PROSPECTS FOR INTERNATIONAL COOPERATION IN WMD NONPROLIFERATION AND NUCLEAR SECURITY

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INTRODUCTION

In 2012 the PIR Center set up a Working Group for International Cooperation in WMD Nonproliferation and Nuclear Security. The group, set up under the PIR Center Advisory Board, includes the following experts: **Dauren Aben**, Senior Fellow at the Kazakhstan Institute of Strategic Studies under the President of Kazakhstan; **Robert Berls**, Head of the Moscow office of the Nuclear Threat Initiative (NTI); **Evgeny Buzhinsky**, PIR Center Senior Vice President; **Alexander Cheban**, PIR Center Research Fellow; **Dmitry Kovchegin**, independent consultant; **Vladimir Kuchinov**, Advisor to the Director-General of the Rosatom state nuclear energy corporation; and **Aleksey Ubeyev**, Chief Specialist of the Nuclear Security Office at the IAEA Department for Nuclear Security and Physical Protection.

The Working Group has prepared a study titled "Prospects for International Cooperation in WMD Nonproliferation and Nuclear Security". The study was authored by Dauren Aben, Artem Blashchanitsa, Evgeny Buzhinsky, Alexander Cheban, Dmitry Kovchegin, and Vladimir Orlov. The full text and the summary of the study are available on the PIR Center website at: **http://gp.en.pircenter.org.**

Individual chapters of the study have passed an external review by Dmitry Cherkashyn, Vladimir Kuchinov, and Vladimir Rybachenkov.

The study analyses lessons learned from the application of various international mechanisms to counter the proliferation of weapons of mass destruction (WMD) and strengthen nuclear security. The study also outlines several proposals for improving the effectiveness of these mechanisms.

The study focuses on those mechanisms of international cooperation in WMD nonproliferation and nuclear security that appear to be the most relevant and promising at this time. In particular, the study takes an in-depth look at the following issues:

- The Nunn-Lugar Program and a new format of Russian-U.S. cooperation on nuclear security that has replaced the program following the signature on June 14, 2013 of a Russian-U.S. intergovernmental agreement on cooperation under the Framework Agreement on a Multilateral Nuclear Environmental Programme in the Russian Federation of May 21, 2003, and the June 14, 2013 Protocol between the Government of the Russian Federation and the Government of the United States on the Framework Agreement on a Multilateral Nuclear Environmental Programme in the Russian Federation of May 21, 2003 (hereinafter referred to as MNEPR, or the June 14, 2013 Agreement);
- The work of the International Science and Technology Center (ISTC) ;
- The current state and the outlook for bilateral Russian-U.S. and multilateral cooperation in improving nuclear security and countering the proliferation of WMD in third countries (the CIS, the Middle East, and Southeast Asia).

The study opens with a chapter written by Vladimir Orlov and Alexander Cheban, titled "**General Principles of Future Russian-U.S. Nuclear Cooperation.**" This section contains, in a distilled form, the PIR Center's proposals on restructuring bilateral Russian-U.S. cooperation on nuclear security and WMD nonproliferation. The main idea of this section is that Russia and the United States made the right choice when they decided against irreversibly winding down their cooperation

following the completion of the Nunn-Lugar Program, and instead developed a new equal format of partnership by signing the agreement on cooperation under the MNEPR program. Orlov and Cheban's section emphasizes that Russian-U.S. cooperation on nonproliferation and nuclear security must not be limited to that single agreement. Rather, they argue, Russia and the United States must also step up cooperation in areas such as chemical and biological weapons nonproliferation, and that such bilateral cooperation should focus primarily on third countries. In their opinion, this approach will enable Moscow and Washington to avoid the difficulties in their bilateral cooperation that arose during the implementation of U.S. projects in Russia under the framework of the Nunn-Lugar Program.

Specific proposals for future Russian-U.S. cooperation, referred to as the *New Partnership* by the authors, are as follows:

- Efforts in the area of chemical weapons destruction as part of Russian-U.S. cooperation should be continued in third countries (especially in Syria), where Russian experience and expertise can be useful;
- Bilateral efforts in the area of enhancing the security of nuclear weapons and nuclear industry facilities in Russia using American assistance must come to an end; all the objectives in this area have been achieved, and there is no scope for further cooperation;
- In the Middle East, one possible area where Russia could help, in cooperation with the United States, is retraining nuclear, chemical and biological weapons scientists from Iraq and Libya;
- Another potentially very useful area of cooperation would be to pursue joint programs in Pakistan, where the United States has been working for a long time, providing significant assistance to the country under a program to prevent theft of nuclear materials. In Afghanistan, Russia and the United States could offer a joint program to train specialists in export controls and the second line of defense. Russia and the United States could also work to improve the system of radiation monitoring along the Afghan border and pursue a program to prevent the theft of nuclear materials and their smuggling across the Afghan border. Existing experience with the use of the Russian-made *Yantar* radiation detectors could be very relevant here;
- Combating nuclear terrorism, including the assessment and modeling of nuclear terrorism threats, should also become elements of the New Partnership. The scope of partnership in this area has already been outlined. The GICNT initiative is one of the most effective instruments of cooperation here;
- Pursuing closer Russian-U.S. nonproliferation partnership in the area of education is probably the least controversial and politicized area of New Partnership cooperation, for which there also happens to be an urgent need. Exchanging experiences, and joint efforts to pass on nonproliferation and nuclear security knowledge and expertise to the younger generation are a necessary precondition for the sustainability of bilateral dialogue on these issues;
- All existing projects under the Nunn-Lugar Program that have not yet been completed must be allowed to run their course, without either halting them abruptly or launching any new projects (or new phrases of the existing projects);
- The Russian business community and the Russian industry must become one of the main driving forces behind New Partnership projects, in the same way that American companies close to the Pentagon or Department of Energy

(Raytheon, Parsons, Halliburton, Bechtel, and others) have been one of the main engines of the Nunn-Lugar Program. U.S. companies continue to act very proactively and energetically; it is important for Russian companies to match that energy and initiative. Russia should work out principles of public-private partnership that would augment its capability to finance projects in third countries. At some point in the future, Russia must be able to share the burden of projects in third countries (including the financial burden) in equal proportions with the United States. Otherwise, the very idea of equal partnership will be compromised.

Chapter 2 is titled "**Lessons Learned and Future Prospects for Bilateral (Russia-U.S.) and Multilateral Cooperation in Nonproliferation: Examples from the Nunn-Lugar Program and G8 Global Partnership.**" In this section, Evgeny Buzhinsky analyzes the experience of these two nonproliferation mechanisms and looks at their lessons learned for further development of bilateral and multilateral cooperation on WMD nonproliferation and nuclear security. In his opinion, the negative aspects of the Nunn-Lugar Program are sometimes greatly exaggerated. For example, Buzhinsky disputes the opinion of some Russian MOD representatives who argue that, thanks to the Nunn-Lugar Program, the Americans have obtained access to a large quantity of classified information about Russian nuclear weapons facilities. Buzhinsky believes that during the U.S.-financed projects to improve the physical protection systems at these facilities, as well as the subsequent inspection visits to check the systems, U.S. representatives had access only to the perimeter of the restricted facilities, and were in no position to obtain any sensitive information.

Buzhinsky is also critical of the prospects for Russian-U.S. cooperation in combating biological threats. In his opinion, the deep lack of trust between the two countries stands in the way of bilateral cooperation in that area. For example, U.S. representatives tend to suspect Russia of pursuing biological weapons research. Buzhinsky believes that as far as biological threats are concerned, it would make more sense to pursue multilateral, rather than bilateral cooperation, including joint efforts as part of the Global Partnership against the Spread of Weapons and Materials of Mass Destruction.

Chapter 3 is titled "**Russian-U.S. Cooperation in Nuclear Security: the Experience of the MPC&A Program.**" In this section, Dmitry Kovchegin highlights the following achievements made after 10 years of bilateral cooperation in nuclear security:
1. The Russian nuclear facilities covered by the program have been equipped with advanced security systems.
2. Two national centers have been set up to prepare specialists in nuclear material protection, control and accounting (MPC&A). Every year, these two centers deliver dozens of training courses that focus on various MPC&A aspects and which are attended by hundreds of specialists working at Russian nuclear facilities.
3. Many necessary new regulatory documents have been developed and implemented in the area of MPC&A.

Kovchegin also proposes several other specific areas of cooperation in which the Russian and U.S. positions are already quite similar:
1. Promoting the notion that while developing nuclear energy is every nation's right, with such development come certain responsibilities, including the responsibility to ensure adequate levels of nuclear security. According to the NPT, developing a

nuclear energy industry is an inalienable right of every country. This is often emphasized by the nations which want to develop their own nuclear infrastructure. But these countries should also realize that with such a right come certain responsibilities. Another thing to note is that a number of international agreements impose obligations with regard to the security of nuclear materials and facilities, which require significant spending and access to advanced know-how and expertise. All of this should be taken into account when assessing any individual country's ability to ensure the safe and secure operation of the nuclear facilities it wants to build.

2. Nuclear security standards. The regulatory requirements in Russia and the United States are more stringent than the minimum levels recommended in the existing IAEA guidelines. Russia and the United States must work together to make sure that their stringent security standards with regard to nuclear materials and facilities are also applied in other nations that operate nuclear facilities or possess nuclear materials. This area of cooperation also includes shared approaches to assessing threats and evaluating the effectiveness of the systems designed to counter those threats. As already mentioned, the key question that must be answered when designing nuclear materials security systems is what kind of threats these systems may have to face. The requirements to the protection systems are drawn up on the basis of the threats facing each individual facility. Approaches to assessing the threats and the effectiveness of the protection systems – including the methods of analyzing vulnerabilities, assessing effectiveness, and testing the systems' performance – must be coordinated on an international level. Such coordination will help to make sure that the nuclear materials and facilities that possess the same value as potential targets for terrorists are also given the same level of protection from these similar threats, regardless of where these facilities are located.

3. Training centers in Russia and the United States are already being used to train specialists from third countries. Meanwhile, Russian and U.S. experts are taking part in various international training programs organized by the IAEA. These efforts must be continued and strengthened through further development of existing training centers and through helping other countries to develop their own personnel training infrastructure.

4. In February 2013, the IAEA released a report titled "Objectives and Essential Elements of a State's Nuclear Security Regime." The document can be used by newcomer states (i.e., those in the initial stages of developing a national nuclear energy industry) to build their national nuclear security infrastructure. Given their vast experience in this area, Russia and the United States could work together to provide assistance to third countries in implementing IAEA recommendations.

Section 4 of the study is titled "**The ISTC as an Example of Multilateral Science and Technical Cooperation in Addressing WMD and Nuclear Security Issues.**" In this section, Alexander Cheban analyzes the experience of the International Science and Technology Center in addressing WMD nonproliferation and nuclear security issues, as well as prospects for further international science and technical cooperation in these areas. The author concludes that the ISTC has the potential to help address nonproliferation and nuclear security issues in third countries. The ISTC has made some miscalculations that led to Russia's decision to quit the organization. Nevertheless, the author believes that overall, the center's work has been a success. Furthermore, the ISTC is already reforming and adapting itself to reflect its new situation. It is turning into a kind of organization in which Russia and other member states are unlikely to develop the same concerns that emerged during the period when there was a patently unequal "donor-recipient" ISTC financing arrangement in place.

The center is now moving away from such an arrangement; this will help it to become more effective in dealing with nonproliferation and nuclear security challenges.

Cheban believes that the ISTC has a particularly significant potential to address these challenges in third countries. Russia should also maintain cooperation with the center, after deciding on a new format of interaction with that organization.
The next sections of the study focus on the most pressing issues on the international nuclear cooperation agenda – namely, addressing WMD and nuclear security challenges in third countries. The definition of "third countries" includes states that possess stockpiles of nuclear or other radioactive materials, require more reliable physical protection arrangements, and could potentially benefit from the experience of bilateral Russian-U.S. cooperation in WMD nonproliferation and nuclear security. The list includes those countries that still have some remaining chemical or biological weapons stockpiles that must be destroyed. It also includes nations that do not have any WMD or materials for WMD production, but which pose a certain risk as potential transit routes for nuclear or other radioactive materials that can be used by terrorists.

Section 5 of the study is titled "**Prospects for International Cooperation in WMD Nonproliferation and Nuclear Security in Central Asia.**" In this section, Dauren Aben outlines the prospects for international cooperation in addressing the Soviet nuclear legacy and other WMD nonproliferation issues in the CIS states. He concludes that the potential for Russia's participation in international cooperation projects in some of the CIS countries (Ukraine, Belarus, and Armenia) is not very great, and for two simple reasons – either these countries don't have any major issues in this area that would require large-scale international efforts, or – as is the case with Ukraine – they have long been successfully addressing these issues without Russian involvement. At the same time, there is scope for international cooperation in combating the threat of the illegal transit of nuclear and other radioactive materials via Azerbaijan and, especially, Georgia.

WMD nonproliferation and nuclear security issues are especially numerous in Central Asia. The need for continued international (especially Russian-U.S.) cooperation on WMD nonproliferation and nuclear security in Central Asia is dictated by a number of factors. First and foremost, the region has many unresolved issues from the legacy of Soviet WMD development programs. There are also new challenges and threats, the most pressing one being trafficking of materials, technologies and equipment related to WMD and their delivery systems, as well as the threat of WMD terrorism. Yet another factor that cannot be discounted is plans by some nations in the region to develop their own nuclear industry and nuclear energy sector. One further argument in favor of continued international cooperation is the adoption of the decision by the Global Partnership Against the Spread of Weapons and Materials of Mass Destruction to expand the program's geographic scope by accepting Kazakhstan as the 24th member state and a recipient country. It is worth emphasizing that Kazakhstan is the world's largest producer of uranium and plans to host an international bank of low-enriched nuclear fuel on its territory.

In Aben's opinion, the main areas for international cooperation in WMD nonproliferation and nuclear security in Central Asia must include: improving enhancing nuclear security systems at nuclear facilities; continuing cooperation at the

former Semipalatinsk nuclear test site; countering radiological security threats; enhancing export controls and border security; cooperating under the framework of the nuclear weapons-free zone in Central Asia; strengthening cybersecurity in nuclear industry; facilitating joint research projects; and promoting education projects in disarmament and nonproliferation.

Section 6 is titled "**Prospects for Resolving Nuclear Security and WMD Nonproliferation Issues in the Middle East: the Experience of the G8 Global Partnership.**" In this section, Artem Blashchanitsa analyzes prospects for addressing WMD and nuclear security challenges in the Middle East through Global Partnership (GP) mechanisms. The author offers the following recommendations for further development of the Global Partnership program in the region:

1. He believes that the program should focus on the following areas:
    - Export and border controls (supplying advanced equipment, training personnel at the EU CBRN Centre of Excellence in Jordan, and expert legal assistance to harmonize national laws with international legislation;
    - Retraining Iraqi, Libyan and Syrian weapons scientists (using the experience already accumulated by the EU, Italy, and the United States);
    - Engaging researchers currently working on dual-use technology projects in Libya, Syria, Iraq, Iran, Jordan, and the UAE in international research projects;
    - Assisting in chemical weapons destruction (retrieval of damaged chemical weapons from two bunkers at Al Muthanna in Iraq; extension of financing for chemical weapons destruction in Libya until the scheduled completion of the program in 2016; and destruction of the Syrian chemical weapons in accordance with Phase 4 of the Russian Foreign Ministry's initiative to place Syrian chemical weapons under international control);
    - Improving nonproliferation culture and training in the essentials of nuclear security (training future specialists in nuclear material protection, control and accounting for Egypt, Jordan, Turkey, Libya, the UAE, and Morocco);
    - Technical and expert assistance in strengthening nuclear security systems (Turkey, Egypt, Jordan, Algeria, Libya, Morocco); protection of chemical agents and precursors (Libya, the UAE); and bio-security at laboratories and facilities (Iraq, Egypt, the UAE);
    - Disposal of radioactive waste in Iraq (providing financial assistance to the EU project)

2. It is necessary to adopt a differential approach to the financing of GP projects in the Middle East by taking their different levels of wealth into account. Projects in the countries undergoing a period of instability and facing serious economic problems (Iraq, Libya, and Syria) should be conducted in the form of donor assistance. The project proposed by Russia to place Syrian chemical weapons under international control and then to eliminate them at some point should be financed by Russia and the United States at part of the New Partnership program, as well as by other donor countries in an extended format as part of the Global Partnership. Projects in other Middle Eastern states – especially ones that want to develop a nuclear energy industry, such as the UAE, Jordan, Turkey, Saudi Arabia, Morocco, Algeria, and Egypt – should be financed primarily by these countries themselves.
3. Because the implementation of GP projects opens up the market for certain services and products, the Russian government should make sure to take part in the kind of projects that could involve Russian companies (such as NPTs Aspect, the

maker of radiation detectors; or MEPhI university, which trains specialists in nuclear materials protection, control and accounting).

Section 7 is titled "**Prospects for Russia's Participation in International Cooperation on WMD Nonproliferation and Nuclear Security in Southeast Asia.**" In this section, Alexander Cheban argues that the issues discussed in the study are becoming relevant for Southeast Asia now that several countries in the region (Vietnam, Malaysia, Indonesia, and Thailand) have announced plans to develop a nuclear energy industry. These plans will inevitably entail nonproliferation and nuclear security risks.

An analysis of the nuclear challenges faced by Southeast Asian countries, as well as their possible solutions, leads to the following conclusions.

First, even though Southeast Asian countries don't have any substantial nuclear infrastructure in place, they are already facing challenges with the security of nuclear materials in research reactors, as well as issues with other radioactive materials used for medical, agricultural, industrial, and other non-energy purposes. These materials require more reliable physical protection systems.

Second, Southeast Asian countries – even those that don't possess any large quantities of nuclear or other radioactive materials – will have to improve their export control systems, which will require international assistance. The problem is especially pressing for those countries in the region that have a long coastline, but don't have enough radiation detectors at their ports and customs checkpoints. That is why Southeast Asian countries are particularly vulnerable to being used for illicit circulation of nuclear and other radioactive materials.

Third, the terrorist threat and the problem of piracy in Southeast Asia increase the nuclear security risks in the region. This calls for energetic international cooperation to minimize those risks since Southeast Asian countries are unlikely to cope with them on their own, especially given their lack of relevant experience.

The resolution of all these issues facing the Southeast Asian countries requires international cooperation. But there are some obvious obstacles to such cooperation because the countries that are capable of providing the necessary assistance in addressing the region's nuclear challenges must first be persuaded that doing so would be in their own best interests. To make this happen, the following considerations must be taken into account:

1. An emphasis should be made on nuclear education. In providing nuclear security, the human factor is even more important than advanced protection systems or radiation detectors. That is why to address the nuclear challenges facing the Southeast Asian countries, it is necessary to train export control and physical protection specialists for these countries. Nuclear education is one of the foremost requirements for resolving the region's nuclear issues.
2. Local projects should aim to make the best possible use of local specialists and local technologists. This recommendation is linked to the previous one concerning nuclear education. The point of training nuclear specialists from Southeast Asian countries is to give these countries the capability to address their nuclear issues using their own specialists and resources.

3. In addition to augmenting the human potential in the Southeast Asian countries, it is necessary to undertake certain technical measures. That includes improving the national export control systems by supplying radiation detectors to these countries.

Russia is especially interested in providing assistance to Southeast Asian nations in addressing their nuclear challenges because it wants a share of the future regional market for nuclear services. In order to strengthen its positions in these markets, Russia has a clear interest in helping these countries to improve their export control systems and train their nuclear specialists.

Each individual section of the study offers a number of conclusions and recommendations. Based on these conclusions, we can highlight several key trends that characterize the current state of the bilateral and multilateral mechanisms of cooperation in WMD nonproliferation and nuclear security:

- Russia and the United States continue their nuclear cooperation; the two countries have signed a new framework agreement in that area. It is, however, quite obvious that in the new circumstances, the scale of that cooperation will inevitably be smaller compared to the period when the Nunn-Lugar Program was in effect. Russia remains ready for nuclear cooperation with the United States on the basis of equality. But it is unlikely to pursue similar cooperation with Washington in the area of bio-security (which is just as important) for as long as Washington continues to regard Russia as a potential proliferator of biological weapons.
- Now that Russia is no longer a member of the ISTC, the effectiveness of that organization's further programs is in doubt. As the same time, it is obvious that the ISTC will continue to exist after its headquarters are moved from Moscow to Astana. It is important that the ISTC leadership intends to conduct an internal reform, and use its accumulated experience to increase the number of the organization's members, improve its effectiveness, and increase the scale of its programs. There are reasons to believe that once the reforms have been implemented, and provided that there is adequate political support from the Kazakh leadership (especially from President Nazrbayev, who has proposed several important WMD nonproliferation initiatives) the ISTC may yet become an even more influential anti-proliferation instrument than it was previously.
- The need for international cooperation in addressing nuclear and radiation security challenges in third countries is becoming ever more pressing. Back in the 1990s and even 2000s the main focus of cooperation in this area was Russia and other CIS countries. Now, however, issues in these countries have for the most part been resolved. That is why the focus of the international community's nonproliferation efforts is shifting towards the Middle East, Southeast Asia, and Africa. Many countries in these regions don't have any substantial nuclear infrastructure. Nevertheless, there are mounting concerns over their plans to develop a nuclear energy industry while many of their internal problems remain unresolved – including outbreaks of separatism, terrorist activity, and internal political instability. Such issues raise serious questions about these countries' ability to provide adequate levels of nuclear security and safety at their nuclear facilities.

Based on the study 's conclusions, the following proposals can be made:
1. Russia and the United States need to develop detailed agreements about the specific areas of cooperation outlined in the framework Agreement of June 14, 2013.

