conventionally armed strategic ballistic missiles. All ICBMs and SLBMs count toward its limits. Like the old treaty, New START limits deployed ICBMs and SLBMs regardless of the types of weapons they carry. However, unlike old START, the new treaty permits deployment of soft-site launchers, that are not accounted as "deployed" or "non-deployed" launchers. Thus, if the U.S. decides to deploy conventionally armed ICBMs at soft sites, such systems would not be limited.

The new U.S. Nuclear Posture Review proposes to eliminate nuclear long range sea launched cruise missiles (SLCMs), but many Russian experts are concerned about the growing counterforce capability of conventional SLCMs.[278] In particular, Trident submarines converted to long range sea-launched cruise missile (SLCM) carriers are con-

sidered as a potential threat to the Russian ICBM force. As in old START, the new Treaty counts the four submarines that the United States has converted so far. At the same time the New START has provisions allowing excluding these submarines from counting by demonstrating that the launchers of converted submarines are incapable of launching SLBMs. Thus, in fact, the new treaty does not limit conventional SLCMs either.

Finally, New START excludes from counting the heavy bombers that are not equipped for nuclear armaments.

Limits on U.S. strategic ballistic missile defense. Russia put significant effort into including a provision on the interrelationship of strategic offensive and strategic defensive arms. It is well known that all previous U.S.-Soviet (Russian) strategic arms control agreements were linked with the 1972 ABM Treaty. The United States abrogated the ABM Treaty in 2002, and Russia had a legal right to withdraw from START, but choose not to do so. Perhaps, the Russian negotiators also hoped to get commitments from the United States to limit its ballistic missile defenses. The Obama administration however, refused to make ballistic missile defenses a bargaining chip in the New START talks.

The new treaty states the relationship between strategic offensive and strategic defensive arms in its preamble. In addition, the parties' obligation is laid down not to convert and not to use ICBM launchers and SLBM launchers to contain missile-interceptors, and vice versa. However, the United States declared that the new treaty "does not contain any constraints on testing, development or deployment of current or planned U.S. missile defense programs."[279] Russia, in its turn, stated that the new treaty "can operate and be viable only if the United States of America refrains from developing its missile defense capabilities quantitatively or qualitatively" and "the exceptional circumstances referred to in Article 14 of the Treaty include increasing the capabilities of the United States of America's missile defense system in such a way that threatens the potential of the strategic nuclear forces of the Russian Federation."[280] The United States does not consider the Russian statement as legally binding and a part of the Treaty, as the Russian side probably expected.[281]

Non-strategic nuclear weapons. Reductions of non-strategic nuclear weapons too have been excluded from the negotiations of New START.[282] The attitude of the Russian government regarding possible steps on reducing non-strategic nuclear weapons has not changed significantly in recent years.[283] Russia's position is that, prior to the beginning of any negotiations on mutual reduction of Russian and US non-strategic nuclear weapons, all nuclear weapons should be withdrawn from foreign territories. That means withdrawal of U.S. bombs from NATO bases in Europe.

Russia also plans to insist that the nuclear arms of the UK and France be taken into account in any future discussion on non-strategic weapons. President Sarkozy's decision to have France rejoin the NATO command will most likely harden Moscow's position. Another linkage in Russia's position on non-strategic nuclear weapons is to conventional arms. The future of negotiations on reductions of non-strategic nuclear weapons will therefore be closely related with the development of the Russian-NATO dialogue that was cut short after the August 2008 events in Georgia. It also will depend on prospects for the Adapted Treaty on Conventional Forces in Europe, that was signed in 1999 but has still not come into force because of NATO concerns about Russian deployments in Georgia and Moldovia.[284] Finally, any unilateral step by NATO to enlarge its membership by including Georgia or Ukraine would block a dialogue on non-strategic nuclear weapons for the indefinite future.

Though Russia's official statements frequently state that, at some point, other nuclear states will have to join the nuclear disarmament process, the requirement on when China would have to join has never been explicitly formulated. If negotiations on non-strategic nuclear weapons are launched, however, Russia might raise one more condition for their successful conclusion: that China join the ban on ground-to-ground intermediate and shorter range ballistic missiles in the 1987 Russia-U.S. Intermediate Nuclear Forces Treaty.