Clearly, more detailed documents are required for further development of such multilateral mechanisms as the Global Partnership. Of all the areas of Russian-U.S. cooperation outlined in the Agreement of June 14, 2013, the following appear to be the most promising and the least controversial:

- Border controls for nuclear and other radioactive materials
- Retrieval, storage and disposal of dangerous sources of radiation

2. Other areas of cooperation outlined in the Agreement of June 14 (MPC&A, HEU consolidation, and conversion of research reactors) are quite sensitive and can cause differences between the United States and Russia. Nevertheless, cooperation in these areas can be entirely feasible in third countries (the Middle East, Southeast Asia, and the CIS).
3. Russian-U.S. cooperation on WMD nonproliferation and nuclear security must not be limited to the Agreement of June 14, 2013. It would be very useful to implement another document - *Agreement between the Government of the Russian Federation and the Government of the United States on Cooperation in Nuclear- and Energy-Related Scientific Research and Development* which was signed on September 16, 2013 in Vienna.
4. In developing international science and technology cooperation, it is extremely important to make use of the ISTC's experience and potential, which has yet to be fully utilized. Even though Russia has quit the organization, it should consider the options for continued cooperation with the ISTC.
5. International cooperation on nonproliferation issues must not be limited to nuclear weapons and materials. The destruction of chemical weapons and bio-security are just as important. Russia and the United States could cooperate in the destruction of Syrian chemical weapons as part of the New Partnership and the Global Partnership. Russian-U.S. cooperation on bio-security will only become possible once Russia joins the Australia Group, which will enable this problem to be addressed via other multilateral formats, such as the Global Partnership.
6. As a first step towards cooperation on bio-security, the parties must develop a common set of principles in this area. To that end it would make sense to establish an international working group of experts, which would not only formulate these principles, but also develop a commonly accepted list of biological threats.
7. In parallel with measures against bio-threats, the parties must pursue international cooperation in fighting infections. This area of cooperation can be relatively free of political and economic differences related to military bio-security. Cooperation in fighting infections will make it possible to strengthen international monitoring and controls over dangerous weapons-usable pathogens. As a result, cooperation in fighting infections, which seemingly has little to do with nonproliferation or politics, could make a tangible contribution to reducing the risks of biological weapons proliferation.
8. Education - technical as well as humanitarian - has an important role to play in countering the spread of various types of WMD and strengthening nuclear security. Specialists with a technical education are responsible for the actual implementation of nuclear security measures. It is important to provide adequate financial incentives to students and young technical specialists in order to attract the young talent to the nuclear industry. Without such incentives, we are going to see a continuation of the trend whereby nuclear security increasingly becomes the domain of ageing specialists, who are not being succeeded by the younger generation. WMD nonproliferation training is also a necessary component of humanitarian education for those students who will work in the Foreign Ministry and other government agencies, and become directly involved in nonproliferation policymaking. That is

why Russian-U.S. or multilateral cooperation in this area should include the rollout of joint WMD nonproliferation training programs at the leading schools of international relations. These programs must be offered to students from all over the world.

9. Humanitarian as well as technical education in the area of nonproliferation and nuclear security must nurture a nonproliferation and nuclear security culture among the young specialists. To establish a clearer definition of the term "nonproliferation and nuclear security culture" and to develop the principles of that term's practical implementation, it would make sense to ask a group of reputable experts from several countries to produce a research paper on this subject.

10. It is a matter of extreme importance that the cooperating parties must have a tangible interest in the areas of cooperation being pursued. Determining such areas of tangible interest is not an easy task. That is why there seems to be a clear need for a new mechanism of coordinating interests, analyzing challenges, and determining possible areas of cooperation. That mechanism could be set up in the form of another specialized working group within the Global Partnership program. The workgroup should be tasked with conducting a detailed analysis of the proposals outlined in this study, and presenting these proposals to the relevant governments in a more polished and detailed form.

On the whole, this PIR Center study is an opportunity to undertake a critical analysis of the current state of international cooperation in WMD nonproliferation and nuclear security; identify the obstacles facing such cooperation; and propose possible ways of overcoming those obstacles.

From the Editor

Chapter 1. SOCHI 2014: G8 MUST SET A NEW BENCHMARK FOR GLOBAL PARTNERSHIP

Vladimir Orlov, Alexander Cheban

Sochi 2014 is not just about the Olympics. It is also about the June 2014 summit of the G8. WMD nonproliferation will not be at the very top of the agenda; that place has been reserved for the challenges posed by mass migration. Nevertheless, it will be one of the central topics of the summit.

It is still hard to make any definitive predictions on the Syrian issue, which dominated the G8 summit in Northern Ireland in 2013. But there are clear signs of progress on the destruction of the Syrian chemical weapons arsenals. Tectonic shifts are also under way with regard to Tehran's nuclear program; the G8 has been making regular statements on this issue since the 2003 summit in Evian[1], when the Iranian nuclear problem began to move to the top of the international agenda.

As for the nonproliferation package, let us take a closer look at the Global Partnership Against the Spread of Nuclear Weapons, which has been officially extended until 2022, but which has yet to be fully fleshed out.

To understand the possible scenarios, we need to focus on three individual aspects of international cooperation against the spread of WMD.

The first aspect is bilateral Russian-U.S. cooperation. It has undergone significant transformations over the past few months; nevertheless, it still remains the engine of multi-faceted and multilateral cooperation.

The second aspect is the International Science and Technology Center (ISTC). There has been a lot of skepticism about this multilateral mechanism, whose HQ is now relocating from Moscow to Astana. What is the role the ISTC has played so far? And what is the role it can still play in the future?

The third aspect is the one this article begins with, i.e. the Global Partnership itself.

Further development of Russian-U.S. and multilateral cooperation on WMD nonproliferation and nuclear security requires a constant supply of fresh ideas. The recommendations offered by our experts can facilitate the implementation of the already approved initiatives and the development of new ones. PIR Center experts make a substantial contribution to keeping the decision-makers supplied with new ideas.

[1] Chair's Summary. *G8 Summit documents*. Evian, 2003, 3 June. http://www.g8.fr/evian/english/navigation/2003_g8_summit/summit_documents/chair_s_summary.html (last accessed December 19, 2013).

In September 2013 PIR Center released a report headlined Prospects for International Cooperation on WMD Nonproliferation and Nuclear Security.[2] The report was prepared by the Working Group for International Cooperation on WMD Nonproliferation and Nuclear Security, which was set up under the PIR Center Advisory Board in 2012.

Preparation and discussion of the report was held as part of individual research by Working Group members and two WG meetings held in Moscow in March and June 2013. Apart from WG members, the meetings were also attended by other WMD nonproliferation and nuclear security experts, including representatives of Russian government agencies, embassies, corporations, NGOs, and research institutions.

A discussion of the report within the expert community, which also involved government representatives, was held during the report's presentation held in Moscow in October 2013. Key findings and recommendations of the report were also presented at an international nonproliferation conference in Cheju, South Korea, in November 2013; they triggered a lively debate between the participants. That debate involved the sherpa of the 2014 Nuclear Security Summit in The Hague, Piet de Klerk; Italian ambassador Carlo Trezza, coordinator of the Missile Technology Control Regime; and other colleagues directly involved in formulating the nonproliferation agenda for 2014-2015.

RUSSIA AND THE UNITED STATES: FLESHING OUT THE NEW PARTNERSHIP

We firmly believe that Russia and the United States should recognize the important role played by the Nunn-Lugar Program in strengthening global security over the 20 years of its existence. Most importantly, the program made a great contribution to the elimination of Russian chemical weapons stockpiles; the disposal of nuclear submarines; and measures to improve nuclear material protection, control and accounting.

The NPL expired in June 2013. That is also when a new format of Russian-U.S. nuclear cooperation was proposed, based on a bilateral agreement signed in June 2013.

It is certainly true that the NPL was launched in a different historical period, and has now become obsolete. It is therefore entirely reasonable to dismantle the Global Partnership program, including its legal mechanisms and practical implementation. But the program must be dismantled without suspending the cooperation itself.

It is important to emphasize that both Russia and the United States realized the need for replacing the Nunn-Lugar Program, whose instruments were largely defined by the consequences of the end of the Cold War and of the Soviet Union's break-up[3]. The present situation is entirely different.

[2] A summary of the report was published in the *Security Index* journal: Aben Dauren, Blashchanitsa Artem, Buzhinsky Evgeny, Kovchegin Dmitry, Orlov Vladimir, Cheban Alexander. Prospects for International Cooperation on WMD Nonproliferation and Nuclear Security. *Security Index* (Russian edition). 2013. No 3 (106). P. 79.

[3] Berls Robert. Remarks at the first extended meeting for the PIR Center Working Group for International Cooperation on Nonproliferation and Nuclear Security. Moscow. March 28, 2013.

On the whole, problems faced by the nuclear industry in Russia and the former Soviet republics have now been resolved. Meanwhile, new problems and threats have emerged in third countries, including nuclear security problems, the threat of WMD terrorism, cybersecurity risks at nuclear facilities, etc. An effective response to these problems requires international cooperation not only in the bilateral but also multilateral format, as well as the development of new political mechanisms.[4] It is also safe to say that the signing of the new Russian-U.S. agreement has facilitated the emergence of new multilateral instruments.

In September 2013 Russia and the United States signed another agreement that has opened up great prospects for deeper nuclear science and technology cooperation. Finally, in the autumn of 2013 Moscow and Washington began to cooperate on the destruction of Syrian chemical weapons, using the experience accumulated as part of the Nunn-Lugar Program and the Global Partnership.

These and other developments demonstrate that Russia and the United States continue to play the leading role in the international arena in the area of WMD nonproliferation and nuclear security; they also show that the two countries are working as equals in this field.

We believe that the Nunn-Lugar Program should be replaced with a new Russian-U.S. program, which would be much more compact in terms of its financing and the number of its projects. We have provisionally dubbed that new program the *New Partnership* (NP).

To all intents and purposes, that partnership was kicked off by the signing of the agreement and the attendant protocol on June 14, 2013. But it has yet to be decided which specific projects the New Partnership will include. The main principle of the NP should be equality; there should be no senior or junior partners, and no designation of countries as donors or recipients. The same should apply to choosing the specific areas of work, financing arrangements, and legal issues.

We believe that as part of the New Partnership, the two countries can identify a maximum of 10 projects that would be in their mutual interest, and that would bring Russia some clear military, foreign-policy (soft power) and commercial benefits. Russia and the United States should not pursue cooperation for the sake of cooperation itself. When they determine areas on which they can pool their efforts, they must be led by their own pragmatic interests.[5] The two areas that immediately come to mind are countering proliferation and strengthening nuclear security in third countries.

The Russian business community and the Russian industry should act as one of the main engines of the implementation of New Partnership projects, just like American companies such as Raytheon, Parsons, Halliburton, Bechtel, and others did with regard to the Nunn-Lugar Program. U.S. companies are very good at taking the initiative; Russian businesses should follow suit.

Russia therefore needs to develop a new set of principles for public-private partnership. Such partnership can increase the Russian capability to implement

[4] Ibid.
[5] Ibid.

projects in third countries. At some point in the future, Russia must be prepared to act as a 50-50 partner with the United States in third countries; that includes the financial contribution as well. Otherwise, the very idea of equal partnership will be compromised. In addition, substantial Russian financing of New Partnership projects would make it easier to engage Russian companies in their implementation.

CONTROVERSY OVER THE ISTC

The ISTC is an international organization founded by the United States, Russia, the EU and Japan in 1992. Its main objective was to engage Soviet scientists formerly involved in WMD projects and left unemployed after the Soviet Union's break-up in civilian research projects in order to prevent them from taking sensitive know-how to third countries. That goal has been achieved, so in 2010 Russia announced that it would pull out of the ISTC in 2015.

At the same time, the ISTC, which is now relocating its HQ from Moscow to Astana, is ready to give Russia observer status and to continue science and technology cooperation with the country. The ISTC also wants to increase the number of its member states by engaging *problem* counties in the Middle East. These countries also need assistance in training export control specialists; this is where the experience accumulated by the ISTC as a whole and Russia in particular could prove useful.

EXPANDING THE GEOGRAPHY OF THE GLOBAL PARTNERSHIP

In our opinion, New Partnership should expand the geography of its projects, with an emphasis on the following regions:

- ☐ Central Asia and Afghanistan
- ☐ Middle East
- ☐ Southeast Asia
- ☐ Sub-Saharan Africa

CENTRAL ASIA

We believe that Central Asia would be the most productive area of multilateral cooperation because there are already some joint projects completed or under way in the region. For example, speaking at the Nuclear Security Summit in Seoul in March 2012, the presidents of the United States, Russia and Kazakhstan made a joint statement on trilateral cooperation at the former nuclear testing range in Semipalatinsk. That statement outlined joint Russian-U.S. efforts aimed at the rehabilitation and clean-up of the former nuclear range territory. Russia and the United States have also cooperated in Uzbekistan on resolving the problems with research reactors; spent fuel from those reactors has been removed to Russia. In addition, Russia and the United States are working to improve radiological controls on the Central Asian countries' borders. European states are also becoming involved in these projects. The subject is covered in great detail in an article by **Dauren Aben** headlined “Nuclear Security in Central Asia: Specifics and Opportunities for Cooperation”.

The need for cooperation in the area of WMD nonproliferation in Central Asia is becoming more pressing because NATO troops will be pulled out of Afghanistan in

2014. The risk of nuclear materials trafficking via the territory of Afghanistan and its neighbors is growing. There are also opportunities for cooperation in Afghanistan itself, primarily in equipping and training the country's border and customs services. Global Partnership members could also provide assistance in bolstering the system of radiation monitoring on the Afghan border, and implementing a program of nuclear material theft prevention. The experience gained as part of rolling out Russian-made Yantar radiation detectors could prove very useful here.

THE MIDDLE EAST

There is a great scope for cooperation in this region in dealing with various problems in the nuclear and chemical areas. There problems were brought about by WMD programs led by the region's countries in the past, as well as their current plans to develop a nuclear energy industry.

With the assistance of other countries, Turkey and the UAE have already begun to build their first nuclear energy reactors; Jordan is expected to follow suit. Saudi Arabia has yet to make any practical steps in that direction, but it has demonstrated its intention to do so in the near future. The development of nuclear energy in the region necessitates measures to strengthen nuclear security and counter the threats of terrorism and proliferation.

This is why there is a clear scope for international cooperation in such areas as education and establishing effective nuclear material protection, control and accounting (MPC&A) systems. Ideally, having an effective MPC&A system in place should be a compulsory requirement for signing contracts to build nuclear power plants.

Russia could make a contribution to the re-training of nuclear, chemical and biological weapons scientists from Iraq and Libya (although the United States has already done a lot of work in this area as part of its own programs). Russia also has valuable experience of cooperation with the Arab countries that goes back to Soviet times; many senior Arab military officers were trained in the Soviet Union. There are also opportunities for cooperation in putting in place the first and second lines of defense at the nuclear facilities to be built in the region's countries.

Russia and the United States are already in a position to pursue cooperation in decommissioning nuclear facilities built in Iraq under Saddam Hussein. Iraq has begun to dismantle nuclear facilities on its territory, but so far, due to a shortage of financial resources and specialists it has managed to shut down only a single facility, the nuclear research center in Baghdad. In August 2010 Iraq signed an agreement with the EU under which it has received 2.5bn euros to be spent on the decommissioning of the remaining nuclear facilities.[6] These include the Karama industrial complex outside Baghdad and the Ibn Firnas complex in the town of Rashidiya, 20km north of Baghdad.[7]

[6] Feshchenko Mikhail. Iraq dismantling its nuclear facilities using EU money. DELFI, *Ukrainskiye novosi*. August 30, 2010, http://www.delfi.ua/news/daily/foreign/irak-demontiruet-svoi-yadernye-obekty-na-dengi-es.d?id=1191571 (last accessed December 27, 2013).
[7] UN inspectors visit two Iraqi nuclear facilities, *Gazeta*, November 26, 2002, http://www.gazeta.ru/2002/12/02/last70271.shtml (last accessed December 27, 2013).

EU assistance notwithstanding, U.S. and Russian help to Iraq in cleaning up the territory of these facilities would also prove useful. Russia in particular has valuable experience in this area; in 1993-1994 there were two operations to remove spent nuclear fuel from Iraq's IRT-5000 research reactor to Russia.[8] As for Libya, in 2009 Russia also completed the removal of spent nuclear fuel from a research reactor in that country.

The future Middle Eastern dimension of the Global Partnership is the subject of an article by **Artem Blashchanitsa** headlined "The Experience of the Global Partnership for the Middle East".

SOUTHEAST ASIA

In Southeast Asia, the greatest scope for cooperation is in strengthening nuclear security and training the region's nuclear specialists. The problems that will have to be resolved as part of the Global Partnership could emerge because a whole number of countries (Indonesia, Malaysia, Vietnam, and Thailand) have announced plans to develop a nuclear energy industry, even though they lack the necessary expertise and specialists.

The GP states could jointly provide assistance in the construction of nuclear reactors and in the removal of spent nuclear fuel from these countries. They could also help with putting in place proper storage conditions for (or disposing of) the numerous radiation sources that exist in Indonesia and Vietnam. For more details, please see an article by **Alexander Cheban** headlined "Nuclear security in Southeast Asia: how Russia can help".

Assistance here could be provided by such active GP donors as South Korea, which is showing great interest in the Southeast Asian region. Also, there is certainly room for a joint Russian-South Korean project in Southeast Asia as part of the Global partnership. Representatives of the South Korean Foreign Ministry have already said that the idea deserves a closer study.

SUB-SAHARAN AFRICA

In this part of the planet, the GP countries could work together on preventing bio-security threats, such as the spread of natural and perhaps also man-made viruses.

The sources of bio-security threats in Africa include governments and terrorist organizations. South Africa still retains a substantial capability for developing biological weapons, even though back in 1993 the country halted its bio-weapons program. Dual-purpose research is under way at a medical research center in Kenya and a virus research center in Uganda. It cannot be ruled out that these facilities are being used to develop weaponized Ebola and anthrax pathogens.[9] In November 2011

[8] Preparations for the first spent nuclear fuel airlifting operation certified under new rules. Russian Atomic Community. May 30, 2011, http://www.atomic-energy.ru/articles/2011/05/30/22700 (last accessed December 27, 2013).
[9] Brian Finlay, Johan Bergenas and Veronica Tessler. Beyond Boundaries in Eastern Africa: Bridging the Security. Development Divide with International Security Assistance. The Stimson Center and the Stanley Foundation. 2011, 10 March. P. 21.

U.S. Senator Richard Lugar and several Pentagon officials visited laboratories in Kenya, Uganda and Burundi, and identified security risks there.[10]

In this context it must be taken into account that the terrorist threat has always been clear and present in Africa. Al Qaeda is active in Kenya, Somalia, Sudan, Tanzania, Uganda, Ethiopia and the Sahel region (Mauritania, Mali, Chad, Niger, Senegal, and Burkina Faso). The radical Islamist group Boko Haram is waging a campaign of terror in Nigeria. Islamist groups have already shown interest in acquiring biological weapons based on the Ebola virus.

According to the U.S. Department of State, there was an attempt to commit an act of biological terrorism in 2011. Brian Patrick Roach, a South African national, tried to trigger an outbreak of disease among livestock in Britain and the United States.[11]

Russia and the United States could cooperate in offering training programs for African biologists in order to strengthen the WMD nonproliferation culture among them; they could also assist in bolstering security arrangements at research facilities. The United States and the EU have only just begun to finance workshops for African biologists. A Russian-U.S. initiative for Africa as part of the GP could take these efforts to a whole new level. At some point in the future international partners could also consider the idea of establishing an international organization in the framework of the Biological and Toxin Weapons Convention (BTWC).

TRADITIONAL AND POTENTIAL AREAS FOR COOPERATION

The problem of improving nuclear security arrangements at nuclear industry facilities has yet to be fully resolved. The Russian companies that have benefited from GP programs include the Machinery Plant (MSZ) in Elektrostal; the Novosibirsky Chemical Concentrates Plant (NZKhK); the Leypunskiy Institute of Energy Physics (FEI) in Obninsk; the Bochvar High Technology Institute for Inorganic Materials Research (OAO VNIINM); the Nuclear Reactor Research Institute (GNTs NIIAR) in Dimitrovgrad; the Luch Research Institute (Luch NII-NPO) in Podolsk; the Beloyarskaya NPP; the Siberian Chemical Combine (SKhK); the Mayak plant; the Mining and Chemical Combine (GKhK); and other Russian nuclear industry facilities that were struggling with nuclear security problems. Apart from the United States, a substantial contribution into improving nuclear security at these facilities has been made by Canada (worth 63.1m dollars), Britain (11.54m pounds); and Germany (63.4m euros).

In other words, Russia has received very broad international assistance in addressing the problems facing its nuclear industry. The country is now in a position to deal with any remaining problems on its own, without foreign help. For more details on this, please see an article by **Dmitry Kovchegin** headlined "Nuclear material protection, control and accounting: new circumstances". But the programs that are still under way must be allowed to run their course, while the new ones should be re-focused on new geographic areas.

[10] Josh Kron. Uganda Seen as a Front Line in the Bioterrorism Fight. *The New York Times*, 2010, 10 November, http://www.nytimes.com/2010/11/11/world/africa/11uganda.html?_r=0 (last accessed December 27, 2013).
[11] Office of the Coordinator for Counterterrorism. Country Reports on Terrorism 2011: Africa Overview. U.S. Department of State, 2012, 31 July, http://www.state.gov/ (last accessed December 27, 2013).