Russia's fissile-material stocks

Russia has huge stocks of fissile materials but has never officially released information on how much HEU and weapon-grade plutonium it produced. Estimates by non-governmental analysts, which are highly uncertain, suggest that, when the Soviet Union collapsed, Russia possessed something in the range of 1270 tons of highly enriched uranium (HEU) and over 120 tons of weapons-grade plutonium, including the material in the warheads that were repatriated from the Ukraine, Kazakhstan and Belarus after the Soviet Union collapsed.

As of mid-2009, Russia had an estimated 850±300 tons of unirradiated HEU and 145±25 tons of weapon-grade plutonium.[285] In the mid-1990s, as a contribution to making its nuclear weapon reductions irreversible, Russia declared 500 tons of weapon-grade HEU and 34 tons of weapons-grade plutonium excess for weapons purposes. Under the Russian-U.S. HEU Purchase agreement, the 500 tons of excess weapons HEU is being blended down at a rate of 30 tons per year to 4–5% U-235 and shipped to the U.S. Enrichment Corporation (USEC) for making power-reactor fuel. This contract is accompanied by a transparency protocol to assure the United States that it is indeed weapon-grade uranium that is being blended down. As of the end of-2009, 382 tons had been blended down.[286] Russia's excess weapon-grade plutonium is to be mixed with uranium and mostly used to fuel the fast-neutron BN-600 reactor and the under construction BN-800 power reactor.

While Russia is annually providing declarations to the IAEA of its stock of separated civilian plutonium, Rosatom, which is responsible for all of Russia's nuclear activities — both military and civilian—and Russia's Ministry of Defense both oppose declarations of stocks of nuclear materials in weapons or designated for weapons. Both these agencies believe that this would be counter-productive because such declarations could not be verified and therefore would not enhance confidence. Any attempt to verify such declarations indirectly through reconstruction of past production and disposition would require an enormous effort to examine records and physical evidence from several decades of large-scale activities. In private conversations, the governmental officials have also argued that the declaration of stocks would be counterproductive to achieving agreement on a Fissile Material Cutoff Treaty because the information would fuel efforts by some countries to add to the Treaty limits on fissile material stocks produced by the nuclear weapon states before the treaty entered into force.

In the mid-1990s, Russia expressed a readiness to consider exchanges among nuclear-weapon states of information on the quantities and storage locations of fissile materials released in the process of dismantlement of excess nuclear weapons. It also was willing to consider subjecting these materials under IAEA monitoring.[287] Since 2000, however, this idea has not reappeared in Russia's nuclear-arms reduction proposals.

Further reductions in HEU stocks

There is no public indication that Russia has set specific requirements for the quantities of weapon-grade fissile materials it needs for its arsenal and for future naval-reactor use. That makes it difficult to estimate how much additional HEU and weapons plutonium might be declared excess as a result of further reductions in Russia's warhead stocks. But, the New START agreement to reduce their stocks of deployed strategic nuclear warheads to 1550 each, could free up hundreds of tons of additional material for disposition.

It is unlikely that Russia will continue any version of the U.S.-Russian HEU Purchase Agreement after it expires in 2013.[288] With a growing economy and greatly increased federal funding for the nuclear sector, Russia does not need the revenue from the HEU deal in the way it did in the early 1990s. Moreover, the current deal is less profitable for Russia than marketing enrichment services commercially.

Several options could be considered for reducing Russia's stockpile of excess HEU other than continuation of the HEU deal in its current form. Russia could use blended-down HEU to fuel some of the reactors it plans to build in its ambitious plan for expansion of nuclear power in Russia and abroad. Indeed, some Russian nuclear-energy experts have expressed concern that, without LEU blended down from Russia's excess HEU, limited uranium production in Russia could constrain Russia's nuclear development. If global demand for low-enriched uranium is high enough, Russia might also blend excess HEU down to LEU and sell it on the international market—i.e., no longer through an exclusive deal with USEC—to supplement new-production enrichment.