Countering nuclear terrorism, as well as threat assessment and modeling, should also become elements of GP projects. In fact, the modalities of such cooperation have already been outlined. The Global Initiative to Combat Nuclear Terrorism (GICNT) is one of the most effective instruments of cooperation in this area. The GICNT now has 85 member states; Russia and the United States will remain the initiative's co-chairs until 2015. Examples of practical cooperation include joint meetings of the GICNT member states' secret services focusing on the prevention of acts of nuclear terrorism (Khabarovsk, 2007); joint workshops; and the Guardian-2012 international demonstration exercise on the prevention of nuclear and radioactive materials smuggling (Moscow and Dimitrov). Other formats of cooperation in this area could also include *joint assessment of cyberthreats to the security of nuclear facilities* and *suppressing the financing of WMD-terrorism and proliferation*.

As far as *chemical weapons destruction* is concerned, broad opportunities for cooperation are opening up in Syria following the country's decision to destroy its chemical stockpiles. Syrian chemical weapons will have to be destroyed in unprecedented circumstances, amid an ongoing civil war. These circumstances make it impossible to build chemical weapons disposal facilities, as is usually the case when countries (including Russia and the United States) eliminate their chemical arsenals. Nevertheless, Russian, U.S. and other countries' expertise and technologies could be used in the destruction of Syrian chemical weapons. In particular, Russia and the United States have mobile facilities for chemical weapons disposal. These facilities can be used to destroy Syrian chemical weapons even in extreme circumstances, without building stationary plants, especially since the Syrian stockpiles are not very large.

Conducting the final phases of chemical weapons destruction in Syria in the GP framework would be logical and timely. We have heard a similar sentiment being expressed by representatives of several GP participants that have already accumulated valuable experience in providing assistance to chemical weapons destruction projects in Russia and Albania.

Finally, the GP framework could be used to initiate cooperation in *fighting infectious disease.* At first glance, such programs are part of the remit of the World Health Organization. In actual fact, however, cooperation in fighting infections would strengthen international controls over many dangerous pathogens without unnecessarily politicizing the issue. As a result, international efforts against infectious disease would also help to increase the transparency of military biological research.[12]

Cooperation in fighting infectious disease can also help to neutralize biological threats not just in Africa but all around the world. Besides, there are specific areas for Russian-U.S. cooperation in this field; the Americans could help Russia to strengthen its own system of biological controls on the border.

Finally, it is worth emphasizing the importance of *international cooperation on nuclear education*. That potential GP area is the least controversial or politicized; there is also a great and urgent need for it. The best format of such cooperation

[12] Ibid.

would be for the leading research centers and universities of both countries to launch a joint Masters program. Such a program would be especially useful if its objectives were to include the training of specialists from third countries that are now developing a nuclear energy industry.[13]

For more analytics on nuclear security, please, visit the section "The Future of the Global Partnership and Russia-U.S. Cooperation in Nuclear Security" of the PIR Center website: *gp.eng.pircenter.org*

There is also a clear need for joint training of humanities specialists who will be involved in improving the legal framework of export controls and international cooperation mechanisms in the area of nuclear nonproliferation and nuclear security. A wealth of experience and expertise has been accumulated over the past few years; there is a strong intellectual potential to prepare a new generation of specialists in various areas of GP. That potential must be strengthened even further.[14]

REALITY AND EXPECTATIONS

All the aforementioned potential areas for Russian-U.S. cooperation in the New Partnership framework and the multilateral Global Partnership initiatives are tightly intertwined. But the same was true in the 2000s of the Nunn-Lugar Program, which was already mature at the time, and the Global Partnership, which was still in its early stages.

In the multi-polar international system that is now emerging, Russia and the United States cannot possibly deal with every single problem solely on a bilateral basis. But they can and should cooperate as recognized leaders in such influential multilateral anti-proliferation mechanisms as the Global Partnership, the GICNT, and the nuclear security summits.

Every multilateral mechanism has to deal with the problem of coordinating joint efforts. Effective Russian-U.S. coordination would certainly improve the effectiveness of the aforementioned international mechanisms.

Right now, we cannot say for certain whether there is actual demand for the potential of the GP. But there is no doubt that such a potential does exist.

[13] Orlov Vladimir, Cheban Alexander. Life After Death. Will New Partnership replace the Nunn-Lugar Program? *Russia in Global Affairs*, 2013. No 2, P. 110, http://pircenter.org/articles/1314-zhizn-posle-smerti-pridet-li-novoe-partnerstvo-na-smenu-programme-nanna-lugara (last accessed December 27, 2013).

[14] Orlov Vladimir, Cheban Alexander. What Should End and What Should Replace the Nunn-Lugar Program. *Russia Confidential*, 2013, No 3, http://pircenter.org/pages/83-russia-confidential-archive (last accessed December 27, 2013).

Chapter 2. LESSONS AND FUTURE PROSPECTS FOR BILATERAL (RUSSIAN-U.S.) AND MULTILATERAL COOPERATION IN NONPROLIFERATION: EXAMPLES FROM THE NUNN-LUGAR PROGRAM AND THE G8 GLOBAL PARTNERSHIP

Evgeny Buzhinsky

The program of providing assistance to the Soviet Union and then Russia in resolving issues related to nuclear weapons and materials was developed thanks to the efforts of U.S. Senators Sam Nunn and Richard Lugar during the difficult period of the Soviet Union's break-up and the formation of the Russian state. During that period, there was a real possibility that the Russian state would be unable to provide adequate security for the huge nuclear arsenal and capability inherited from the Soviet Union. The realization of that danger led the U.S. Senators to the idea of providing assistance to Moscow to make sure that it would retain full control of its nuclear capability.

The situation was compounded by the severe economic crisis the Soviet Union was undergoing when it broke up. The financial and economic situation in Russia, which had launched radical market reforms, was no less difficult. There were also significant amounts of money required for the transportation of the nuclear arms from Ukraine, Belarus and Kazakhstan to Russia as part of the nuclear disarmament program; the post-Soviet republics did not have sufficient resources of their own to finance those projects.

The Nunn-Lugar Program (NLP) began on June 17, 1992, when Moscow and Washington signed the *Agreement between the United States of America and the Russian Federation Concerning the Safe and Secure Transportation, Storage and Destruction of Weapons and the Prevention of Weapons Proliferation*. The legislative framework of the NLP consisted of two bills: the Soviet Nuclear Threat Reduction Act of December 12, 1991, which dealt with the provision of broad assistance to the Soviet Union in safe and secure transportation, storage, and elimination of nuclear weapons, as well as the prevention of nuclear weapons proliferation; and the Cooperative Threat Reduction Act of October 11, 1993, which detailed areas of nuclear cooperation with Russia and other former Soviet states, and contained additional clauses about the need to provide assistance to Russia in the destruction of chemical and biological weapons stockpiles.

The agreement was approved for an initial seven-year term, and was prolonged twice, in 1999 and in 2006. After the signing of the agreement, in 1992 the U.S. Congress allocated about $400 million for assistance to Russia. Similar amounts of money were allocated on an annual basis in subsequent years; in fact, the figure was even higher in the last few years. For example, Russia received $520.8 million from the United States in 2011, and $508 million in 2012. The target for 2013, the last year of the program, was $519 million.[15] The total amount received by Russia from the United States under the Nunn-Lugar Program is about $9 billion (according to American

[15] Fiscal Year 2013 Budget Estimates - Cooperative Threat Reduction Program. Defense Threat Reduction Agency. February 2012, http://comptroller.defense.gov/defbudget/fy2013/budget_justification/pdfs/01_Operation_and_Maintenance/O_M_VOL_1_PARTS/O_M_VOL_1_BASE_PARTS/CTR_OP-5.pdf (Retrieved on June 27, 2013)

sources).[16] According to Russian government agencies, out of those $9 billion Russia had actually received $4.5 billion; the rest of the money was used to pay U.S. subcontractors or cover administrative costs, and was not actually used in the implementation of the projects.[17]

It is worth noting that initially the United States tried to make the provision of its financial assistance to Russia conditional on Russian compliance with several requirements. Among other things, Washington wanted Moscow to give it some degree of control over Russian defense-related nuclear R&D, and made other demands, which directly impinged on Russian national sovereignty. The United States also wanted Russia to provide compensation for the financial assistance it would receive by supplying oil and other strategic products to the Americans. Russia rejected these demands as unacceptable. In the end, the United States had to agree to the provision of financial assistance without any compensation or conditions, i.e. free of charge.

There were at least two good reasons for such a decision:

1. The United States feared that Russia, which was in a difficult economic situation at the time, would postpone the destruction of its nuclear arms for financial reasons. Prolonged storage of these weapons would pose the risk of nuclear weapons being lost or ending up in the hands of terrorist groups.

2. In addition, the United States had an interest in ensuring Russian compliance with the nuclear reductions mandated by the START I Treaty. Lack of sufficient progress in the destruction of nuclear arms could lead to a situation whereby Russia would have significantly more warheads than it was allowed under the treaty. To avoid such a situation, the United States decided to provide Russia with uncompensated financial support in the reduction of its nuclear arsenal and in making that arsenal more secure. In a way, that decision by the United States was an act of *rational egoism*.[18]

Nevertheless, American financial assistance came with some strings attached. For example, at Washington's insistence, the 1992 agreement had a clause giving the Pentagon the right to inspect facilities that have been equipped with new hardware paid for with American money. Such a clause primarily reflected the requirements of domestic U.S. legislation with regard to controls over the spending of government money. Under the terms of the controls system agreed with Russia, the Americans had the right to make regular visits to Russian nuclear facilities that used to be strictly classified during the Soviet Union. Russian MOD representatives sometimes argue that were it not for the Nunn-Lugar Program, the United States would never have obtained such a large amount of sensitive information about Russia's Northern Fleet and its nuclear weapons storage system.[19]

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[16] Barnes Diane. DOD Nonproliferation Work to Suffer Under Budget Cuts. Global Security Newswire. *NTI website*. March 4, 2013, http://www.nti.org/gsn/article/nuclear-nonproliferation-activities-suffer-under-budget-cuts-hagel/ (Retrieved on June 27, 2013).

[17] A Russian Foreign Ministry representative. Remarks at an informal PIR Center workshop Midweek Brainstorming. Moscow, June 3, 2013

[18] Statement by Russian Nuclear Energy Minister V.N. Mikhaylov at the Congress of People's Deputies of the Russian Federation. *Rossiyskaya Gazeta*. December 19, 1992

[19] Chernenko Elena, Safronov Ivan. Russia intends to continue reducing its nuclear arsenal using its own resources. *Kommersant*. October 10, 2012. No 190 (4975), http://www.kommersant.ru/doc/2041015 (Retrieved on May 22, 2013

Such opinions have prompted some representatives of the Russian military leadership to demand that the Nunn-Lugar Program be halted immediately. I personally confronted differences of opinion over Russia's participation in the program when I worked at the MOD. It has to be recognized that in the end, the position of the moderate circles at the MOD, who wanted the program to continue, prevailed.

Right from the start, the Russian leadership was especially angry at the amount of various privileges and preferential treatment the Americans involved in the NLP were entitled to. In particular, they were given limited immunity; they did not have to pass customs procedures at the Russian border; they did not have to pay taxes in Russia, etc. The most egregious clause in the June 17, 1992 Agreement was that the U.S. subcontractors involved in the NLP were not legally or financially liable in the event that their actions or the equipment they installed were to cause an incident - even if they were acting with deliberate intent.[20] Russia has repeatedly demanded that the clause be changed, but the United States insisted on it remaining as is during every extension of the agreement. Russia was also unhappy with the fact that about 40 percent of the money allocated for the Nunn-Lugar Program was paid to U.S. contractors and consultants instead of being spent directly on Russia's needs. Clearly, this negative experience should be taken into account when pursuing assistance programs with third countries. In order to give these countries useful assistance, it will be necessary to develop an effective financing mechanism that would minimize spending on items not directly related to the implementation of projects.

All that being said, the implementation of the NLP has yielded significant benefits, especially as far as the Russian treasury is concerned.[21] As of early 2013, 7,610 strategic nuclear warheads have been deactivated. A total of 902 intercontinental ballistic missiles, 191 mobile ICBM launchers, 498 ICBM silos, 155 bombers, 906 nuclear air-to-surface missiles, 684 submarine-launched ballistic missiles, 33 nuclear submarines, 194 nuclear test tunnels, and more than 2,937 tonnes of chemical weapons have been destroyed. There have been 578 nuclear weapons transport train shipments. The safety and security of nuclear weapons storage have been upgraded at 50 nuclear facilities operated by the Navy, 25 storage facilities operated by the Strategic Rocket Forces, and two weapons facilities operated by the Rosatom state corporation. In addition, 39 biological monitoring stations have been built and equipped as part of the program.[22]

By 2013, projects in all the aforementioned areas (i.e. destruction of missiles, warheads, nuclear submarines, etc.) had very nearly reached the targets originally set for 2017. For example, Russia and the United States had originally planned to dismantle about 9,280 nuclear warheads as part of the Nunn-Lugar Program by 2017. As already stated, by 2013 a total of 7,610 warheads had been destroyed; in other words, by 2013 the two sides had fulfilled 82 percent of the 2017 target. The situation

[20] Agreement between the United States of America and the Russian Federation Concerning the Safe and Secure Transportation, Storage and Destruction of Weapons and the Prevention of Weapons Proliferation (Washington, June 17, 1992). *PIR Center website*, http://www.pircenter.org/articles/1294-soglashenie-mezhdu-rossijskoj-federaciej-i-soedinennymi-shtatami-ameriki-otnositelno-bezopasnyh-i-nadezhnyh-perevozki-hraneniya-i-unichtozhenie-oruzhiya-i-predotvraschenie-rasprostraneniya-oruzhiya-vashington-17-iyunya-1992-g (Retrieved on June 27, 2013).

[21] Kozichev Evgeny. How the Nunn-Lugar Program worked. Background. *Kommersant*. October 10, 2012. No 190 (4975), http://www.kommersant.ru/doc/2040919 (Retrieved on May 22, 2013).

[22] The Nunn-Lugar Scorecard – Senator Dick Lugar. January 2013. http://web.archive.org/web/20121211221110/http:/www.lugar.senate.gov/nunnlugar/scorecard.html (Retrieved on June 27, 2013).

was similar in such areas as ICBM destruction (87 percent of the 2017 target); building and equipping biological monitoring stations (63 percent); SLBM destruction (85 percent); destruction of ICBM silos (82 percent); and nuclear weapons transportation (71 percent).

The following targets have already been fully met:

- destruction of air-to-surface nuclear missiles
- destruction of strategic bombers
- destruction of nuclear testing tunnels
- nuclear weapons storage site physical protection upgrades[23]

The Nunn-Lugar Program has brought Russia substantial benefits - especially in those years when the country was facing certain difficulties addressing its nuclear security challenges on its own due to the dire state of its economy. During that period, the advantages of the program substantially outweighed the disadvantages outlined above (i.e. having to grant foreign citizens access to restricted Russian facilities; allowing these citizens various sweeping privileges on Russian territory; ineffective use of funds, etc.). At this time, it is safe to say that the Nunn-Lugar Program has fulfilled its historic mission. It has made a contribution to neutralizing nuclear security threats on Russian territory. Clearly, it no longer makes sense for Russia to continue to put its sensitive information at risk for the sake of the continuation of the program. The downside is that once the program has ended, Russia will have to allocate $300-400 million every year for several years to come toward the destruction of dismantling nuclear warheads and achieving other objectives previously financed by the program. It is possible that the end of the program, which meant substantial financial savings for Russia, will force the country to review some of its defense spending plans.[24] But the upside is that Russia will now have greater freedom to pursue R&D in defense and other areas, without fearing that sensitive information regarding Russia's weapons development will somehow fall into the hands of foreign citizens visiting Russian nuclear facilities as part an inspection.

For fairness' sake it must be said that the amount of sensitive information falling into the hands of U.S. inspectors overseeing the spending of American funds in Russia was not that great. As part of their inspection visits these inspectors were given access only to the perimeter of restricted Russian facilities. They had no way of obtaining any information that would threaten Russian security if it fell into the wrong hands.

Be that as it may, Russia still had to end its participation in the Nunn-Lugar Program, if only for considerations of prestige. Compared to the situation in the 1990s, when the program was launched, Russia has come to play a far greater role on the international arena. It was no longer fitting for the country to remain a recipient of U.S. assistance, and to prolong agreements containing discriminatory clauses. Having become once again one of the leaders of the international community, Russia was in a position to press for the signing of a new nuclear cooperation agreement with the United States. This had to be a kind of agreement that puts both parties on an equal footing, and reflects the reality of today, rather than the situation that existed in the

[23] The Nunn-Lugar Scorecard – Senator Dick Lugar. January 2013. http://web.archive.org/web/20121211221110/http:/www.lugar.senate.gov/nunnlugar/scorecard.html (Retrieved on June 27, 2013).

[24] Chernenko Elena, Safronov Ivan, Belyaninov Kirill. The Nunn-Lugar account to be sent to the Russian Finance Ministry. *Kommersant*. No 195 (4980), October 17, 2012

1990s and 2000s. That is why the Russian leadership had decided as far back as October 2012 not to prolong the Nunn-Lugar Program after the expiration of its term in June 2013.[25]

Nevertheless, it would not make much sense to abandon all cooperation with the United States in areas that fall under the scope of the program. That is why the June 17, 1992 Agreement is now being replaced by a new program of Russian-U.S. cooperation, which is much more compact in terms of its financing and the number of its projects. Russia first tried to initiate such new program back in 2006, when the Russian leadership was hotly debating the question of whether to prolong the Nunn-Lugar Program for another seven-year term. That is when Russia first indicated that it might be willing to pull out from the program because of Washington's reluctance to address Russian concerns. In the end, however, Russia agreed to prolong the agreement on terms that favored the United States. That was partly because many Russian officials at the Rosatom state corporation, the MOD, and the Foreign Ministry saw the program as a well-established mechanism of addressing the challenges Russia was facing in the nuclear area, and did not want to lose that mechanism.

Due to the importance of resolving nuclear nonproliferation issues, U.S. and Russian leaders showed their readiness to look for a compromise solution on the new nuclear cooperation agreement between Russia and the United States to replace the obsolete NLP. The importance of Russian-U.S. cooperation boiled down to the fact that one party was helping the other to resolve nuclear security issues that were putting the whole world at risk; that was the case during the first years of the NLP, but not any longer. At this moment the value of continued nuclear cooperation between the two countries lies primarily in the area of cooperative efforts to eliminate and destroy nuclear materials and chemical weapons in third countries (especially the CIS states), and in developing measures to bolster the security of nuclear facilities that exist in those countries. These measures make it possible to establish cooperation between professionals and build trust between nations.[26] They also allow the existing experience and expertise to be but to a good use as part of cooperative efforts in third countries, i.e. the new and potential Global Partnership members where nuclear security issues have yet to be fully resolved.

As a result, on June 14, 2013 the Russian ambassador to Washington, Sergey Kislyak, and acting U.S. under secretary of state, Rose Gottemoeller, signed new agreements in Washington that have essentially replaced the 1992 agreement, which expired on June 17, 2013. The provisional application of the newly signed agreements began on that date. They will fully enter into force once they have been ratified by the relevant Russian and U.S. bodies. The official titles of the newly-signed documents are as follows:

1) The Agreement between the Government of the Russian Federation and the Government of the United States on Cooperation under the Framework Agreement on a Multilateral Nuclear Environmental Programme in the Russian Federation of May 21, 2003, and the June 14, 2013 Protocol between the Government of the United States of America and the Government of the Russian Federation to the Framework

[25] Chernenko Elena, Safronov Ivan. Russia intends to continue reducing its nuclear arsenal using its own resources. *Kommersant*. October 10, 2012. No 190 (4975), http://www.kommersant.ru/doc/2041015 (Retrieved on May 22, 2013).
[26] Ibid.

Agreement on a Multilateral Nuclear Environmental Programme in the Russian Federation of May 21, 2003[27] (hereinafter referred to as MNEPR, or the June 14, 2013 Agreement);

2) Protocol between the Government of the United States of America and the Government of the Russian Federation to the Framework Agreement on a Multilateral Nuclear Environmental Programme in the Russian Federation of May 21, 2003[28] (hereinafter referred to as the June 14, 2013 Protocol).

These two documents take into account the lessons learned from the Nunn-Lugar Program, including the negative ones. For example, the Protocol signed on June 14 addresses the contentious problem of liability for intentional nuclear damage. Also, Paragraph 3 Article 3 of the agreement on cooperation under the MNEPR program contains measures that resolve Russian concerns about possible leakage of sensitive information during visits to restricted Russian facilities by U.S. inspectors. The paragraph reads that if access to Russian facilities is "restricted by Russian legislation, the executive agencies shall develop joint, flexible and mutually acceptable procedures that do not require access by representatives of the United States".[29] This means that Washington has essentially agreed not to apply the aforementioned requirement of U.S. legislation for compulsory visits by U.S. inspectors to facilities where some projects are funded by the United States. On the whole, it is safe to say that the newly signed agreements reflect Russia's interests to a far greater extent than the now-expired 1992 agreement.

The new Russian-U.S. agreements have a much smaller scope compared to the 1992 agreement. In addition to nuclear cooperation, the Nunn-Lugar Program also covered cooperation in addressing the problem of destroying chemical weapons stockpiles. The MNEPR program, which now defines the scope of Russian-U.S. cooperation in the area of nonproliferation, is limited to nuclear-environmental issues. That is why the agencies tasked by the Russian government with implementing the June 14, 2013 agreement and protocol are the Rosatom state corporation, the Federal Service for Environmental, Technological, and Atomic Supervision, and the Federal Customs Service. The scope of bilateral Russian-U.S. cooperation on nonproliferation therefore does not include chemical weapons or bio-security. Of course, Russia is completing the chemical weapons destruction program using its own funds; the Americans have stopped financing that program, so there is no great scope here for continued Russia-U.S. cooperation. In contrast, the need for cooperation on bio-security issues is becoming increasingly obvious. Previous PIR Center papers contain a recommendation to include cooperation in countering bio-security threats in the scope of any future agreement to be signed after the end of the Nunn-Lugar

[27] Russian-U.S. agreement on cooperation under the MNEPR agreement (Washington, June 14, 2013). *PIR Center website*, http://pircenter.org/articles/1333-soglashenie-mezhdu-rossiej-i-ssha-o-sotrudnichestve-po-soglasheniyu-o-mnepr-vashington-14-iyunya-2013-g (Retrieved on June 27, 2013).

[28] Protocol between the Government of the Russian Federation and the Government of the United States on the Framework Agreement on a Multilateral Nuclear Environmental Programme in the Russian Federation of May 21, 2003. *PIR Center website*. http://pircenter.org/media/content/files/11/13718025061.pdf (Retrieved on June 27, 2013).

[29] Russian-U.S. agreement on cooperation under the MNEPR agreement (Washington, June 14, 2013). *PIR Center website*, http://pircenter.org/articles/1333-soglashenie-mezhdu-rossiej-i-ssha-o-sotrudnichestve-po-soglasheniyu-o-mnepr-vashington-14-iyunya-2013-g (Retrieved on June 27, 2013).

Program.[30] As we can see, that recommendation has not been followed. Nevertheless, it is obvious that the United States and Russia must pursue cooperation in this area because acts of terrorism involving the use of biological weapons are far more likely than acts of nuclear terrorism.

On the other hand, the decision by Russia and the United States not to include bio-security issues in the new agreement, and to limit the scope of that agreement to nuclear-environmental issues makes certain sense. As far as the two countries' relations are concerned, bio-security issues are currently even more contentious than nuclear security issues. That is why they could only hinder progress towards reaching a new Russian-U.S. agreement. The controversy in this area is caused by lingering stereotypes in the United States; the Americans still believe that Russia is pursuing biological weapons research, and that it must allow international inspectors to visit Russian biological facilities in order to ascertain the peaceful nature of its programs. What is more, the Americans are refusing to allow any such inspections of their own biological facilities; they claim that they do not pursue biological weapons research, so such inspection visits to their own facilities are unnecessary. In addition, the United States and its allies are hindering Russia's accession to the Australian Group (an organization that includes 33 countries and deals with preventing chemical and biological weapons proliferation) under the pretext that Russia is a potential proliferator of biological weapons. The manifestly biased and unfounded position adopted by the United States on the issue of Russia's alleged biological weapons research is hindering constructive Russian-U.S. dialogue on countering bio-security threats.

Besides, it is obvious that bio-security threats cannot be addressed in a bilateral cooperation format anyway. They require global solutions. One promising multilateral international mechanism of addressing this issue is the Global Partnership Against the Spread of Weapons and Materials of Mass Destruction (Global Partnership). Looking at the experience of Global Partnership so far, some useful conclusions can be made for future cooperation.

Global Partnership is a G8 program launched at a summit in Kananaskis, Canada, in June 2002. Initially the program's objectives did not include combating nuclear proliferation at the level of states; that was seen as the remit of the NPT regime and the IAEA. The main purpose of the program was to prevent weapons and materials of mass destruction from falling into the hands of non-state actors, i.e. terrorists.[31]

The G8 nations and the donor states that have joined them are providing financial assistance to countries which have weapons and/or materials of mass destruction on their territory, and which don't have sufficient capacity of their own to ensure adequate security measures for such weapons and materials, as well as to eliminate and destroy them. Essentially, the donor countries have been providing assistance to the recipient countries to prevent the latter from becoming a source of WMD terrorism.

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[30] Orlov Vladimir, Cheban Alexander. Life after death. Will New Partnership replace the Nunn-Lugar Program? *Rossiya v globalnoy politike*. 2013. No 2 (March-April). P. 110, http://pircenter.org/articles/1314-zhizn-posle-smerti-pridet-li-novoe-partnerstvo-na-smenu-programme-nanna-lugara (Retrieved on June 27, 2013).

[31] Global Partnership Against the Spread of Weapons and Materials of Mass Destruction. Reference/Edited by V.A. Orlov. Moscow: Prava cheloveka, 2005. P. 10.

The Global Partnership program now includes 25 states, including the G8 nations (Britain, Canada, France, Germany, Italy, Japan, Russia, and the United States), as well as Australia, Belgium, the Czech Republic, Denmark, the European Union, Ireland, Kazakhstan, Mexico, the Netherlands, New Zealand, Norway, Poland, South Korea, Switzerland, Sweden, and Ukraine. The Philippines has applied to join.[32]

In accordance with documents adopted at Kananaskis, the goal of reducing the risks of WMD falling into the hands of terrorists was to be achieved through the following measures in the recipient countries:

- Chemical weapons destruction
- Destruction of nuclear submarines
- Elimination of nuclear materials
- Engaging weapons scientists (especially those involved in WMD programs) in various civilian projects[33]

Initially the program was supposed to run for a 10-year period until 2012. A total of $21 billion had been spent over that decade, including 10bn allocated by the United States, 2bn by Russia, and about 1bn by Canada.[34] The remaining 20 donor countries provided $7 billion between them. Most of the money (about 70 per cent) was spent in Russia. On the whole, the Global Partnership program had met its objective of reducing the risks of WMD proliferation from the former Soviet countries.

But that was not the end of the Global Partnership program. In 2011 the G8 countries agreed at the summit in Deauville to prolong the program for another 10 years until 2022. The overall funding figure was not announced, but some individual countries undertook financial commitments with regard to GP projects. At the 2010 Nuclear Security Summit in Washington, President Barack Obama announced a U.S. commitment to make $10 billion available for the GP program in 2012-2022.[35] At the second Nuclear Security Summit in Seoul in 2012, Canada said it would provide $367 million in 2013-2018.[36]

Since WMD terrorism threats had largely been neutralized in the former Soviet countries, the G8 Summit in Deauville decided to shift the focus of Global Partnership from the CIS to other regions where there are weapons or materials of mass destruction, and a risk of them falling into the hands of terrorists. Documents

[32] Cheban Alexander. International mechanisms of countering nuclear proliferation and Russia's interests: the examples of Global Partnership and the ISTC. *Indeks Bezopasnosti*. 2013. No 3-4 (102-103). P. 141. http://pircenter.org/media/content/files/11/13613052500.pdf (Retrieved on June 27, 2013).

[33] Statement by G8 Leaders: The G8 Global Partnership Against the Spread of Weapons and Materials of Mass Destruction. Kananaskis, Canada, http://www.state.gov/documents/organization/184977.pdf (Retrieved on June 12, 2013).

[34] Global Partnership Working Group — GPWG Annual Report Consolidated Report Data 2012. Annex. 88 p. http://www.state.gov/documents/organization/183039.pdf (Retrieved on June 27, 2013).

[35] Office of the Press Secretary, The White House. Nuclear Security Summit National Statement of the United States. 2010, April 13, http://www.whitehouse.gov/the-press-office/nuclear-securitysummit-national-statement-united-states (Retrieved on June 27, 2013).

[36] Nolke Sabine. The G-8 Global Partnership Against the Spread of WMD. Speech at the conference The *Apex of Influence — How Summit Meetings Build Multilateral Cooperation*. Chicago. 2012, 10 May, http://fora.tv/2012/05/10/The_G-8_Global_Partnership_Against_the_Spread_of_WMD#fullprogram (Retrieved on September 12, 2012).

agreed in Deauville highlighted such priority regions as the Caucasus, Central and Southeast Asia, Africa, the Middle East, and Latin America.[37] They also made a separate mention of China, India, Brazil, and South Africa.[38] The plan is to invite all these regions and countries to become GP members.

Assistance will be provided in the following priority areas:

- improving nuclear and radiation security
- improving bio-security
- facilitating the implementation of UN Security Council Resolution 1540
- projects focusing on weapons scientists
- addressing issues related to chemical weapons destruction.[39]

Russia supported such a shift in the Global Partnership's target countries and priorities. At the same time, Russia was determined to ensure the completion of projects on its own territory after 2012, especially in such areas as the destruction of chemical weapons and nuclear submarines. At the summit in Deauville, Moscow managed to secure commitments to that effect from the donor countries. These commitments were spelled out in separate clauses of the G8 Deauville Summit documents, including:

- disposal of spent nuclear fuel from the dismantled nuclear submarines
- raising sunken nuclear objects
- disposal of radio-isotopic thermal electric generators (RITEG)
- disposal of weapons-grade plutonium and dismantling fissile material production facilities[40]

The lessons that have been learned from the experience of the Global Partnership program so far are largely the same as for the Nunn-Lugar Program. GP has also suffered from such issues as inefficient use of financial resources, which was typical of NLP. Up to 50 per cent of the money allocated for GP has ended up in the accounts of foreign subcontractors. There was also the familiar problem of foreign citizens gaining access to restricted Russian facilities. Obviously, that negative experience must be taken into account during the planning and implementation of GP projects in third countries. One positive example that has already been mentioned is Article 3 of the July 14, 2013 Russian-U.S. agreement, which essentially stipulates that restricted facilities are not subject to inspections.

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[37] Report on the G8 Global Partnership Against the Spread of Weapons and Materials of Mass Destruction. 2011, 26–28 May, http://www.g20-g8.com/g8-g20/g8/english/the-2011-summit/declarations-and-reports/appendices/report-on-the-g8-global-partnership-angainstthe.1353.html (Retrieved on September 12, 2012).

[38] G8 Global Partnership — Assessment and Options for Future Programming. 2011, 26–28 May, http://www.g20-g8.com/g8-g20/g8/english/the-2011-summit/declarations-andreports/appendices/g8-global-partnership-assessment-and-options-for.1354.html (Retrieved on September 12, 2012)

[39] G8 Global Partnership — Assessment and Options for Future Programming. 2011, 26–28 May, http://www.g20-g8.com/g8-g20/g8/english/the-2011-summit/declarations-andreports/appendices/g8-global-partnership-assessment-and-options-for.1354.html (Retrieved on September 12, 2012)

[40] G8 Global Partnership — Assessment and Options for Future Programming. 2011, 26–28 May, http://www.g20-g8.com/g8-g20/g8/english/the-2011-summit/declarations-andreports/appendices/g8-global-partnership-assessment-and-options-for.1354.html (Retrieved on September 12, 2012)

Another thing worth noting is that at this moment the Global Partnership program is undergoing a difficult period of reform. The legal framework of Global Partnership consists of the 2003 MNEPR agreement, and so far, no radically new mechanisms of implementing the program have been developed. It is now being decided which individual third countries the Global Partnership should engage next.

Nevertheless, proposals to that effect are already being drawn up. The idea is to use the experience of both the Nunn-Lugar Program and the Global Partnership for cooperation projects in third countries. One of the proposals, for example, is to use the mechanisms developed as part of NLP for addressing nonproliferation challenges in Southeast Asia[41], where there is a clear need for improving physical protection of radiation sources, and where there are additional risks related to these countries' nuclear energy development plans.[42]

Also, concrete steps have already been made to use the experience of the Nunn-Lugar Program and the Global Partnership in developing threat reduction programs in the Middle East and North Africa. On May 22, 2013, the U.S. Senator Jeanne Shaheen introduced a bill to provide for a Next Generation Cooperative Threat Reduction Strategy, and for other purposes (also known as the Next Generation Cooperative Threat Reduction Act of 2013). The essence of the bill is to provide financial assistance to Middle Eastern and North African states in addressing their issues related to weapons and materials of mass destruction. The proposed mechanisms for providing such assistance are similar to the mechanisms used in the Nunn-Lugar Program. In particular, the bill proposes an assistance program for the Middle East and North Africa covering the 2014-2019 period, with $30 million to be spent on the program every year.[43]

The bill has already passed the second hearing; it has now been submitted for review to the Senate Committee on Foreign Relations.[44]

To summarize this chapter, both positive and negative lessons can be drawn from the Nunn-Lugar Program and the Global Partnership. On the plus side, these programs have developed a unique mechanism of addressing the challenges posed by WMD-related materials. The downsides include inefficient use of resources, as well as the controversy over liability for nuclear damage and over the risk of leakage of sensitive technologies. Obviously, preventing these issues from flaring up during cooperation projects in third countries will require the establishment of more equal relations with these countries in the spirit of true partnership, as far as the implementation of these projects is concerned.

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[42] Klyuchanskaya Svetlana. Prospects for cooperation between Russia and the Southeast Asian countries in strategic areas. *Indeks Bezopasnosti*. 2011. No 4 (99). P. 64.

[43] S. 1021: Next Generation Cooperative Threat Reduction Act of 2013. 113th Congress, 2013–2015. Text as of May 22, 2013 (Introduced), http://www.govtrack.us/congress/bills/113/s1021/text (Retrieved on June 27, 2013).

[44] S. 1021: Next Generation Cooperative Threat Reduction Act of 2013. 113th Congress, 2013–2015, http://www.govtrack.us/congress/bills/113/s1021 (Retrieved on June 27, 2013).

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Chapter 3. RUSSIAN-U.S. COOPERATION IN NUCLEAR SECURITY: THE EXPERIENCE OF THE MPC&A PROGRAM

Dmitry Kovchegin

The program to upgrade material protection, control, and accounting (MPC&A) systems at Russian nuclear facilities is an essential component of Russian-U.S. cooperation in the area of nuclear threat reduction. Not formally a part of the Cooperative Threat Reduction (CTR) Program, the MPC&A Program is being implemented under a separate MPC&A agreement between the Russian and U.S. governments, signed on October 2, 1999. Bilateral cooperation in the area of nuclear materials security has been running since 1992 under different agreements between the two governments, and also between U.S. national laboratories and Russian nuclear institutes. However, for the purposes of this work, we will discuss this cooperation in the form in which it has been implemented since 1999.

Although not formally covered by the CTR Program, the implementation of the MPC&A Program is directly related to the 1992 Framework Agreement[45], which is the legal foundation of the CTR Program. Under Article 1 of the MPC&A Agreement, "This Agreement and all activities undertaken in accordance with this Agreement shall be subject to and governed by the provisions of the Agreement Between the United States of America and the Russian Federation Concerning the Safe and Secure Transportation, Storage and Destruction of Weapons and the Prevention of Weapons Proliferation of June 17, 1992, as extended and amended by the Protocol signed on June 15 and 16, 1999," whereas Article 10 limits the effective period of the MPC&A Program by the expiration date of the Framework Agreement[46]. Thus, expiration of the Framework Agreement will directly affect the implementation of MPC&A cooperation.

In the fall of 2012, Russia announced its refusal to continue cooperation on the terms set out in the 1992 Framework Agreement[47]. After June 17, 2013, cooperation continued on new terms that suited both parties, as spelled out in new agreements, namely in the Agreement on Cooperation on the Multilateral Nuclear Environmental

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[45] Agreement Between the Government of the Russian Federation and the Government of the United States of America Concerning the Safe and Reliable Transportation, Storage, and Destruction of Weapons and the Prevention of Weapons Proliferation. Washington, June 17, 1992. PIR Center website, http://pircenter.org/media/content/files/11/13613608360.pdf (Retrieved on June 27, 2013).

[46] Agreement Between the Government of the Russian Federation and the Government of the United States of America Regarding Cooperation in the Area of Nuclear Material Physical Protection, Control, and Accounting. October 2, 1999. PIR Center website, http://www.pircenter.org/media/content/files/9/13524028590.pdf (Retrieved on June 27, 2013).

[47] Chernenko Yelena, Safronov Ivan. "Absence of a Program. Russia intends to dispose of nuclear arsenals using its own Resources from now on." Kommersant. October 10, 2012. No 190 (4975), http://www.kommersant.ru/doc/2041015 (Retrieved on June 27, 2013).

Program (MNEPR) Agreement[48] and the related Protocol of June 14, 2013.[49] It is therefore expedient to discuss the lines and forms of Russian-U.S. MPC&A interaction, seeing as the sides deemed it necessary to continue this cooperation.

Scope of cooperation under the MPC&A Program

The aim of cooperation under the 1992 Framework Agreement was to destroy nuclear weapons and ensure their safe and secure storage and transportation in the process. However, ensuring the security of nuclear weapons per se far from eliminates the risk of their proliferation. Apart from direct theft of a complete nuclear device, possible scenarios of illegitimate acquisition of nuclear weapons include manufacturing a nuclear explosive device from stolen nuclear materials. In fact, this scenario is considered to be the more probable, since facilities used for the storage and handling of nuclear weapons are normally much better protected than those used for the storage and handling of nuclear materials. This problem became particularly acute for Russia in the early 1990s, after the Soviet system for the protection of nuclear facilities and materials had disappeared in the wake of Soviet Union's disintegration. It was in realizing this threat that Russia and the United States agreed the necessity of MPC&A cooperation.

This cooperation involves upgrading MPC&A systems at individual nuclear facilities and setting up a national nuclear material security infrastructure. Upgrades to individual facilities involve the procurement, installation, and operational support of MPC&A equipment, as well as the training of personnel involved in MPC&A activities. An additional aspect of MPC&A activity is the consolidation of nuclear materials (both through reducing the number of nuclear facilities and limiting the areas within individual facilities where nuclear materials are handled or stored), in order to reduce the number of facilities potentially attractive to terrorists and bring down the security costs.

The effort to set up a national nuclear material security infrastructure involves drawing up regulatory documents to govern MPC&A activities, creating a system of federal agency control, setting up national training centers, and developing training programs for MPC&A specialists.

The U.S. executive agent for the MPC&A Program is the Department of Energy (DOE), and the Russian executive agent is the Rosatom State Corporation, which has inherited the powers and remit of the former Minatom in this respect. The U.S. portion of cooperation is effected through DOE national laboratories, with the participation of a number of subcontractors. The Russian portion of cooperation is effected through the nuclear facilities which are being upgraded. The list of such

[48] Agreement Between Russia and the USA on cooperation on the MNEPR Agreement (Washington, June 14, 2013). PIR Center website, http://pircenter.org/articles/1333-soglashenie-mezhdu-rossiej-i-ssha-o-sotrudnichestve-po-soglasheniyu-o-mnepr-vashington-14-iyunya-2013-g (Retrieved on June 27, 2013).

[49] Protocol Between the Government of the Russian Federation and the Government of the United States of America to the Framework Agreement on a Multilateral Nuclear Environmental Program in the Russian Federation of 21 May 2003. PIR Center website, http://pircenter.org/media/content/files/11/13718025061.pdf (Retrieved on June 27, 2013).

facilities covers virtually all the establishments of the Russian nuclear complex involved in the handling of nuclear materials that can be used in the manufacture of a nuclear explosive device, with the exception of the facilities engaged in the assembly and dismantling of nuclear warheads. Also participating in this cooperation are Russian specialized organizations engaged in MPC&A activities: developers and manufacturers of associated equipment and systems; organizations providing research and technical support; training centers; certification agencies; etc. Any specific projects are carried out under contracts between DOE national laboratories and Russian organizations[50].

Subject to a separate agreement, the U.S. DOE cooperates with Russia's *Federal Service for Ecological, Technological, and Nuclear Supervision (Rostekhnadzor)* to develop the latter's MPC&A licensing and supervision capabilities.

A significant portion of the challenges originally facing the sides have been solved by now. The following achievements merit mentioning:

1. The Russian nuclear facilities covered by the Program have been equipped with advanced security systems.
2. Two national centers have been set up to train specialists in nuclear material protection, control and accounting. Every year these two centers deliver dozens of training courses that focus on various MPC&A aspects, and which are attended by hundreds of specialists working at Russian nuclear facilities.
3. A significant amount of MPC&A-related regulatory documents have been developed.

At present, the primary objective of MPC&A cooperation is to ensure the sustainability of the upgrades that have been carried out, in order for the Russian nuclear facilities thus upgraded to be able to maintain the required level of nuclear security indefinitely after U.S. support has been discontinued.

The grounds for revising the existing agreement

The Framework Agreement, which establishes the terms and procedures for implementing both the CTR Program and the MPC&A Program, was signed at a time when Russia needed urgent support and was therefore prepared to agree to terms that were more advantageous to the United States. The situation has since changed: a significant number of challenges faced by Russia in the early 1990s have already been solved, and the country has developed significant capabilities for solving the remaining challenges. In addition, Russia has changed its views of the potential costs and benefits arising from the implementation of the Agreement in the form in which it was signed in 1992 and twice since prolonged, in 1999 and 2006. In actual fact, both sides have long since acknowledged the obsolescence of the original Agreement: the Plutonium Management and Disposition Agreement, signed in 2000[51], and the related

[50] Agreement Between the Government of the Russian Federation and the Government of the United States of America Regarding Cooperation in the Area of Nuclear Material Physical Protection, Control, and Accounting. October 2, 1999. PIR Center website, http://www.pircenter.org/media/content/files/9/13524028590.pdf (Retrieved on June 27, 2013).

[51] Agreement Between the Government of The Russian Federation and the Government of The United States Of America Concerning the Management and

Protocol of 2006[52], create a different framework for the implementation of a similar agreement, which would suit the Russian side much better. New agreements signed in 2013 de-facto replace the obsolete 1992 Agreement.