Reductions in plutonium stocks

Russia has always seen its excess plutonium as an asset that should be used to produce energy. In the Russian-U.S. plutonium-disposition agreement of 2000, each side committed to eliminate 34 tons of weapon plutonium. Russia's plan was that 14.5 tons of its excess plutonium would be used to fuel the BN-600 fast-neutron reactor and the rest as mixed-oxide (MOX uranium-plutonium) fuel in VVER-1000 light-water reactors.

Because the use of MOX fuel in light-water reactors was not part of its strategy of nuclear power development, Russia took the view that, if other countries want Russia to burn excess weapons plutonium in this way, they should pay for the design, construction and operation of the facilities to produce mixed-oxide (MOX) fuel, and for the modifications required to adapt theVVER-1000 light-water reactors to use the MOX fuel. Such provision of financial assistance was a part of the 2000 plutonium-disposition agreement. Early after conclusion of this agreement the Joint U.S.-Russian working group on cost analysis estimated that the total cost for the Russian disposition program would be in the range of $2.1 billion.

There has always been a strong view within Russia's nuclear establishment, however, that the plutonium should be saved for fast-breeder reactors, where it could be recycled repeatedly to generate more plutonium without building up anywhere near the same amount of troublesome higher transuranic elements (americium and curium). This position was partially supported by the G.W. Bush Administration when it proposed a Global Nuclear Energy Partnership (GNEP) that would promote international cooperation on the development of fast-neutron reactors.

After the United States informed Russia in April 2007 that U.S. financial assistance will not be more than $850 million, the Russian government decided to abandon the idea

of using MOX fuel in light-water reactors and to move in the direction of using the BN-600 *and* the BN-800 reactor that is now under construction to consume all excess weapons plutonium covered by the year-2000 agreement. The United States and Russia have renegotiated the 2000 plutonium-disposition agreement to take into account this and other changes in their plutonium-disposition programs and the amendment to this agreement was signed on April 12, 2010.[289] It is expected that the construction of the BN-800 and modification of the BN-600 reactor will be finished by 2014. The completion of a facility to produce plutonium-containing fuel for these reactors is planned in 2012. The program envisions that the total rate of plutonium disposition will be no less than 1.3 metric tons per year. But some Russian experts doubt that plutonium fuel production could start even by 2014, the currently planned completion date for the BN-800. In such a case, it will be fueled initially with HEU as is currently the case with the BN-600.

Fissile material production

Russia's production of fissile materials for weapons ended in 1994 and Russia has confirmed its continuing commitment to this production moratorium. Russia has four enrichment plants with a total annual capacity of about 22 million separative work units (SWU/year). Currently only one facility at Novouralsk is licensed to produce HEU – but only up to 30% enrichment, perhaps for the BN-600 reactor and naval-reactor fuel.

Russia has not produced weapon-grade uranium since 1989. Ten of Russia's thirteen plutonium production reactors were shut down by 1992. The two plutonium production reactors at Seversk were shut down in the summer of 2008. Completion of work on coal-fired plants to replace the heat and electric power from the third reactor at Zheleznogorsk is expected by the end of 2010. After that, Russia will have fully ended its production of weapon-grade plutonium.

In addition to the reprocessing plants that have been associated with the plutonium-production reactors, Russia also has the RT-1 spent fuel reprocessing plant at Mayak that reprocesses the spent fuel of first-generation VVER-440 power reactors and HEU fuel from the BN-600 fast-neutron reactor, naval and research reactors. Based on Russia's annual declarations to the IAEA, the RT-1 currently separates about 1.5 tons of plutonium per year. Based on the vision that fast breeder reactors and closed fuel cycle will be the future of Russia's nuclear power program, Rosatom is interested in developing advanced reprocessing technology. For this purpose it initiated the construction of the Experimental Demonstration Center for spent fuel reprocessing at Zheleznogorsk.

Fissile-material use

Most of Russia's research reactors and all of its submarine and icebreaker propulsion reactors use HEU fuel. Russia's government understands the importance of reducing the accessibility of HEU, the fissile material that could be most easily converted into terrorist nuclear weapons. It therefore supports the collaborative effort between Rosatom and the U.S. Department of Energy to convert Soviet-designed research reactors in third countries from HEU to LEU fuel and repatriate their Russian-origin HEU fuel.