As applied to MPC&A cooperation, the following issues of significant concern to the Russian side should be highlighted:

1. Security risks arising from possible leaks of information about the Russian nuclear complex. Under the MPC&A Agreement, the U.S. side has the right to access those areas at Russian nuclear facilities where MPC&A operations are being carried out, in order to make sure the allocated funds are being used appropriately. In keeping with this provision of the Agreement, U.S. specialists regularly visit Russian nuclear facilities. This creates additional risks with regard to information which is deemed secret under Russian law. MPC&A cooperation also involves direct contacts between U.S. specialists and their Russian counterparts that have access to sensitive information. This circumstance may be regarded by the Russian side as an additional security risk.
2. U.S. financial support under the MPC&A Agreement is conditional on the Russian side's consent to implementing those MPC&A projects and solutions which suit the U.S. side. This presents no issues in most instances, since the level of agreement between the Russian and U.S. specialists on various aspects of nuclear security is quite high. There are, however, a number of matters of principle on which the sides have failed to reach an agreement despite years of discussions. On some of these matters, the sides have *agreed to disagree.* Consequently, the sides do not cooperate in these areas, and the Russian side finances all associated activities independently. Negotiations are still on-going on other matters of principle. Overall, such disagreements do nothing to contribute to a positive climate of cooperation.
3. Unlike in other areas of nuclear cooperation, such as the disposition of weapons-grade plutonium, transportation of nuclear warheads destined for disposal, or the scrapping of retired nuclear-powered submarines, the question of liability for possible damage does not present a great problem within the MPC&A Program. This is due both to the nature of the MPC&A activity and to the way it is organized: U.S. contractors and personnel do not carry out any practical operations at Russian nuclear facilities, but rather perform expert and supervisory functions. Nevertheless, the existence of the liability provision in its original wording cannot be taken off the list of factors with which the Russian side is unhappy.

Disposition of Plutonium Designated as no Longer Required for Defense Purposes and Related Cooperation. August 29-September 1, 2000. PIR Center website, http://pircenter.org/articles/890-soglashenie-mezhdu-pravitelstvom-rf-i-pravitelstvom-ssha-ob-utilizacii-plutoniya-zayavlennogo-kak-plutonij-ne-yavlyayuschijsya-bolee-neobhodimym-dlya-celej-oborony-obrascheniyu-s-nim (Retrieved on June 27, 2013).

[52] Protocol to the Agreement Between the Government of The Russian Federation and the Government of The United States Of America Concerning the Management and Disposition of Plutonium Designated as no Longer Required for Defense Purposes and Related Cooperation. September 15, 2006. Official website of the Russian Foreign Ministry, http://www.mid.ru/bdomp/spd_md.nsf/0/2FE67462F501D7C244257B8E0034BE0F (Retrieved on June 27, 2013).

Although the terms of MPC&A cooperation used to suit the United States, Washington may also be interested in reaching a new agreement. The U.S. side does not conceal its desire to reduce the burden on the country's budget in the foreseeable future by shifting all responsibility for ensuring the security of Russian nuclear facilities and materials, including any associated costs, onto the Russian side. A forced cessation of cooperation on the original terms is not the preferred way of achieving this goal, but it could contribute towards this end. This factor is becoming increasingly relevant in the light of the U.S. budget constraints.

Taking into account the aforementioned circumstances, let us now consider the possible areas in which the two sides could cooperate on mutually acceptable terms.

Cooperation to upgrade individual nuclear facilities should be discontinued in the near future

Until now, the primary aspect of cooperation in the area of nuclear security involved improvements to MPC&A systems at individual Russian nuclear facilities with financial support from the United States. The funds allocated for this purpose would be used to procure and install new equipment, cover its operating costs, organize personnel training, etc. Seeing as this aspect of cooperation has been running since the mid-1990s, in individual instances U.S. funding has recently been spent on replacing equipment which was delivered in the early phases of the program. This situation leads to an unacceptable level of dependence on external assistance, and to the shifting of responsibility for the security of Russian nuclear facilities and materials onto the U.S. side. At the same time, the Russian side has been paying insufficient attention to ensuring the sustainability of its security systems beyond the inevitable reduction, and eventual discontinuation, of U.S. support.

Discontinuing cooperation at individual nuclear facilities will help settle the issue of liability for possible damage, while simultaneously eliminating Russia's concerns as to possible U.S. access to sensitive information. Additionally, this will prompt the management of Russian nuclear facilities to take greater responsibility for the security of their facilities, since they will no longer be able to rely on U.S. support in addressing current issues.

Cooperation at individual facilities could be continued on a number of high-priority issues, provided that the sides manage to align their approaches to settling these issues and make sure the funds allocated for the purpose are used appropriately. Such issues could include further consolidation of nuclear materials, as well as initial physical inventory taking for the purpose of establishing the actual stocks of nuclear materials.

Cooperation to develop nuclear security infrastructure

Cooperation under a new agreement should be centered on issues of mutual interest. Ideally, the sides should bear the responsibility for the expenses incurred due to the involvement of their specialists and organizations in joint projects.

Discussed below are some issues that could present mutual interest.

Aligning approaches to threat assessment and system performance evaluation

The key question that must be answered when designing nuclear materials security systems is what kind of threats these systems may have to face. The requirements for protection systems are drawn up on the basis of the threats facing each individual facility.

Owing to the sensitive nature of information involved, detailed discussion of any specific threats will remain unlikely for a long time, although it would be desirable for both countries' special services to share information of a general nature about threats and hypothetical scenarios involving unauthorized activities targeting nuclear materials and facilities.

At the same time, coordination of approaches to assessing potential threats and evaluating the effectiveness of security systems, including methods for analyzing these systems' vulnerabilities, evaluating their performance, and conducting performance testing, present a much lower risk of disclosure of sensitive information, while promising significant benefits. Cooperation in this area would help ensure an equal level of protection against similar threats for Russian and U.S. nuclear materials and facilities.

Sharing best practices

One of the key achievements of bilateral nuclear security cooperation is the opportunity for Russian and U.S. specialists to share experience on issues of mutual interest, including with regard to equipment, technology, procedures, etc. This opportunity has primarily benefited Russian specialists, since the development of advanced MPC&A systems in Russia began considerably later than in the United States; therefore, drawing on U.S. experience in this field has helped Russia achieve the targets of cooperation much faster than it would have been possible otherwise.

This cooperation can and should be continued in various forms under a new agreement, including through joint seminars and conferences, the development and implementation of specialist training programs, joint drills and exercises, exchange of information about tests on various equipment, joint R&D activity, etc.

Ensuring the sustainability of MPC&A systems

As mentioned above, the primary objective of current MPC&A cooperation is to ensure the sustainability of the upgrades carried out at Russian nuclear facilities, so that they can maintain the required level of nuclear security indefinitely after discontinuation of U.S. support. The sustainability issue is of particular importance to Russia. However, the current situation in this area still requires much improvement.

One of the key issues here is that the Russian and U.S. sides understand the term *sustainability* differently.

In Russia, as a rule, the term is interpreted along the lines of maintaining the operability of equipment, including repairs, supplies of spare parts and consumables, and also replacement of unserviceable equipment. Correspondingly, many nuclear facilities see their sustainability role as carrying out running repairs, procuring spare parts, consumables and new equipment with the money provided by the U.S. side.

In reality, however, the U.S. side interprets *sustainability* as a set of management practices adapted to the MPC&A specifics, which allow for successful achievement of the objectives set before each individual system for an indefinite period of time and in a situation of constrained resources. If the Russian side embraced this interpretation of the term, this could boost its interest in MPC&A cooperation, opening new avenues of joint work.

In order to be able to appraise the progress achieved in this area, the sides have agreed a list of seven sustainability elements, each complete with the relevant compliance criterion. If a nuclear facility meets the seven criteria, it is understood to be prepared for sustained operation of its nuclear materials security systems without U.S. financial assistance. The elements and criteria are described in the table below:

Sustainability element	**Compliance criterion**
MPC&A organization	The facility has an established and documented MPC&A organization with clear roles and responsibilities, sufficient methods of interaction within and outside the facility, and a regularly updated MPC&A activity plan.
Site operating procedures	The facility has written procedures for all key MPC&A operations. These procedures are regularly revised and updated to keep them consistent with regulations and in line with any changes introduced at the facility that affect MPC&A operations.
Human resource management and site training	The facility has a personnel training plan based on analysis of training and qualifications requirements for each MPC&A position. The facility is capable of organizing personnel training both on site and at national training centers. Compliance with the plan is checked regularly.
Operational cost analysts	The facility conducts analysis of the costs associated with long- and short-term maintenance of the MPC&A system. The facility has a regularly updated budget plan reflecting the projected costs and sources of funding.
Equipment maintenance, repair, and calibration	The facility has a maintenance and repair plan for the purpose of maintaining MPC&A systems in operational condition. Compliance with this plan is checked regularly.
Performance testing and operational monitoring	The facility conducts regular threat assessment and MPC&A system performance evaluations to check the system's resilience to the identified threats. Any deficiencies are documented and used in developing an improvement plan.
Configuration management	The facility documents all planned changes to the MPC&A system, and evaluates them to verify that the system's effectiveness will not be compromised.

Source: Erastov Victor, Bolton Charles. Sustainability of MPC&A Systems Developed under U.S.-Russian Cooperation Program at Rosatom Sites and Organizations. Proceedings of INMM Annual Meeting, 2006.

The U.S. side has considerable experience and established practices to help ensure the sustainability of MPC&A systems.

The advantage of both the aforementioned sustainability criteria and the procedures used for their implementation is that they are universal. With very minor adjustments, they can be equally used for ensuring the security of nuclear materials and facilities, and for addressing a wide range of other issues facing Russian nuclear facilities. Therefore, Russian-U.S. cooperation in this relatively narrow field could help develop competencies in Russia that would have much wider application.

Russian-U.S. cooperation outside Russia

Russian and U.S. nuclear security expertise, and also the two countries' prior experience of cooperation for the purpose of improving nuclear security, can and should be used to protect nuclear materials outside Russia and the United States.

To ensure that such cooperation is effective, the sides must first agree on what they believe to be the most critical threats, i.e. threats which they are prepared to jointly counter. In a situation when the two sides have different perceptions of the existing threats, coordination of any specific aspects of cooperation is unlikely to succeed.

The following example illustrates the different threat assessment approaches that may affect the future of cooperation. For the United States, the top priority is to ensure nuclear security, particularly in terms of preventing theft of nuclear materials which can be used in the manufacture of a nuclear explosive device. Consequently, nuclear power plants running on low-enriched uranium fuel are outside its scope. Russia, for its part, while recognizing the threat of theft, is also concerned with the threats of radiation terrorism and acts of sabotage against nuclear power plants with potentially severe contamination consequences. Therefore, Russia's scope of concerns covers nuclear power plants and high-energy emission sources that contain no nuclear materials, such as radioisotope thermoelectric generators used as autonomous power sources for a variety of equipment in areas with no access to power grids.

The two sides can cooperate on those issues on which they have reached an agreement. On issues of interest to only one of the sides, Russia and the United States may work independently.

Russia and the United States could make a valuable contribution towards identifying approaches to international cooperation for nuclear security. Both countries have a wealth of experience cooperating in various bilateral and multilateral formats; this experience should be used in planning future cooperation with other countries. Among other things, this could help to avoid the mistakes previously made by Russia and the United States. The following are some of the lessons that could be learned from the past experience of Russian-U.S. cooperation:

1. From the very start, Russian-U.S. nuclear security cooperation has been based on a *donor-recipient* model. This has periodically created significant problems for the Russian participants, hampering the implementation of joint programs. This is not to say that the *donor-recipient* model will be absolutely inappropriate in cooperation with third countries. Nevertheless, during the planning stage and the later stages it would be important to consider the sides'

potential perception of this format of cooperation, and the ways in which such perception may influence their mutual relations.

2. Sustainability issues were put on the Russian-U.S. cooperation agenda much later than the launch of the joint programs. This created a number of issues, which have yet to be fully resolved. In providing assistance to third countries, the aspects of *exit strategy* without detriment to the results already achieved should be considered during the planning phase, before commencing any actual work. It is worth considering the possibility of including these aspects in the provisions of the agreements that will form the legal basis of such cooperation.
3. Instances have been known in the history of Russian-U.S. nuclear cooperation when certain U.S. practices could not be adopted in Russia without adjustments, owing to various regulatory or organizational restrictions, cultural differences, etc. It is important to take this circumstance into account, conduct a thorough analysis of the *environment* in the country being assisted, and consider the possibility of achieving the nuclear security targets with methods different from those used in the countries providing the assistance.

The above list is far from exhaustive. Russia and the United States must analyze their cooperation experience and jointly develop approaches that could be used for providing assistance to other countries. The following specific aspects of cooperation may be proposed on which the Russian and U.S. positions are close:

1. Promoting the notion that, while developing nuclear energy is every nation's right, such development also implies certain responsibilities, including the responsibility to ensure adequate levels of nuclear security. According to the Nonproliferation Treaty, developing a nuclear energy industry is an inalienable right of every country. This is often emphasized by nations which want to develop their own nuclear infrastructure. However, these countries should also clearly realize that such a right implies certain responsibilities. Another thing to note is that a number of international agreements impose obligations with regard to providing security of nuclear materials and facilities, which requires significant spending and access to advanced know-how and expertise. All of this should be taken into account when assessing any individual country's ability to ensure safe and secure operation of the nuclear facilities it wants to build.

2. Nuclear security standards. The regulatory requirements in Russia and the United States are more stringent than the minimum levels recommended in the existing IAEA guidelines. Russia and the United States must work together to make sure that their stringent security standards with regard to nuclear materials and facilities are also applied in other nations that operate nuclear facilities or possess nuclear materials. This area of cooperation also includes shared approaches to assessing threats and evaluating the effectiveness of the systems designed to counter those threats. As already mentioned, the key question that must be answered when designing nuclear materials security systems is what kind of threats these systems may have to face. The requirements to the protection systems are drawn up on the basis of the threats facing each individual facility. Approaches to assessing the threats and the effectiveness of the protection systems, including the methods of analyzing vulnerabilities, assessing effectiveness, and testing the systems' performance, must be coordinated on an international level. Such coordination will help to

make sure that the nuclear materials and facilities that possess the same value as potential targets for terrorists are also given the same level of protection from these similar threats, regardless of where these facilities are located.

3. Training centers in Russia and the United States are already being used to train specialists from third countries. Meanwhile, Russian and U.S. experts are taking part in various international training programs organized by the IAEA. These efforts must be continued and strengthened though further development of the existing training centers and through helping other countries to develop their own personnel training infrastructure;
4. In February 2013 the IAEA released a report titled *Objectives and Essential Elements of a State's Nuclear Security Regime*. The document can be used by newcomer states (i.e. those at the initial stages of developing a national nuclear energy industry) to build their national nuclear security infrastructure. Given their vast experience in this area, Russia and the United States could work together to provide assistance to third countries in implementing IAEA recommendations.

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Chapter 4. THE ISTC AS AN EXAMPLE OF MULTILATERAL SCIENCE AND TECHNOLOGY COOPERATION IN ADDRESSING WMD AND NUCLEAR SECURITY ISSUES

Alexander Cheban

The International Science and Technology Center (ISTC) is an intergovernmental organization that has made a sizable contribution to addressing WMD nonproliferation and nuclear security issues. It presents an example of resolving these issues through developing multilateral cooperation in research and technology.

The ISTC was set up in the early 1990s and spent nearly two decades focusing its efforts on dealing with challenges in Russia and other post-Soviet states. It has largely coped with its task of reducing the risk of a *brain drain* from Russia, thus prompting Moscow to take the decision to quit the ISTC by 2015. The announcement was a painful one for the ISTC, which–among other things–will now have to relocate its headquarters from Moscow. Yet despite this setback, the ISTC is continuing its operations and developing ambitious plans for reform and transformation into a global organization.

Thus, a study of the ISTC is pertinent in that the organization has accumulated a wealth of valuable experience in addressing nonproliferation issues and in that the ISTC is not a thing of the past but is an organization that is taking steps to become a global one. For Russia, the ISTC continues to be relevant even after it quits the organization because the ISTC still leaves Russia an opportunity to continue to cooperate.

This section will give a brief overview of the history of the ISTC and analyze its main achievements and failings. It will also look at the current state of the ISTC and prospects for its further development and cooperation with Russia and third countries.

ISTC HISTORY: KEY LESSONS

The idea of establishing the ISTC came up in the early 1990s, during the break-up of the Soviet Union. At that difficult time, all of Russia's WMD-related institutions were in crisis. Due to drastic funding cuts, physical protection of nuclear facilities deteriorated, quality of export controls was compromised, etc. Yet arguably an even more dangerous consequence of the cuts was that Russian specialists familiar with WMD production found themselves in reduced circumstances. Many of them were left without work, while in the difficult 1990s finding a new job was not easy. It is common knowledge that as a result many Russian scientists moved to the West and found well-paid employment in their field there. Yet, the majority of weapons scientists did not have those opportunities. With the end of the Cold War the international situation was becoming less tense; the developed countries sought to end WMD production and reduce their existing stockpiles. Therefore demand for weapons scientists was not great, and not all of them managed to retrain and find jobs in civilian sectors.

In those times of hardship, Russian weapons scientists and engineers, who had lost their jobs and were desperate to improve their finances, had just one option left: to move to *threshold countries*, which were trying to obtain nuclear and other weapons

of mass destruction. In the early 1990s, those countries were not numerous and included mainly Iraq, Libya, North Korea, and possibly Iran. All those countries, except for DPRK, are rich in energy resources and, in theory, could have generously rewarded Russian weapons scientists and engineers, had they agreed to assist them in implementing their WMD programs.

Having said that, none of the four countries were observed to make attempts to involve Russian weapons scientists in developing their WMD programs. That may have been due to the fact that some of those countries no longer had a strong motivation to possess WMD. That was especially true for Iraq, which was crushed in 1991 and lost most of its WMD potential. Equally, Libya and Iran in the 1990s and beyond were unlikely to have a strong enough motivation to possess WMD to risk involving foreign scientists in such a sensitive area. As for North Korea, given how closed to the rest of the world that regime is, it was particularly wary of giving foreigners any access to its nuclear program. Thus, in the early 1990s the probability of Russian weapons scientists moving to work in a proliferation-suspect country was largely a hypothetical one.

Still, that probability existed, which meant that it was imperative to create all the necessary conditions to prevent Russian weapons scientists and engineers from even entertaining the idea of selling their expertise to other countries and organizations - especially since it appears that some of the former Soviet scientists did in fact entertain those ideas. A case in point is a poll that was conducted by the ISTC at the start of its operations in 1992 among 600 Russian weapons scientists. They were asked whether they would accept a job offer for a highly paid position in their specialist field in one of the following foreign countries: Iran, Iraq, Syria, or North Korea? Out of those polled, 26 percent said they would not accept a job offer like that under any circumstances; 28 percent said they were more likely to decline than accept it; 15 percent said that in principle they could accept it; while 12 percent replied they would definitely take it (19 percent were undecided). The pollsters specifically noted that those who were ready to move to work to countries that were suspicious from the proliferation point of view were mostly young scientists.[53]

Thus, only 12 percent of Russian weapons scientists and engineers (mostly young and inexperienced ones) were positively ready to accept a job offer like that. Still, it was a large figure. Moreover, according to that poll, there was a considerable number of specialists who did not rule out the possibility of relocating to threshold countries.

Naturally, not all Russian specialists would agree with the results of that poll. Most of them believe that Russian weapons scientists were overwhelmingly responsible people, steeped in the culture of nonproliferation, and that is why none of them moved to threshold countries, or would have moved even if their financial circumstances had not improved with time.[54]

In any event, it is obvious that after the Cold War was over, people who possessed proliferation-sensitive expertise had to be provided with employment opportunities in

[53] Schweitzer Glenn. Presentation at an informal PIR Center workshop. See: First ISTC director Glenn Schweitzer visits PIR Center. March 26, 2013, http://pircenter.org/news/6423-istcs-first-director-dr-glenn-schweitzer-visits-the-pir-center (Retrieved on June 27, 2013).
[54] Vorobyev Servey. First deputy director of the ISTC in 2007-2012. Interview with the author. Moscow, March 30, 2012.

the civilian sector so that they were not tempted to sell that expertise to undesirable employers.

To address that task, it was decided to set up an intergovernmental organization, the International Science and Technology Center. For the first time this idea was voiced in a tripartite statement by Andrey Kozyrev (Russia), Hans-Dietrich Genscher (Germany), and James Baker (United States) in January 1992. After that talks on an ISTC agreement began. They resulted in the signing, on November 27, 1992, of an Agreement Establishing an International Science and Technology Center. The agreement was signed by Russia, the United States, Japan, and the EU. It came into effect in March 1994, which is considered to be the start of ISTC operations, although in actual fact the ISTC began working in January 1993, when the ISTC Preparatory Committee was set up.[55] The first executive director of the ISTC, Glenn Schweitzer, took office in 1992. Since then, traditionally the ISTC executive director has always been from a country other than Russia, while the first deputy executive director must be from Russia.

The ISTC headquarters is based in Moscow. It was proposed that the United States, Japan, the EU and other donor countries would assist Russia and other former Soviet Union states in resolving the problem of finding employment for former weapons scientists. Thus, inside the ISTC, Russia acted both as a recipient of foreign financial aid and as a donor. Its contribution in the latter capacity was relatively small: all that Russia had to do was to provide premises for housing the ISTC headquarters, without bearing any further financial obligations.

Meanwhile, the Russian Duma has failed to ratify the agreement on establishing the ISTC, although the issue was discussed thrice, in 1996, 2000 and 2004. The center was allowed to operate by Presidential Decree No 767-rp of December 11, 1993, which allowed provisional application of that agreement. On December 17, 1993, the president issued another decree, No 161-r, inviting the ISTC parties to sign a protocol on provisional application of the agreement, which was subject to review in two years' time, i.e. in 1995. That review, however, never took place. Some analysts believe that a result, the ISTC does not actually have sufficient legal grounds to operate in Russia. ISTC representatives disagree; they argue that since the protocol on provisional application has been neither reviewed nor abrogated, it still remains in force.[56]

Nonetheless, for nearly 20 years the ISTC has been actively operating in Russia as well as in other Commonwealth of Independent States (CIS) countries that have joined the organization. Overall, the ISTC comprises 39 member states. These are: all 27 European Union members, as well as Canada, Norway, the United States, South Korea, and Japan. These 32 countries act as ISTC donors. Russia, as has been mentioned above, is both a donor and a recipient of aid. Six more former Soviet Union countries – Armenia, Belarus, Georgia, Kazakhstan, Kyrgyzstan, and Tajikistan – have the recipient status. The 39 ISTC member states represent 75 percent of the world's total science and technology potential.[57]

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[55] Schweitzer Glenn. Containing Russia's Nuclear Firebirds: Harmony and Change at the International Science and Technology Center. 2013. Athens and London: The University of Georgia Press. P. xv.
[56] Pikayev Anatoliy. (ed.). Results and prospects for the implementation of the Global Partnership program. International Science and Technology Center. Moscow: IMEMO RAN, 2009. P. 96
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In the opinion of the first executive director of the ISTC, Glenn Schweitzer, the organization's history can be divided into three phases:

1) 1994-2000 – a period of *fast start*
2) 2001-2006 – an *era of euphoria*
3) 2007-2011 – a period of *unraveling.*[58]

It is obvious that the ISTC will continue to operate even after Russia quits. However, a crisis in the organization's relations with the Russian authorities, which first emerged in 2007, has resulted in serious challenges for the ISTC and affected the scope of its operations. That is why the most pressing issue at that time was the survival of the ISTC as an organization.

One could suggest a fourth period in the history of the ISTC, which began in 2010-2011, when the president of the Russian Federation issued a resolution on withdrawing from that organization, after which Russia notified the other member states of its decision in an official Foreign Ministry note. This phase is continuing and will clearly last till 2015, when Russia finally leaves the ISTC. This phase could be summed up as a period of the ISTC's reform, more on which later.

The outlined periods in the history of the ISTC show that the organization has had good moments, resulting in *an era of euphoria*, as well as bad moments, resulting in Russia's decision to quit the organization.

The ISTC's operations boil down to financing and managing science and technology projects. At first, it cooperated mainly with nuclear institutes. However over time the donors realized that from the point of view of nonproliferation and counterterrorism (meaning technical support of antiterrorist efforts), other scientific areas, such as biology and chemistry, were relevant too. After that the list of ISTC project topics and project participants expanded considerably.[59]

In recent years, cooperation with the ISTC has largely been in line with Russia's interests. The ISTC has invested more than half of all its allocated funds in Russia. For instance, in 1994-2009 a total of 2,017 of its 2,702 projects were implemented in Russia, costing $655 million, out of a total amount of $836 million.[60] Overall, since it was set up, the ISTC has allocated over $1 billion in funding, of which nearly 70 percent was spent in Russia.[61]

Some of the ISTC's most significant projects in Russia include the following: assisting Russian enterprises in creating their tools base; training Russian specialists and

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[61] Schweitzer Glenn. Presentation at an informal PIR Center workshop. See: First ISTC director Glenn Schweitzer visits PIR Center. March 26, 2013, http://pircenter.org/news/6423-istcs-first-director-dr-glenn-schweitzer-visits-the-pir-center (Retrieved on June 27, 2013).

arranging their contacts with foreign colleagues; assisting in preserving some branches of sciences (in particular, providing financial support to the *Vector* institute, which conducts research into extremely dangerous infections); organizing contacts for the Science Ministry's divisions and academic institutions with CERN; and building vivariums.[62]

The ISTC has largely fulfilled the GP objective of engaging former weapons scientists in civilian projects. Over the 1994-2009 period more than 60,000 Russian scientists who had previously been involved in some way in WMD production took part in ISTC projects[63]. Of them, some 600 scientists, thanks to the ISTC, found jobs in the civilian sector. Clearly, the ISTC could not provide civilian jobs to all 60,000 scientists, but that was never its ambition. The ISTC's main achievement is not finding employment for weapons scientists but involving them in research, which removed the danger associated with the uncertainty and lack of control surrounding people who possess sensitive knowledge.[64]

And yet, despite the above successes and achievements of the ISTC, a negative feeling towards it began to gradually form in Russia, first in 2006-2007 and peaking in 2010-2011, when Moscow announced that it was pulling out of the organization. A presidential decree issued on August 11, 2010, said that Russia was quitting the ISTC, and on July 13, 2011, the Russian Foreign Ministry published an official note on Russia's actual withdrawal from the agreement on establishing the ISTC by mid-2015. Russia's pullout should take place within six months from the moment projects implemented on Russian territory are completed, which should happen by the end of 2014. In the official communications, Russia did not explain its reasons for quitting the ISTC. But to experts these reasons are pretty obvious.

Russia's withdrawal from the ISTC has been a result of mistakes made both by the Russian leadership in their assessment of the ISTC's operations, and by the ISTC secretariat in building relations with the Russian authorities.

The latter included some ill-judged statements from ISTC representatives on the organization's operations in Russia. For example, during a meeting of the Global Partnership Working Group in Germany in 2006, an ISTC representative said that had it not been for the ISTC, Russian science would not have survived. At the time Russia was already harboring some concerns regarding the ISTC, more on which later. Those concerns were not helped by misguided statements like the one above. According to eyewitness accounts, Russian diplomats present at that Working Group meeting, having heard the suggestion that Russia was unable to save its science, began to say in earnest that it should quit the ISTC.[65]

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[62] Kondratenkova Lyubov. Remarks at the PIR Center workshop *International Mechanisms of Countering Nuclear Proliferation and Russia's Interests*. Moscow. May 23, 2012

[63] Development of international science and technology cooperation. 2009 Annual Report. International Science and Technology Center. http://www.istc.ru/istc/istc.nsf/va_WebResources/Annual_Reports_RUS/$file/AR2009Rus.pdf (Retrieved on June 27, 2013).

[64] Vorobyev Sergey. We are supervised by Rosatom. *Agentstvo atmonykh novostey*. August 13, 2008. http://atominfo.ru:17000/hl?url=webds/atominfo.ru/news/air4732.htm&mime=text/html&charset=windows-1251 (Retrieved on September 12, 2012).

[65] Kondratenkova Lyubov. Remarks at the Midweek Brainstorming informal PIR Center workshop. Moscow, March 21, 2013. See: First ISTC director Glenn Schweitzer visits PIR Center. PIR Press. http://pircenter.org/news/6423-istcs-first-director-dr-glenn-schweitzer-visits-the-pir-center (Retrieved on June 27, 2013).

The Russian leadership's mistake was underestimating the ISTC's achievements, although that was largely the ISTC's own fault. Experts point out that the ISTC secretariat failed to give due effort to publicizing the organization's successes and strengthening its positive image. The ISTC's achievements became known mainly to a narrow circle of scientists involved in the organization's projects, and were not properly communicated to the Russian government.[66] Instead, the government regularly received negative reports about the ISTC's operations. Thus, it has to be admitted that in the PR war, ISTC supporters were defeated by their opponents.

The complaints being voiced in Russia about the ISTC are threefold:

1. The center's operations in Russia make it easier for foreign spies to work in the country under cover and steal sensitive Russian technologies.[67]

2. The ISTC finances only selected projects, which stifles competition and hampers innovation in Russian R&D.[68]

3. The ISTC does not pay taxes and enjoys other exemptions, thereby causing losses to the Russian treasury.

Let us take a closer look at each of these three complaints individually.

The opinion that the ISTC makes it easier for foreign spies to infiltrate into Russia is shared by some experts, including the authors of the monograph "Results and prospects of the implementation of Global Partnership"[69], as well as some Nuclear Energy Ministry officials.[70] But speaking in 2009, V. Kryuchenkov, first deputy of the ISTC chief executive, said that the secret service officials charged with preventing any leakage of sensitive information from the center had never voiced any complaints. On the contrary, many of those officials were able to perform their administrative and organizational duties while working on ISTC projects.[71] Any risk of espionage can be ruled out because prior to their implementation, all project proposals submitted to the ISTC pass a rigorous vetting procedure at various Russian government agencies, including the secret services. The center implements only those projects which have not raised any objections from Russia or other Parties on whose territory these projects are carried out.[72]

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[66] Kondratenkova Lyubov. Remarks at the Midweek Brainstorming informal PIR Center workshop. Moscow, March 21, 2013. See: First ISTC director Glenn Schweitzer visits PIR Center. PIR Press. http://pircenter.org/news/6423-istcs-first-director-dr-glenn-schweitzer-visits-the-pir-center (Retrieved on June 27, 2013).
[67] Anatoliy Pikayev. Op. cit. P. 99
[68] Boris Gorshitskiy. Dmitry Medvedev's videoblog. 13:38, May 10, 2010. http://blog.kremlin.ru/search/?page=2&query=%D0%BC%D0%BD%D1%82%D1%86 (Retrieved on April 28, 2012)
[69] Anatoliy Pikayev. Op. cit. P. 99
[70] Vladimir Kryuchnkov. Foreword. From the book: ISTC. Fifteen years of cooperation. Moscow: ISTC, 2009. P. 10
[71] Ibid.
[72] Servey Vorobyev. Interview with the author.

As for the second complaint, i.e. that the ISTC stifles innovation in Russian R&D, the center's counterargument is as follows: out of the 3,000 projects in Russia financed by the center, at least 150 involved innovation.[73]

The ISTC's response to the third complaint is that even if Russia believes that the center's operations are not in Russian national interests, a hasty pullout is not the only option. Instead, Moscow could make use of a rather straightforward procedure for making changes to the agreement on establishing the ISTC. All it has to do is notify the other ISTC parties in writing.[74] All of these parties are prepared to take into account Russian wishes because they all want the HQ of the organization to remain in Moscow.

Thus, there was quite a tangible reason for Russia's decision to pull out of the ISTC, namely the fact that Western countries were making use of Russia's scientific advances on the cheap. At the same time, it appears that to pull out of the ISTC for this reason alone would be a mistake. As mentioned above, ISTC supporters justly point out that all Russia had to do to improve the situation was to clearly and firmly put its concerns across to the other ISTC members. Even ISTC opponents agree with this and point out that in 2005-2006 Russia had a real chance to secure amendments to the agreement on the ISTC so that it would be in Russia's interests. But Russia remained passive, and the blame for the failure to change the ISTC agreement before Russia's pullout lies equally on Russian government agencies and on the ISTC secretariat.[75]

Opponents of the ISTC say that the time for reforming the organization has been missed, and that Russia, having admitted its mistakes in its policy towards the ISTC, should still proceed with pulling out of the organization. Another argument they cite in their favor is that the ISTC has completed its tasks in Russia, and Russia no longer has any need to be a member.

As mentioned above, Russia's pullout from the organization was keenly felt by the ISTC. Its headquarters is still based in Moscow, along with the bulk of its research and technical base, which is used by the organization for carrying out successful projects in Russia and other post-Soviet countries. After Russia quits the organization, this base will be lost and the ISTC's operations will be made considerably more difficult - so much so that suggestions have been voiced that the ISTC will have to end its existence as an organization altogether.[76]

And yet, despite these skeptical forecasts, the ISTC plans to continue working and even has ambitions to turn itself into a global organization. To achieve that, it is necessary to reform the ISTC, and the organization has already made some headway towards this goal.

[73] Ibid.
[74] Sergey Vorobyev. Report at the PIR Center international workshop "Lessons and prospects of multilateral cooperation in nuclear security and nonproliferation". Moscow, April 19, 2012.
[75] Kalinina Natalia. Report at the PIR Center international workshop "Lessons and prospects of multilateral cooperation in nuclear security and nonproliferation". Moscow, April 19, 2012.
[76] Kuchinov Vladimir. Interview with the author. Moscow, March 29, 2012.

Originally it was proposed that a new organization would be created on the basis of the ISTC, an International Agency of Science and Innovation Programs (IASIP).[77] In that case the probability of attracting Russia into the IASIP would be very high. However, the ISTC secretariat soon realized that setting up a new organization would be unreasonable since it was associated with numerous bureaucratic and technical difficulties. It would be more rational to use the potential of the already existing organization, having reformed it so that it meets modern requirements.[78]

One of the main strands in reforming the ISTC should be to abandon the division of its members into two categories (donors and recipients). It is proposed that the ISTC will adopt a format typical of the IAEA and other international organizations, in which all participants have equal status.[79]

In addition, the ISTC is planning to expand its membership. It is proposed that the organization should be joined, first and foremost, by countries that have issues as far as proliferation is concerned, and which have weapons scientists (i.e. Middle Eastern states, possibly followed by African and Asian countries).

It is also proposed that a reformed ISTC should have a wider range of tasks. These tasks should cover the following areas:

1. promising energy technologies, climate change, disaster relief, rehabilitation, environmental protection, nano- and information technologies, biosecurity and biotechnology, disease prevention and treatment;
2. fundamental and applied research in high energy physics and laser physics;
3. developing new detection and control methods in the interests of strengthening global nonproliferation regime and of ensuring safe, secure and verifiable use of nuclear energy for peaceful purposes;
4. developing better cooperation with such organizations as the IAEA and CERN, as well as WHO, UNESCO, CIS and possibly NATO;
5. other areas of science and technology that are of mutual interest (if such are declared).[80]

These proposals are being discussed by the member states and have already been supported by all of them, except Russia.[81]

In Russia, ISTC issues are supervised by *Rosatom*, which has no commercial interest in it. This has prompted some experts to conclude that *Rosatom* is seeking to free itself of the supervision of an organization that does not generate any profit.[82] At the same time, as experts point out, *Rosatom's* quite understandable agenda should not have resulted in Russia's pullout from the ISTC, as the relevant issues could have easily been transferred under the supervision of, for instance, the Education and

[77] Guiding principles of the international agreement on the International Agency for Science and Innovation Programs (IASIP) (working draft). From an email by Vorobyev Sergey. April 2, 2012.
[78] Owsiacki Leo, ISTC executive director. Remarks at an informal PIR Center workshop Midweek Brainstorming. Moscow, March 21, 2013. See: First ISTC director Glenn Schweitzer visits PIR Center. PIR Press. http://pircenter.org/news/6423-istcs-first-director-dr-glenn-schweitzer-visits-the-pir-center (Retrieved on June 27, 2013).
[79] Vorobyev Sergey. Interview with the author. Moscow, March 30, 2012.
[80] Guiding principles of the international agreement on the International Agency for Science and Innovation Programs (IASIP) (working draft). From an email by Vorobyev Sergey. April 2, 2012.
[81] Vorobyev Sergey. Correspondence by email. April 2, 2012.
[82] Materials of an informal PIR Center workshop. May 23, 2012.

Science Ministry.[83] However, no agency or department volunteered to assume additional responsibilities.

Indeed, the Russian authorities still have a lot of work to do to study the details of the proposed ISTC reform and formulate Russia's stance. But this work could bring a substantial benefit to the Russian state, and this benefit should not be underestimated.

A fundamentally new provision contained in the agreement that is being drafted says that intergovernmental and nongovernmental organizations or states that are not Parties to it could be invited by the Governing Board to take part in its work in the capacity of non-voting observers. It means that Russia, even if it is no longer a member of the ISTC, will still be able to have a say in its decisions and derive benefits from it by participating in the organization's activities as an observer. It also means that even despite Russia's withdrawal from the ISTC, individual Russian scientists or organizations will have the opportunity to take part in ISTC projects and to benefit from them.[84]

The ISTC is living through an important period in its history, as a fundamentally new Agreement is being developed. Until 2015 Russia remains a full member of the ISTC, and therefore can have some influence on the new Agreement being developed so that it meets Russia's interests to the fullest degree possible. In any event, Russia should take part in drawing up a new Agreement, and only then decide which of the three options to choose:

1. completely withdraw from the ISTC;
2. cooperate with the organization as an observer state;
3. join the new Agreement.

Of the three, the first option appears to be the worst, and the last, the best. As one expert put it, "a bad wedding is always better than a good funeral".[85] Russia's pullout from the ISTC would mean losing all benefits of taking part in science and technology cooperation.

The option of becoming an observer state at the ISTC also offers some interesting prospects. Furthermore, it represents a compromise between the Russian supporters and opponents of the country's membership of the ISTC. Following Russia's decision to quit the ISTC, there is indeed a strong case for considering the option of participating in that organization as an observer state.[86]

And yet, Russia could gain more from joining the new agreement on the ISTC. First, it would allow the headquarters of this international organization to remain in Moscow, which would add to Russia's international image. However at the moment it appears increasingly more likely that the ISTC headquarters will be moved to Almaty or Astana (Kazakhstan's invitation to the ISTC to move its HQ there when Russia

[83] Ibid.
[84] Vorobyev Sergey. Remarks at an enlarged meeting of the PIR Center Working Group on International Cooperation on WMD Nonproliferation and Nuclear Security. Moscow, March 28, 2013.
[85] Panasyuk Aleksandr, chief safeguards specialist at the International Uranium Enrichment Center (IUEC). Remarks at an enlarged meeting for the PIR Center Working Group on International Cooperation on WMD Nonproliferation and Nuclear Security. Moscow, March 28, 2013.
[86] Vorobyev Sergey. Remarks at an enlarged meeting of the PIR Center Working Group on International Cooperation on WMD Nonproliferation and Nuclear Security. Moscow, March 28, 2013.

withdraws from the organization was made back in 2010), and the final decision on relocating the headquarters is expected to be made by the end of 2013.

POTENTIAL BENEFITS OF PARTICIPATION IN A NEW ORGANIZATION BASED ON ISTC

Additional financing of Russian R&D. One of the arguments in favor of Russian pullout from the ISTC is that the country has become strong enough and can afford to finance its R&D sector on its own, without assistance from abroad.[87] But that is not a reasonable approach. Even today Russia spends a lot less on R&D than countries in Europe or East Asia. Even if Moscow can find additional resources to spend on R&D, extra funding from such organizations as the ISTC will always remain useful – especially since these organizations are closely monitored by the government and the secret services, making it impossible for them to do any harm to Russian national interests.

Improving the financial situation of Russian scientists. It is often argued that Russian scientists are already enjoying decent living standards, so this problem is not as pressing as it used to be.[88] That may well be true, especially compared to the situation back in the 1990s. But there is no arguing that Russian scientists are still worse off than their colleagues in the West. Inevitably, that leads to an exodus of talented young Russians. The ISTC can help to staunch that brain drain because its projects are an opportunity for scientists to make some extra money and improve their lot without leaving their home country.

Establishing contacts with foreign colleagues. Russia wants its scientists not just to live and work in their home country, but also to travel abroad and maintain close working contacts with their foreign colleagues. The ISTC enables them to do just that, thereby providing excellent opportunities for professional growth.

Strengthening Russia's positions on the international arena. The ISTC is a multilateral international organization, so hosting its headquarters in Moscow is good for Russia's international prestige.

Encouraging innovation in Russia. Some Russian experts question the need for hosting the ISTC in Moscow because Russia already has its own independent project, Skolkovo, which they say pursues more or less the same goals.[89] In truth, however, there is very little duplication between the two; in fact, the programs are complementary. Skolkovo is a commercial enterprise which prioritizes highly profitable projects. The ISTC, on the other hand, pursues the kind of projects that do not promise quick returns; it invests in science and research, which is the most risky stage of any commercial endeavor.[90] According to Sergey A. Vorobyev, the ISTC could be something of a pre-Skolkovo. In other words, in could nurture projects from the most risky R&D stages, and then hand them over to Skolkovo once they start to generate a profit.[91] There is no such cooperation at the moment; according to ISTC

[87] Ibid.
[88] Anatoliy Pikayev. Op. cit. P. 99
[89] Albert Zulkharneev. Report at the PIR Center workshop "International Mechanisms of Countering Nuclear Proliferation and Russia's Interests". Moscow, May 23, 2012
[90] Lyubov Kondratenkova. Report at the PIR Center workshop
[91] Sergey Vorobyev. Report at the PIR Center international workshop "International Mechanisms of Countering Nuclear Proliferation and Russia's Interests". Moscow, May 23, 2012.

representatives, Skolkovo has declared its general interest in working with the center, but it does not actually want to launch any specific projects.[92] Besides, Skolkovo itself is not yet up and running as a mature venture. Some experts doubt if it ever will. The whole idea behind Skolkovo is based on a questionable premise that the government, not the market forces, should choose the projects which deserve support, and then finance them from the treasury.[93] The ISTC model looks much better in that regard because the choice of projects to be financed is made by the scientists themselves as opposed to the government or the market (which tends to prioritize quick profit over promising long-term research projects).[94] Of course, some of the proposals submitted by the scientists do not pass the ISTC selection procedure. But a very large proportion of these proposals (50 percent) end up receiving ISTC financing[95], which suggests that the center is very responsive to the requirements of the science community. This is why cooperation between Skolkovo and the ISTC can help to minimize the shortcomings of the former, and to bolster its contribution to the Russian economy.

To summarize, the ISTC can help Russia to achieve new objectives which have very little to do with nonproliferation. Of course, the country' most pressing proliferation issues have already been addressed - which could be another reason why Russia intends to end its ISTC membership. But just like any other capital, Moscow should demonstrate some interest in continued nonproliferation efforts by the center. This will not only bolster its reputation as a staunch supporter of nonproliferation, but also reduce the threats to Russian national security originating in other countries.