In the past several years, about 700 kg of Russian-origin HEU fuel has been returned to Russia. Unused HEU fuel has been removed from Serbia, Bulgaria, Romania, Libya, the Czech Republic, Uzbekistan, Latvia, Vietnam and East Germany. Spent fuel has been removed from research reactors in Uzbekistan, the Czech Republic, Latvia, Bulgaria and Hungary.[290] In 2009, spent fuel was planned to be returned from Kazakhstan, Ukraine, Romania, Libya and Poland. The HEU from the fresh fuel is down-blended to

LEU and used for civilian power-reactor fuel. The spent fuel is reprocessed at the Mayak RT-1 plant and the recovered uranium is blended down to produce various LEU fuels. Rosatom has developed and tested LEU fuel for some types of Soviet-designed research reactors and such fuel has already been used to convert reactors in Libya, the Czech Republic, Vietnam, Uzbekistan, and Ukraine. During 2009, conversions to LEU fuel are planned in Bulgaria, Hungary and the Czech Republic.

Research reactors are converted to LEU primarily by developing high-uranium-density LEU fuel that contains at least the same density of U-235 as the HEU fuel being replaced and that therefore has approximately the same fuel life. Some of the LEU fuel that has been developed by Russia for converting Soviet-designed research reactors in other countries could also be used to convert some of Russia's own research reactors. Russia has 70 HEU-fueled research reactors and critical assemblies.[291]

While Rosatom is considering reducing the number of HEU-fueled reactors in Russia, it is not giving high priority to either shutting down research reactors that are no longer needed or converting to LEU fuel the HEU-fueled research reactors that are still needed. A Federal Targeted Program "On providing nuclear and radiation safety for 2008 and further to 2015" approved in July 2007 plans the shutdown of only 12 research reactors and critical assemblies of which 9 are fueled by HEU fuel. This program also plans the modernization of 3 critical assemblies. In addition, Rosatom and the U.S. Department of Energy recently reached an agreement to carry out a study on the feasibility of converting six Russian research reactors to LEU.[292] One obstacle to conversion of some research reactors in Russia, the United States and Europe is that suitable LEU fuel is not yet available.

Russia currently has no interest in converting its naval propulsion reactors to LEU. Rosatom has expressed interest, however, in constructing and exporting floating nuclear power plants to developing countries and realizes that it would be inappropriate to use HEU fuel in such reactors. It therefore has designed floating nuclear power plants with two LEU-fueled 70 MWe KLT-40S reactors each. Currently, the first two floating nuclear power plants are under construction. One is going to be used in Pevek (Chukotka) and other in Viluychinsk (Kamchatka peninsula). The design of the KLT-40S reactor is based on an HEU-fueled ice-breaker reactor, which is in turn related to HEU-fueled naval reactors. The development of LEU fuel for the floating nuclear power plants could therefore help open the way to converting naval propulsion reactors to LEU as well.

Multinational fuel-cycle facilities

In the context of former President Putin's proposed Global Nuclear Infrastructure Initiative, Russia and Kazakhstan in 2007 established an International Uranium Enrichment Center (IUEC) as a joint stock company at Russia's Angarsk enrichment plant. Armenia and Ukraine are interested in joining IUEC.[293] Russia has offered participation in the IUEC to India to assure it fuel for its Russian-origin power reactors.

The Angarsk enrichment plant, which has never produced HEU, is currently the smallest of Russia's enrichment plants, with a capacity of only 2.6 million SWU/yr. Rosatom is planning to increase the enrichment capacity of the plant to 4.2 million SWU/yr. Including the additional new capacity of 5 million SWU/yr associated with the Russian-Kazakh joint venture to enrich uranium from Kazakhstan, the capacity of the Angarsk plant could reach 9.2 million SWU/yr by 2015.[294]

The possibility of converting Russia's other three enrichment plants (Novouralsk, Seversk, Zelenogorsk) into international enrichment centers is currently not clear. In principle, it would be possible to do so for the plants in Zelenogorsk and Seversk after 2013 when these plants will have ended their involvement with military-origin material associated with the HEU blend-down agreement. It may not be possible to convert the Novouralsk plant, however, because it is licensed to produce HEU to fuel the BN-type and naval propulsion reactors. In any case, Russia's willingness to convert its other enrichment plants into international centers will depend on the success of Angarsk.

To give countries an alternative to developing their own enrichment technology and to ensure supplies of LEU for nuclear fuel, the International Atomic Energy Agency and Russia agreed to set up the world's first nuclear fuel bank. The agreement on establishing a fuel bank was signed in Vienna in March 29, 2010 by Sergei Kirienko, the head of ROSATOM with the IAEA Director Yukiya Amano.[295] In accordance with this agreement Russia will establish a stock of 120 tons of LEU at the IUEC in Angarsk, and the IAEA will provide this material to countries whose supply of nuclear fuel is interrupted.

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[264.] Statement by Ambassador Masood Khan, UN First Committee, New York, October 15, 2007, http://reachingcriticalwill.org/political/1com/1com07/statements/15octpakistan.pdf.

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[265.] Address by Russian Minister of Foreign Affairs Sergey Lavrov at a Plenary Meeting of Conference on Disarmament, Geneva, 7 March 2009, www.unog.ch/80256EDD006B8954/(httpAssets)/B8B531BA899341A4C12575720037E61D/$file/1030_Lavrov.pdf.

[266.] Daryl Kimball and Miles Pomper, "A Fresh START? An Interview with Russian Ambassador Sergei Kislyak," *Arms Control Today*, December, 2008.

[267.] http://merln.ndu.edu/whitepapers/Russia2010_English.pdf.

[268.] A discussion of the roles of Russian nuclear weapons can be found in: Anatoli Diakov, Eugene Miasnikov and Nikolay Sokov, "Nuclear Arms Reductions and Arms Control, in U.S.-Russian Bilateral Relations: Current Status and Future," Occasional Paper, Center for Arms Control, Energy and Environmental Studies at the Moscow Institute of Physics and Technology, Dolgoprudny, 2006.

[269.] Alexei Arbatov, *The Nuclear Turning Point – A Blueprint for Deep Cuts and De-Alerting of Nuclear Weapons*, Brookings Institution, Washington, DC, 1999, p. 320.

[270.] It is quite symptomatic that at one of the meetings organized by the Ministry of Defense for the members of the State Duma in February 2009, General Nikolay Makarov, the Head of the General Staff of the Russia's Military Forces noted that, in the near term, nuclear weapons will continue to be the main stabilizing factor, and its role might well grow (Viktor Yesin, "Novyy Dogovor o SNV: Bazovyye Prinzipy Documenta," ("New START Treaty: Basic Principles of the Document"), *Nezavisimoye Voyennoye Obozreniye*, 27,February 2009.

[271.] Treaty Between the United States of America and the Russian Federation on Measures for the Further Reduction and Limitation of Strategic Offensive Arms, www.state.gov/documents/organization/140035.pdf.

[272.] Anatoli Diakov and Eugene Miasnikov, "US-Russian Strategic Arms Control After 2009. Room For The Compromise?" *Security Index*, vol. 4, Winter 2008.

[273.] Address by Russian Minister of Foreign Affairs Sergey Lavrov at Plenary Meeting of Conference on Disarmament, Geneva, March 7, 2009.

[274.] Anatoli Diakov and Eugene Miasnikov, On Some Aspects of the The Joint Understanding for the START Follow-on Treaty, signed by U.S. and Russian Presidents During the Recent Summit Meeting, *Nezavisimoye Voyennoye Obozreniye*, August 7, 2009; www.armscontrol.ru/pubs/adem-080709.pdf.

[275.] *Nuclear Posture Review Report*, April 2010, www.defense.gov/npr/docs/2010%20Nuclear%20Posture%20Review%20Report.pdf.

[276.] Hans Kristensen, "New START Treaty Has New Counting," FAS Strategic Security Blog, March 29, 2010.

[277.] As of April 2010, the United States had 94 heavy bombers (76 B-52H and 18 B-2) that can be equipped with nuclear weapons (*Nuclear Posture Review Report*, April 2010).

[278.] See, for example: V.Yu. Volkovitskiy, Prikrytiye Strategicheskih Yadernykh Sil – Vazhneishaya Zadacha Voyenno-Vozdushnyh Sil (Screening Strategic Nuclear Forces is a Most Important Task For the Air Forces), part 2, *Vozdushno-Kosmicheskaya Oborona (Air and Space Defense)*, N 1, January – February 2010.