The ISTC has a significant potential in addressing proliferation and nuclear security issues in third countries. A case in point is the work of the ISTC's first executive director Glenn Schweitzer. After retiring from the ISTC in 1994, he began to build close cooperation between the U.S. research community and Iranian scientists, who were given an opportunity to travel to international seminars abroad and exchange experience with their foreign counterparts.[96] That contributed to making Iranian scientists more open to the rest of the world, which in turn made it less likely that they could become involved in secret research into weapons of mass destruction. One could argue that further efforts to involve Iran and other proliferation-suspect countries in international science and technology cooperation are more effective than recent attempts to assassinate scientists from those countries. Russia should get involved in these efforts too, especially since it has better relations with Iran than the United States does. For obvious reasons, attempts to establish cooperation with Iranian scientists by Glenn Schweitzer, a U.S. citizen, aroused the suspicions of Iranian counterintelligence officers. Similar attempts undertaken by Russia and supported by other ISTC members would receive a better reaction from the Iranians.

It is also necessary to consider the ISTC's potential in resolving complex science and technology issues related to strengthening the nonproliferation regime. For instance, it is still essential to improve border control when it comes to nuclear materials. New

[92] Sergey Vorobyev. Interview with the author.
[93] Gaddy Clifford, Ickes Barry. Can Russia end its addiction to raw materials? Pro et Contra. 2011. September-October. P. 34
[94] Lyubov Kondratenkova. Report at the PIR Center workshop
[95] Sergey Vorobyev. Interview with the author.
[96] First ISTC director Glenn Schweitzer visits PIR Center. *PIR Press*. March 26, 2013. http://pircenter.org/news/6423-istcs-first-director-dr-glenn-schweitzer-visits-the-pir-center (Retrieved on June 27, 2013).

modern devices are being designed to detect nuclear materials. For example, researchers from the Los Alamos National Laboratory (United States) have for the first time demonstrated that pulse laser-driven neutrons can be used as an effective means of detecting smuggled nuclear materials. To generate neutrons, scientists at the Trident laser facility focused an intense laser pulse onto a 0.3-mkm foil of deuterated plastic, a material in which hydrogen atoms were replaced with deuterium isotopes.[97]

It is obvious that research in this field should continue, and involve scientists from other countries too. The ISTC's relevant experience and achievements may prove valuable in making laser-driven neutrons available to all countries to be used to detect smuggled nuclear materials at border checkpoints.

Similarly, the ISTC could assist in efforts to detect, at customs and border control checkpoints, dangerous pathogens that could be used to make another type of WMD, biological weapons. It should be noted that these pathogens are often more difficult to detect than nuclear materials when they are smuggled across the border. Special equipment to detect them is being successfully developed, again in the United States. It is obvious that the ISTC, which has in recent years accumulated considerable experience in research and technical cooperation in biosecurity, could help in further developing pathogen detection equipment in many countries of the world, including Russia and third countries.

Without a doubt, the ISTC's experience and R&D could be similarly applied to addressing other high-tech nonproliferation and nuclear security issues. In addition, cooperation with the ISTC would allow third countries to enjoy the benefits of taking part in international scientific and technical cooperation. Furthermore, to do that, they would not have to go through the process of becoming ISTC members. All they will have to do is to get the status of an observer at the ISTC Governing Board. Moreover, this status can be granted not only to individual states but also to individual organizations from third countries.

Thus, summing up this section, it should be noted that the ISTC has a positive potential for addressing nonproliferation and nuclear security issues in third countries. The ISTC has made some mistakes, which have resulted in Russia's decision to pull out of the organization. Still, one could argue that the ISTC has had more successes than failures. Besides, the organization is seeking to reform itself in order to become better suited to modern requirements. The ISTC is turning into a more equal organization, in which Russia and the other member states are unlikely to develop the same concerns that were prompted by the inherently unequal donor-recipient division in the ISTC financing scheme. The ISTC is now abandoning this system in favor of a new arrangement that would make it more effective in tackling nonproliferation and nuclear security issues.

At the same time it is obvious that the ISTC should learn from its mistakes, which largely had to do with some ill-judged statements and less than impressive publicity of its achievements. The ISTC would clearly benefit from hiring several professionals in public and government relations. Most of the ISTC staff are top-class technical specialists. It is clear that the organization needs to add a couple of foreign policy and public relations experts to that mix.

[97] Fast neutrons to be used to combat nuclear materials smuggling. *Rossiyskoye atomnoye soobshchestvo*. June 13, 2013. (Retrieved on June 27, 2013).

The ISTC has a particularly strong potential in addressing challenges in third countries. Russia should seek to continue its cooperation with the organization. It will be able to do so even after its pullout if it receives the status of an observer state.

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CHAPTER 5. PROSPECTS FOR INTERNATIONAL COOPERATION IN WMD NONPROLIFERATION AND NUCLEAR SECURITY IN CENTRAL ASIA

Dauren Aben

The need for continued international (especially Russian-U.S.) cooperation on WMD nonproliferation and nuclear security in Central Asia is obvious, based on a whole number of factors. The main problem that has yet to be resolved is the Soviet heritage related to WMD development programs.[98] There are also new challenges and threats, the most dangerous ones being illegal circulation of WMD materials, technologies, equipment, and delivery systems, as well as the threat of WMD terrorism.[99] There are also plans by several countries in the region to develop a nuclear industry and a nuclear energy sector. Yet another argument in favor of continued cooperation in the framework of the Global Partnership Against the Spread of Weapons and Materials of Mass Destruction is the recent decision to expand the geographic scope of the program by accepting Kazakhstan as the 24th member and a recipient country.[100] It is important to take into account that Kazakhstan is the world's largest producer of uranium, and plans to host an international bank of low-enriched nuclear fuel on its territory.[101]

The main areas of future cooperation on WMD nonproliferation and nuclear security in Central Asia include: improving nuclear security systems and nuclear infrastructure facilities; continued cooperation on the former Semipalatinsk nuclear test site; countering radiological security threats; bolstering export controls and border security; establishing cooperation in the framework of the Central Asian nuclear weapons-free zone; strengthening cybersecurity measures in the nuclear industry; facilitating joint research projects; and promoting education programs in the area of disarmament and nonproliferation.

International cooperation in improving nuclear security systems at nuclear infrastructure facilities

The partly natural, partly manmade disaster at the Fukushima nuclear power plant in Japan has triggered a renewed international debate about new approaches to various aspects of nuclear safety and security.[102] That debate concerns not only the outlook for the development of the global nuclear energy industry and the use of safer and

[98] Butler, Kenley. Weapons of Mass Destruction in Central Asia. October 1, 2002. Nuclear Threat Initiative: http://www.nti.org/analysis/articles/weapons-mass-destruction-central-asia/ (Retrieved on June 27, 2013).
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[100] Kazakhstan joins the G8 Global Partnership Against the Spread of WMD. *Novosti-Kazakhstan* news agency. February 23, 2012. http://www.newskaz.ru/politics/20120223/2744918.html (Retrieved on June 20, 2013)
[101] Uranium and Nuclear Power in Kazakhstan (updated March 2013). World Nuclear Association: http://www.world-nuclear.org/info/Country-Profiles/Countries-G-N/Kazakhstan/#.UcwdVjvwlyw (Retrieved on June 20, 2013).
[102] See, for example: Duyeon Kim, Jungmin Kang. Where nuclear safety and security meet. *Bulletin of the Atomic Scientists*. January/February 2012. Vol. 68, no. 1, pp. 86-93.

more secure technologies, but also the improvement of nuclear safety and security standards; nuclear materials security; modernization of protection and rapid response systems to deal with potential emergencies or acts of terrorism; and the role of the IAEA and national regulatory agencies.

The nuclear security problem in Central Asia is becoming especially urgent because of the growing threat of WMD proliferation and WMD terrorism. In addition, Kazakhstan is pressing ahead with its plans of developing a nuclear industry; the government has already made a political decision to build a nuclear power plant.[103] As part of the Nunn-Lugar Program, a whole range of projects have been implemented in the Central Asian states in such areas as technological upgrade and improvement of nuclear and radioactive materials protection, control and accounting systems, as well as bolstering security measures at nuclear industry installations and nuclear facilities.[104]

Some might say that all these improvements, along with increased protection of nuclear facilities by law-enforcement agencies, have minimized all external threats, including the threat of a direct attack by terrorists. But one must take into account that these days, terrorists tend to be well armed and well trained, and that physical protection systems must be continuously improved to stay up to date. Let us not forget that most of the aforementioned projects were implemented in the late 1990s and early 2000s. They could not have taken into account the weaknesses and risks identified in the area of nuclear security and safety in recent years.

Technical weaknesses in the security systems of nuclear facilities, as well as shortcomings in personnel training and emergency response procedures, make these facilities vulnerable not only to natural disasters and emergencies, but also to deliberate malicious acts. That includes not only terrorist attacks, but also more covert actions, such as attempts to gain unauthorized access; illegal transfer or theft of nuclear and radioactive materials; and acts of sabotage.[105] Even if the facility is reliably guarded and equipped with advanced physical protection systems, one cannot discount the human factor. Protection and security systems cannot be relied upon if terrorists have an accomplice among the facility's personnel.

That is why such issues as the interrelationship between the various aspects of nuclear security and safety, and the need to improve the security culture, are now coming to the fore. There is also an obvious need for further modernization of the security and physical protection systems at nuclear facilities, as well as nuclear-related research centers and industrial facilities in the Central Asian states. That modernization must include not only the installation of more advanced equipment, but also increasing the resilience of nuclear facilities to emergencies and attacks by terrorists, as well as augmenting the capability of the security forces. In order to achieve a real and tangible improvement in the level of security at their nuclear facilities, the Central Asian states require comprehensive assistance (i.e. money, technology, and expertise) from international partners.

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[103] Gayfutdinova Venera. NPP to appear in Kazakhstan in 12 years' time. *Kapital*. February 1, 2013
[104] Kazakhstan: Reducing Nuclear Dangers, Increasing Global Security. Washington, DC: Embassy of the Republic of Kazakhstan and the Nuclear Threat Initiative, 2004.
[105] Bunn, Matthew. The Threat of Nuclear Terrorism: What's New? What's True? Nuclear Security Dossier: http://www.nuclearsummit.org/files/nuclear_terror_threat_dossier_2012.pdf (Retrieved on June 20, 2013).

With the relevant governments' consent, representatives of international partners, in cooperation with the national nuclear security and safety agencies, could conduct a so-called security audit at the existing nuclear facilities in order to estimate the scale and the cost of the required modernization projects. These inspections must include a comprehensive analysis of the existing procedures, technology, facilities and equipment in order to identify potential problems and vulnerabilities, and develop preventive measures to increase the level of nuclear security and safety. These programs could also include an independent international certification of the project to build a nuclear power plant in Kazakhstan, to make sure that the project meets all the nuclear safety and security standards and requirements.

International partners could also provide assistance to the Central Asian states in conducting regular training exercises to improve coordination between the personnel during various incidents at nuclear facilities. International partners might also take part in such exercises, if this is deemed necessary. Recommendations by experienced international specialists could help to improve emergency response procedures in the event of natural disasters, man-made emergencies, and terrorist attacks. They could also help to modernize safety and security control systems at nuclear facilities.

International assistance is also required in improving nuclear security culture, which is an important element of nuclear security. This problem requires a comprehensive approach. Projects in this area must target the personnel responsible for protecting nuclear facilities and materials, as well as specialists responsible for safe and secure operation of nuclear facilities and radiation safety. This applies both to the nuclear industry facilities and to national regulatory agencies. The higher the level of security culture among the personnel, from senior managers to rank and file, the higher the level of security at nuclear facilities, and the lower the risks caused by the human factor, including the insider threat.

To facilitate an improvement in the level of security culture in the nuclear industry, and to promote the sharing of best practice, international partners could provide the Central Asian states with assistance in rolling out multilateral education programs covering all aspects of nuclear security. It would be very helpful to set up regional centers of nuclear security excellence, which would offer continuous training program for nuclear security personnel and specialists working at the nuclear industry facilities and the national regulatory agencies. As a first step, international partners could assist in establishing an international nuclear security training center in Kazakhstan; the proposal was announced by Kazakh President Nursultan Nazarbayev in April 2010 during the first Nuclear Security Summit in Washington.[106]

Continued international cooperation on the former nuclear test site in Semipalatinsk

At the Nuclear Security Summit in Seoul in April 2012 the presidents of Kazakhstan, Russia, and the United States made a joint statement to the effect that efforts to eliminate the consequences of nuclear tests at the Semipalatinsk site had been almost completed.[107] It is certainly true that as part of multilateral cooperation programs, an

[106] Statement by Kazakh President Nursultan Nazarbayev at a summit in Washington. *Chelovek, energiya, atom*. 2010. No 2 (8). P. 5-6.
[107] Joint statement by the presidents of Kazakhstan, Russia, and the United States on trilateral cooperation on the former nuclear test site in Semipalatinsk. Seoul, March 27, 2012. Kazakh President's website. http://www.akorda.kz/ru/page/sovmestnoe-zayavlenie-prezidentov-respubliki-

unprecedented amount of work has been completed at Semipalatinsk to dismantle nuclear weapons testing infrastructure and to increase the level of safety and security of the facilities controlled by the National Nuclear Center of the Republic of Kazakhstan.

At the same time, there is a clear and pressing need for continued international cooperation at the former test site in Semipalatinsk. First and foremost, a number of sensitive facilities still remain there; bolstering their safety and security is in the interests of not just Kazakhstan but its international partners as well. One of these facilities is the Baikal-1, which is currently being used as long-term storage for a significant amount of nuclear materials and waste generated by the now decommissioned BN-350 fast-neutron reactor in Aktau.[108] Furthermore, Kazakhstan plans to use the facility as the core of the proposed new national center for radioactive waste processing and storage.[109] It is also important to maintain a proper level of security at the mothballed tunnels and galleries previously used for nuclear weapons testing.

The Kazakh National Nuclear Center is also currently working on a land rehabilitation initiative at the former Semipalatinsk test site. Based on the findings of a comprehensive radiological study, the Center believes that up to 95 per cent of the land occupied by the former test site can be returned to economic use in several phases by 2020, with the exception of severely polluted areas and the territories occupied by nuclear facilities still in use.[110] It would therefore make sense to consider the possibility of international experts taking part in implementing this initiative. In particular, they could provide their assistance in assessing the long-term public health and environmental consequences of the proposed return of lands at Semipalatinsk to economic use.

According to the existing estimates, Soviet nuclear weapons tests at Semipalatinsk inflicted serious damage on public health in the area around the test site, and left large swathes of agricultural lands in Kazakhstan radioactively contaminated. The UN General Assembly has recognized that the consequences of nuclear tests have been grave. In the period between 1997 and 2009 it passed six separate resolutions concerning the provision of international assistance to Kazakhstan in addressing the Semipalatinsk problem as part of the program titled *International Cooperation and Coordination of Efforts to Rehabilitate the Population, Environment, and Economic Development of the Semipalatinsk Region of Kazakhstan*.[111]

As part of the implementation of these resolutions, Kazakhstan's international partners could consider the possibility of their continued involvement in rehabilitation programs to help overcome the region's serious social, economic, and environmental

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kazakhstan-rossiiskoi-federatsii-i-soedinennykh-shtatov-ameriki-o_1341834725 (Retrieved on June 20, 2013)

[108] NNSA Secures 775 Nuclear Weapons Worth of Weapons-Grade Nuclear Material from BN-350 Fast Reactor in Kazakhstan. Press Release. November 18, 2010. National Nuclear Security Administration: http://nnsa.energy.gov/mediaroom/pressreleases/bn35011.18.10 (Retrieved on June 20, 2013).

[109] On the approval of the Program of the Development of the Nuclear Industry in the Republic of Kazakhstan in 2011-2014 and in the 2020 Time Frame. Kazakh legislation database. http://adilet.zan.kz/rus/docs/P1100000728 (Retrieved on June 20, 2013).

[110] Dairova Oksana. Semipalatinsk to be rehabilitated. *Kursiv*. August 5, 2010.

[111] Sharipov Maksut. Kazakhstan at the UN: active and responsible participant. *Kazakhstanskaya pravda*. March 3, 2012.

challenges. Such involvement could include the provision of financial and technical assistance, as well as expertise, in conducting systemic and comprehensive studies of the public health and environmental situation, analyzing soil and water samples taken at Semipalatinsk, and implementing a system of regular monitoring of radiation levels at the former nuclear weapons test site.

International cooperation in combating threats to radiological security and safety

In recent years radiological security and safety issues have come to be regarded as part of the general nuclear security problem. Giving the growing risks and threats stemming from the possibility of radiation emergencies, the security of radiation sources, and the danger of these sources being used by terrorists, radiological security is becoming a subject of growing international concern.

Radiological security threats in Central Asia stem from the fact that after the break-up of the Soviet Union, countries in the region lost control of some of the radiation sources used for industrial, medical, and research purposes. These sources contain highly radioactive materials, including cesium-137, strontium-90, cobalt-60, and iridium-192. According to some reports, a certain amount of radioactive sources and materials were buried in Central Asia's numerous uranium tailings dumps and other radioactive waste storage sites. Unlike the Central Asian nuclear facilities, these tailings dumps and waste storage sites are not properly guarded and protected.[112] If highly radioactive materials from these sites fall into the wrong hands, they can be used to build the so-called dirty bomb. That is one of the region's most serious security risks related to WMD terrorism.[113]

Dirty bombs do not have the capability to cause mass casualties or a serious amount of destruction. But they can cause radioactive contamination of large territories, leading to public health risks and lost economic opportunities. A dirty-bomb attack would also have a tremendous psychological impact on the population in and around the affected areas.

One of the risk factors in Central Asia is the spread of radical ideas in some sections of society, especially among the young people. In 2010-2012 Kazakhstan saw growing activity of religious extremists and terrorists, which makes the threat of radiological terrorism and other forms of WMD terrorism an increasingly serious problem. Only a few years ago the risk of terrorist acts was believed to be fairly low in the country. Now, however, there is a real possibility of terrorist attacks using radioactive materials being perpetrated by radical opponents of nuclear energy development to win public support for their cause. Given the existing concerns among the Kazakh public over radiation, and the generally negative attitude to nuclear programs, radical groups might also attempts acts of sabotage. All these risks must be taken into account during the implementation of the government's plans to set up an LEU bank in the country and to build a nuclear power plant.

[112] Kazakhstan hosts a workshop on locating and securing radiation sources; inventory of radiation sources to be taken. *Obozreniye eksportnogo kontrolya*. June 2005. O. 3-4; Kazakhstan and Kyrgyzstan taking inventory of radiation sources and stepping up control over radioactive materials. *Mezhdunarodnoye obozreniye eksportnogo kontrolya*. December 2005 / January 2006. P. 12-13

[113] Sharipov Maksut. Kazakhstan at the UN: active and responsible participant. *Kazakhstanskaya pravda*. March 3, 2012.

The risk of a dirty bomb attack is fairly high due to the relatively easy availability of radioactive materials, and the simplicity of the dirty bomb design. Furthermore, sources of radiation can be very small and compact, making them easy to transport and smuggle across the borders. That necessitates close cooperation between the Central Asian states and international partners in ensuring timely detection and interdiction of radioactive contraband in the region.

On the national level, the relevant government agencies must take steps towards further improvement of the existing protection, control and accounting measures for the radiation sources that are widely used in many legitimate areas, including healthcare, research, industry, and agriculture. The governments in Central Asia must also introduce harsher penalties for theft or improper use of radiation sources, and incorporate measures outlined in the International Convention for the Suppression of Acts of Nuclear Terrorism into their national legislation.

Interested foreign states could provide assistance to the Central Asian governments in strengthening the legislative and regulatory framework for the registration and use of radioactive materials, including the introduction of modern registration systems that would keep track of all radiation sources throughout their operational lifetime. International assistance would also be useful in taking inventory and issuing registration certificates to radioactive sources and materials; organizing regular events to locate, secure and dispose of unaccounted or decommissioned sources; building special storage facilities; and upgrading physical protection systems at the existing facilities. Assistance from international partners would be hugely important in equipping border crossings and other strategic locations with radiation detectors in order to prevent the smuggling of highly radioactive sources and materials. More active exchange of information about illicit circulation of such materials should be one of the mechanisms of multilateral cooperation in this area.

International cooperation in strengthening export controls and border security

Yet another potential threat is the possibility of Central Asian countries being used as transit routes for nuclear and other WMD-related materials, technologies and equipment. This threat is very real. To the north and east, the region borders on countries that are potential sources of such contraband (just as the Central Asian states themselves are, incidentally). To the south lie potential end users of such contraband, i.e. nations or international terrorist groups aspiring to acquire nuclear weapons. The routes of such contraband can be largely the same as the ones used to smuggle drugs out of Afghanistan and into Europe. Illicit activities can also be disguised as legal commercial operations, with sensitive equipment and technologies, dual-use products, and fissile materials being purchased by front companies or brokerages. To this date there have been no confirmed cases of highly-enriched uranium or plutonium being smuggled via Central Asia. But there have been numerous cases in the region of the authorities interdicting cargos containing radiation sources or radioactive scrap metal.[114]

Although much progress has been achieved in securing and guarding the national borders in the region, the Central Asian states must actively cooperate with each other and with international partners if they are to be able to respond effectively to all these threats. Effective and timely detection and prevention of attempts at illicit circulation

[114] Hanley Charles J. Central Asia is a hotbed for radioactive smuggling. *Deseret News*. June 15, 2002.

of sensitive materials requires continued energetic efforts to strengthen the national systems of export, border and customs control in the Central Asian states. If would make a lot of sense to use the existing experience of cooperation with international partners accumulated during the implementation of such U.S. and EU-initiated assistance programs as Export Control and Border Security, Second Line of Defense, Border Management in Central Asia, etc.