[279.] "Ballistic Missile Defense and New START Treaty," Bureau of Verification, Compliance, and Implementation Fact Sheet, April 8, 2010, www.state.gov/t/vci/rls/139899.htm.

[280.] Statement by the Russian Federation on Missile Defense, Prague, April 8, 2010.

[281.] "Ballistic Missile Defense and New START Treaty," Bureau of Verification, Compliance, and Implementation Fact Sheet, April 8, 2010, www.state.gov/t/vci/rls/139899.htm; Transcript of Remarks and Response to Media Questions by Russian Foreign Minister Sergey Lavrov at Press Conference in Relation to the Upcoming Signing of a Treaty between Russia and the USA on Measures to Further Reduction and Limitation of Strategic Offensive Arms, Moscow, April 6, 2010, www.mid.ru/brp_4.nsf/0/F45DC88975370C9DC32576FE003B0772.

[282.] Peter Baker, Amb. Sergei Kislyak, Rose Gottemoeller, Luncheon: "Whither U.S. – Russian Relations?" Carnegie International Nonproliferation Conference, April 7, 2009.

[283.] For more details, see: Anatoli Diakov, Eugene Miasnikov and Timur Kadyshev, "Non-Strategic Nuclear Weapons. Problems of Control and Reduction," Occasional Paper of Center for Arms Control, Energy and Environmental Studies at the Moscow Institute of Physics and Technology, Dolgoprudny, 2004.

[284.] "The Adapted Conventional Armed Forces in Europe Treaty at a Glance," Arms Control Association Factsheet, 2007.

[285.] *Global Fissile Material Report 2009*. This is the number of tons of 93% equivalent material; the actual number of tons of HEU may be larger.

[286.] www.usec.com/megatonstomegawatts.htm.

[287.] "Setting the Context for the Cut-Off Treaty," Statement by Ambassador Berdennikov at the Canadian workshop, Toronto, Canada, January 17, 1995.

[288.] Alexander Emeliyanov, "Renessance on Kirienko", *Rossiyskaya Gazeta*, July 5, 2006.

[289.] www.nuclear.ru/rus/press/other_news/2116116/.

[290.] "Russia does not consider reasonable a total end to the use of HEU in the civil nuclear sector," *Atom-Info,* April 12, 2009, www.atominfo.ru/news/air6298.htm.

[291.] Ole Reistad, and Styrkaar Hustveit, "HEU Fuel Cycle Inventories and Progress on Global Minimization," *Nonproliferation Review*, Vol. 15, No. 2, 2008, p. 265.

[292.] These six reactors are: IR-8 (8 MWt), OR (0,3 MWt) and Argus (20 kWt)at the Kurchatov institute, IRT (2,5 MWt) at the Moscow Institute of Physics and Engineering, IRT-T(6 MWt) at the Tomsk's Polytechnical Institute, MIR (100 MWt) at the NIIAR.

[293.] As of the time of this writing, the necessary exchange of notes had been initiated but not yet been completed.

[294.] Sergei Kirienko, "Enrichment Capacity at Angarsk to Be Boosted," *Details*, (Angarsk) June 28, 2007.

[295.] www.nuclear.ru/rus/press/nuclear_cycle/2115971/.

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[296.] "Agreement between the Government of the United Kingdom of Great Britain and Northern Ireland and the Government of the United States of America for Co-operation on the Uses of Atomic Energy for Mutual Defense Purposes," Washington DC, July 3, 1958.

[297.] Ministry of Defence, Directorate of Defence Policy, *The Strategic Defence Review, Supporting Essays*, The Stationery Office, July 1998, p 5–2.

[298.] Greenpeace, *In the Firing Line*, September 17, 2009. www.greenpeace.org.uk/ITFL.

[299.] Joe Murphy, "We May Not have Cash for Trident, Says Cameron", *Evening Standard*, April 30, 2009. See also, Patrick Wintour and Nicholas Watt, "Tories Cast Doubt on £21bn Trident Nuclear Missile Upgrade", *The Guardian*, May 1,2009.