More active cooperation and exchange of information should be pursued with foreign secret services. The Central Asian states should also continue the practice of joint anti-terrorism exercises not only in the CSTO and SCO framework, but also on a bilateral and regional basis. One of the possible ways of stepping up regional cooperation and improving the Central Asian states' capability in export control and border security is to give them greater assistance in the implementation of UN Security Council Resolution 1540, which aims to prevent WMD from falling into the hands of non-state actors.[115] Closer cooperation is also required under the Global Initiative to Combat Nuclear Terrorism, which is spearheaded by Russia and the United States.

Cooperation in the framework of the Central Asian NWFZ

Nuclear weapons-free zones are an important element of the international nuclear nonproliferation regime. They help to achieve the long-term goal of a world free of nuclear weapons. In 2006 Kazakhstan, Kyrgyzstan, Uzbekistan, Tajikistan and Turkmenistan established the Central Asian Nuclear Weapons-Free Zone (CANWFZ). The main objective of the move was to promote global nuclear disarmament, strengthen regional and international security, and step up cooperation in resolving the region's environmental issues.[116] Nevertheless, the potential of the CANWFZ has yet to be fully utilized due to a number of unresolved issues with the nuclear-weapon states; the absence of practical implementation mechanisms; and insufficient cooperation between the Central Asian states in the CANWFZ framework.

Of the five nuclear-weapon states, only Russia and China have expressed their support for the Treaty of Semipalatinsk, which established the CANWFZ. The other three (i.e. the United States, Britain, and France) say they disagree with a number of provisions in the treaty, and refuse to sign the protocol to that treaty.[117] Clearly, proper political legitimacy of the CANWFZ requires its recognition by all official nuclear-weapon states, and the lack of legally-binding security guarantees on their part undermines the effective functioning of the zone.

The Central Asian states have repeatedly expressed their readiness to pursue constructive dialogue with the nuclear-weapon states and discuss all contentious issues. As a result, a series of consultations was held between the Central Asian states and the five nuclear-weapon states. The experience of other NWFZs demonstrates that the signing and ratification of the protocols can sometimes take decades. It is

[115] Central Asia and the Caucasus 1540 Reporting. August 21, 2012. Nuclear Threat Initiative: http://www.nti.org/analysis/reports/central-asia-and-caucasus-1540-reporting/ (Retrieved on June 20, 2013).

[116] Treaty on a Nuclear Weapons-Free Zone in Central Asia. PIR Center. http://www.pircenter.org/kosdata/page_doc/p1513_1.pdf (Retrieved on June 20, 2013)

[117] Kutnayeva Nuriya, Akhtamzyan Ildar. On the signing of the Treaty on a Nuclear Weapons-Free Zone in Central Asia. *Indeks Bezopasnosti*. 2007. Vol. 13, No 1 (81). P. 131-136.

important to avoid a similar scenario in Central Asia, because unresolved differences over various clauses in the Treaty of Semipalatinsk could become part of a geopolitical struggle for influence in the region between the leading international players, and lead to a split between the CANWFZ members.

The CANWFZ, which is the only regional initiative that includes every single country in the Central Asian region, faces the task of consolidating and strengthening regional cooperation on nuclear nonproliferation and disarmament. In and of itself, the establishment of the CANWFZ or its recognition by the international community cannot achieve that objective. What is required is a certain regional mechanism that would make the full use of the CANWFZ potential to counter proliferation challenges and threats. Under the terms of the Treaty of Semipalatinsk, the member states have agreed to hold meetings and consultations to discuss various issues related to the implementation of the treaty. So far, however, these meetings have been few and far between. This complicates the development of comprehensive cooperation between the Central Asian states on fulfilling the commitments reflected in the treaty, as well as cooperation with the relevant international organizations.

This is why all interested parties – especially Russia and the United States – should consider the possibility of providing assistance to the CANWFZ member states in establishing a standing institutional body that would coordinate regional cooperation on pressing issues of nuclear nonproliferation and disarmament, even though the legal status of the CANWFZ has yet to be fully recognized. Such a body could also be tasked with monitoring the states' compliance with the terms of the treaty. The organizational and technical verification and monitoring measures would augment the IAEA safeguards system, and help to establish a climate of mutual trust between the CANWFZ members. Since the Treaty of Semipalatinsk does not contain any information exchange provisions, such exchange could be conducted in the framework of this new institutional mechanism.

Establishing an institutional mechanism in the CANWFZ framework would enable the member states to pursue a more coordinated policy on rehabilitation and environmental protection measures, including such areas as safety and security of the uranium tailings dumps and radioactive waste disposal. A new regional structure would also facilitate closer cooperation between the Central Asian states on peaceful use of nuclear energy.

International cooperation on cybersecurity in the nuclear industry

Cybersecurity issues are now coming to the fore in the context of international and national security. The growing number of cyberattacks against government ministries, diplomatic agencies, companies and research institutions all over the world emphasize the urgent need for improved protection of information infrastructure and resources from criminals, hackers, and other attackers trying to gain unauthorized access. All of this fully applies to Central Asia as well.

Cybersecurity in the nuclear industry is especially important due to that industry's obvious sensitivity and the potential dangers of the loss of integrity of IT systems at nuclear facilities. Unauthorized access to such systems can lead to catastrophic and unpredictable consequences. Targeted cyberattacks by foreign governments or non-state actors can also lead to the leakage of sensitive information, technologies and expertise required for the manufacture or use of nuclear materials for malicious

purposes. Due to the rapid progress in the area of IT, existing national security standards and practices are often lagging behind the constantly evolving cyberthreats.

This is why there should be a greater focus on cybersecurity in Kazakhstan, which is pursuing ambitious nuclear industry development plans, including the construction of a nuclear power plant. It is worth noting that Kazakhstan was one of the countries with the greatest number of computers infected by the Red October cyberespionage malware, which was discovered by Kaspersky Labs, a cybersecurity firm, in January 2013.[118] International assistance to Kazakhstan in the search for solutions to the cybersecurity risks and challenges could help the country to create an effective system of protecting sensitive information and technologies, and to ensure the reliability and resilience of nuclear industry IT systems in the face of various cyberthreats.

Reducing the vulnerability of nuclear industry facilities requires, first and foremost, an in-depth analysis of Kazakhstan's existing body of laws and regulations in the area of cybersecurity, and of the relevant procedures pertaining to the protection of nuclear facilities. Involving reputable international specialists and scientists in this process would help to develop proposals on improving the country's legislation and procedures, identify the existing and potential cybersecurity threats, and develop effective countermeasures, with an emphasis on proper protection of information. The next step would be to hold comprehensive inspections at nuclear infrastructure facilities to identify vulnerabilities to attempted unauthorized access or acts of IT sabotage. The participation of reputable international experts in such inspections would make them more effective.

One of the critically important issues that require close attention is the choice of IT equipment and software for nuclear infrastructure facilities. Since such systems and software are not produced in the region, there is a potential danger of imported products having weaknesses and vulnerabilities that could be used by unauthorized users not only to gain access to confidential information, but also to manipulate industrial automation systems for their own purposes. Preventing such unauthorized access and preserving the integrity of information requires meticulous checks of the information systems used at nuclear facilities. Cooperation with international partners would help Kazakhstan to introduce the required certification and testing procedures for IT equipment and software, as to roll out a set of organizational, legal, technical and technological measures to make sure that computer networks are properly protected.

The international community could also help Kazakhstan and other Central Asian states in setting up special cyber units within the national security agencies, tasked with countering attacks in cyberspace. In addition, individual donor countries could look into the possibility of offering training courses at their universities and colleges to address the shortage of cybersecurity specialists the Central Asian states are currently facing in various industries, including the nuclear industry.

International assistance in nuclear science and technology cooperation

[118] The Red October operation – a wide network of cyberespionage against diplomatic and government agencies. The Kaspersky Labs Research Center. January 14, 2013.
http://www.securelist.com/ru/blog/207764382 (Retrieved on June 20, 2013)

As part of the Nunn-Lugar Program, hundreds of Central Asian scientists formerly involved in Soviet WMD programs have been able to apply their skills and expertise in civilian areas with the help of the International Science and Technology Center (ISTC).[119] Former weapons scientists have been given support in conducting fundamental and applied R&D, and provided with opportunities for integration into the global research community by participating in international research projects.

The transfer of the ISTC headquarters to Kazakhstan after the Russian decision to quit the organization has posed certain organizational and financial difficulties. It has also raised doubts about the completion of the ongoing R&D programs and projects, and about the launch of new ones.[120] Nevertheless, the research communities of the Central Asian states want to continue their long-standing and productive cooperation with their Russian colleagues. They hope that a new mechanism will be established to enable renewed cooperation between Russia and the other participating countries in the ISTC framework.

Some Central Asian countries, such as Kazakhstan, make a particular emphasis on fundamental and applied research into peaceful use of nuclear energy. Their objectives include the development of a civilian nuclear industry. There countries pursue projects to design new types of nuclear reactors; develop high-precision and high-tech equipment for nuclear facilities; increase the security and safety of nuclear power plants; design auxiliary buildings and facilities for the nuclear industry; test new types of nuclear fuel; and resolve the problem of nuclear waste disposal. That is why continued and increasingly close science and technology cooperation with international partners, including research centers in Russia and the United States, would enable the Central Asian research organizations significantly to expand the area and scale of their theoretical and applied research into peaceful use of nuclear energy.

Interested parties could draw up a list of jointly financed priority R&D projects involving research centers in Central Asia and the partner countries, focusing on such areas as nuclear physics; radiation material studies; seismology; nuclear energy safety; and radiological environmental studies and monitoring. The existing research and experimental facilities in Central Asia and Russia could be used for joint testing of new materials, new types of nuclear fuel, fuel cells, and other nuclear components. That research could be part of various projects to increase the safety and security of nuclear industry facilities. It is worth emphasizing that partnership with Russia is singularly important for the success of the program to modernize Kazakhstan's research reactors. The program includes the replacement of the instruments and reactor components that have reached the end of their service life. Since Kazakhstan is interested in setting up new high-tech industrial facilities, it would make sense to consider the possibility of involving companies from Russia, the United States, and other countries in the work of the Nuclear Technology Park in the town of Kurchatov. This is why the transfer of the ISTC headquarters to Kazakhstan can be viewed as an important step in promoting cooperation between the international community and Central Asia, a step that will help to strengthen the science and technological capability of the region's countries.

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[119] ISTC information bulletin. International Science and Technology Center. http://www.istc.ru/istc/istc.nsf/va_WebPages/ISTCFactSheetRus (Retrieved on June 20, 2013).

[120] Cheban Alexander. International mechanisms of countering nuclear proliferation and Russia's interests: the examples of Global Partnership and the ISTC. *Indeks Bezopasnosti*. Autumn-Winter 2012. Volume 18, No 3-4 (102-103). P. 141-168.

Another priority and long-term area of cooperation would be for international partners to assist in the training of specialists for those Central Asian states that plan to develop their own uranium and nuclear energy industries. The region's countries still have a pool of qualified specialists who were trained back in Soviet times. But these specialists are now approaching retirement age. With no-one to replace them, it will be difficult to implement the existing nuclear industry development plans. That is why it is very important to improve the system of personnel training and retraining in the relevant areas. The capability of the region's own education and training institutions is clearly insufficient for these purposes. It would therefore make sense to study the possibility of additional training of Central Asian specialists abroad, especially at the research centers and universities in Russia and the United States.

Another potential area of nuclear cooperation is nuclear medicine. International partners could consider the possibility of providing assistance in the completion of an innovative project to set up the Nuclear Medicine and Biophysics Center in Kazakhstan, to be followed by similar centers in other Central Asian countries. Such centers are required because countries in the region are lagging far behind in the application of nuclear medicine for the diagnostics and treatment of socially significant diseases. The nuclear medicine centers could cooperate with the relevant research and production organizations in Russia and the United States in the development, manufacture, and distribution of radiopharmaceuticals for diagnostics and specialized treatment of cancer; in the introduction of innovative diagnostic and treatment methods; and in the training of medical and technical specialists.

International cooperation in the promotion of WMD nonproliferation and nuclear security education

Amid the growing risks of the proliferation of WMD, delivery systems, and related materials, technologies and equipment, the international community is facing an urgent need to step up education programs focusing on disarmament, nonproliferation, export control, and nuclear security. Despite the heritage of Soviet weapons programs and the new WMD proliferation threats, the Central Asian states don't seem to treat education in this area as an important priority. Their secondary and tertiary education establishments do not offer any relevant courses. In addition, their government officials working for the relevant agencies do not have sufficient experience and expertise in these issues. The general public in Central Asia is very prone to radiophobia due to the lack of awareness about nuclear and radiation safety.

The importance of education in the area of disarmament and nonproliferation has been recognized at the highest international level. UN General Assembly Resolution 57/60, which was passed without a vote on November 22, 2002, emphasizes the need for concrete steps by the UN member states to promote this area of education.[121] It would therefore make sense for international partners to consider the possibility of establishing cooperation with the Central Asian governments in rolling out education programs and projects focusing on disarmament, nonproliferation, export control, and nuclear security.

[121] Resolution adopted by the General Assembly [on the report of the First Committee (A/57/510)] 57/60. United Nations study on disarmament and nonproliferation education. United Nations website: http://www.un.org/ga/search/view_doc.asp?symbol=A/RES/57/60&Lang=E (Retrieved on June 20, 2013).

Such cooperation could include efforts to organize specialized training courses and programs for officials and specialists working for the relevant government agencies, nuclear industry facilities, and research centers, as well as for journalists who cover these issues. It is also necessary to provide assistance in developing and *gradually incorporating in the curricula* of Central Asian universities relevant *disciplines focusing on the nuclear nonproliferation regime,* nuclear weapons reduction, export control, and nuclear security. These efforts could involve the leading research centers in Russia and the United States, which can assist the Central Asian states in developing academic courses, modules and programs at every level of education, as well as provide lecturers and training materials. In addition, Russian and U.S. research centers could conduct workshops for teachers, and continuous training courses for government officials dealing with WMD nonproliferation, nuclear security, and export control.

Another important aspect of education activities is working with the public opinion; this is currently very low on the list of the Central Asian governments' priorities. Experience demonstrates that it is very easy to form negative perceptions of any nuclear industry initiative among the general public in the region, owing primarily to a high level of radiophobia. Not so long ago activists of non-governmental organizations and environmental movements succeeded in mobilizing the public against the proposed imports of nuclear and radioactive waste to Kazakhstan for reprocessing and burial. Similarly negative coverage was given to Kazakh initiatives regarding the return of lands at the former Semipalatinsk nuclear test site to economic use; the proposal to host an international nuclear fuel bank; and the project to build a nuclear power plant in Kazakhstan.[122]

German and Japanese experience shows that such anti-nuclear campaigns can play an important role in the social and political life of the country, and even affect election outcomes. There is a potential danger of opposition figures in Kazakhstan and elsewhere using anti-nuclear rhetoric for their own political ends. That would enable them to manipulate public opinion and stoke up tensions. In the difficult social and economic climate at the moment, such tactics could create fertile ground for a further increase in anti-government sentiment among the general public. Furthermore, campaigns to discredit the government's nuclear initiatives could make use of external forces, which would further increase their destructive effects. Another possibility is that the high level of radiophobia among the general public, and the general negative attitude to nuclear initiatives can make nuclear industry facilities a more attractive target for terrorists or saboteurs.

That is why education programs focusing on WMD nonproliferation and nuclear security are becoming an important element in the provision of information security in the Central Asian states. Taking into account existing experience in this area, international partners could give countries in the region necessary assistance in overcoming negative public perceptions of the civilian nuclear industry. They could also help to formulate a clear strategy of countering subversive activities and information attacks, include those relying on social networks as a medium. Other important elements in the provision of information security in the nuclear sphere should include regular and timely circulation of accurate and accessible information; the training of qualified public relations specialists; interaction with the media outlets and public opinion formers; and ongoing public education and awareness efforts. This

[122] Vasilyev Sergey. A Nuclear Gamble. *Ekspress-K.* April 4, 2013. No 58 (17658).

can minimize the potential for any destructive information attacks, manipulation of information, and the spread of inaccurate or knowingly false information.

Conclusions

The end of Russian-U.S. cooperation in the framework of the Nunn-Lugar Program and Russia's pullout from the ISTC must not put an end to Russia's international cooperation in the area of WMD nonproliferation and nuclear security. That would not be in the best interests of Russia, the United States, or third countries, because it would have negative consequences for peace and stability all over the world. It is therefore very important to eliminate as soon as possible any remaining uncertainty concerning the prospects for partnership between Russia, the United States, and other countries in the area of nonproliferation and nuclear security.

The Central Asian states also have a clear interest in continued cooperation with foreign partners (especially Russia and the United States) on the entire range of WMD nonproliferation and nuclear security issues. Such cooperation can help them to resolve the issues they inherited from the Soviet Union, and to develop adequate responses to the modern challenges and threats related to WMD proliferation and nuclear security. Such cooperation is also in the best interests of the leading powers, including Russia and the United States, because it helps to reduce the risks related to WMD terrorism and illegal circulation of sensitive materials, technologies, and equipment. Another important consideration is that such cooperation can help these countries to strengthen their political and economic positions in Central Asia.

Clearly, a reformed mechanism of multilateral cooperation on WMD nonproliferation and nuclear security must be based on new guiding principles, the main such principle being equality. The new format of cooperation should also reflect the situation on the ground and take into account the national interests of all the participating states. To increase the effectiveness of such cooperation, it would be useful to engage, as equal partners, individual countries as well as interested international and regional organizations.

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Chapter 6. THE EXPERIENCE OF GLOBAL PARTNERSHIP FOR THE MIDDLE EAST

Artem Blashchanitsa

International cooperation on WMD nonproliferation is making first tentative steps in the Middle East. The theory of cooperation is being tested in practice by the project to destroy the Syrian chemical weapons stockpiles.

But are opportunities for cooperation limited to Syria only?

GLOBAL PARTNERSHIP AND ECONOMIC CRISIS

The Deauville Summit decided to extend the Global Partnership Against the Spread of Weapons and Materials of Mass Destruction (GP) beyond 2012 and to continue to use it as an effective mechanism with which to counteract the threat of WMD terrorism[123]. At the same time, recognizing that the risk of the proliferation of weapons and materials of mass destruction is a global one, the countries that took part in this summit highlighted the need to broaden the program's geographical scope and to involve other regions, not just the post-Soviet space.

Among the main areas of cooperation under the program, they highlighted nuclear, radiological and biological security, the provision of employment for scientists working in sensitive industries, and the provision of assistance to third-party states in implementing UN Security Council Resolution 1540, adopted in 2004.

Since 2002 a colossal amount of work has been done. According to the latest figures, projects in Russia and CIS countries have accounted for the bulk of the more than $21 billion that has been spent[124]. At the same time, as Alexandre Gorbachev, Director of the French Alternative Energies and Atomic Energy Commission's (CEA) Global Partnership program, pointed out, those taking part in these projects have amassed a significant amount of experience that can be put to good use in other countries that have either little or no involvement in the program at present[125].

At the G8 Summit in Northern Ireland on 17-18 June 2013, the main items on the agenda were the civil war in Syria, the development of trade, the international exchange of information on taxation, and transparency in public administration. The summit paid far less attention to challenges associated with ensuring nuclear security and the nonproliferation of WMD. As a result, the final documents from the meeting make no mention of any further action to develop the Global Partnership. The only reference to this issue came in the extremely modest Point 91 of the communiqué

[123] G8 Global Partnership: Assessment and Options for Future Programming. Deauville, May 26-27, 2011. http://www.g7.utoronto.ca/summit/2011deauville/2011-gpassessment-en.html#outreach (last accessed December 2, 2013).
[124] Global Partnership Working Group – GRWG Annual Report. Consolidated Report Data 2012. Annex. 88 p. http://www.state.gov/documents/organization/208032.pdf (last accessed December 2, 2013).
[125] YemelyanenkovAleksandr. The children of Kananaskis.http://www.rg.ru/2012/11/27/partnerstvo.html (last accessed December 28, 2013).

adopted by the G8 leaders, which consisted of a routine sentence stating that preventing the proliferation of WMD is a top priority[126]. So the expected breakthrough on these issues never materialized. Members of the GP need to establish some clear directions for the program's future development.

Officially, there is no general, agreed document in which GP participants have set out either a specific timeframe for future cooperation, or the specific levels of funding assigned to the program. In the meantime, countries such as the United States and Canada have already said they intend to continue funding the GP. The United States has made a commitment to contribute $10 billion to help fund projects delivered under the program between 2012 and 2022[127], while Canada has already published its plans to provide $367 million between 2013 and 2018[128].

Other donor countries are yet to put an exact figure on their continued participation in the program. Most probably, however, this is driven by the lack of clear guidelines for the development of the Global Partnership and by the lack of available funds at a time of economic crisis, rather than by a lack of desire to continue making a contribution to combating the proliferation of weapons and materials of mass destruction.

As things stand, GP participants have made a commitment to see projects in Russia and in the post-Soviet space through to the end in the next few years. Irrespective of this, however, those countries that are actively and effectively advocating the nonproliferation of weapons of mass destruction and the materials required for their manufacture are clear in their understanding that, given its global nature, modern terrorism must be fought right around the world. In this respect, it can be said that the G8 is not only engaged in a constant search for new donors to contribute to the program, but is also examining the prospects for a further investment of effort and funding in other parts of the world that have not attracted the required attention.

In this context, it is the Middle East that stands out dramatically from the world's other regions[129]. It is a region that is never calm, and the processes taking place there can only give cause for serious concern about how to prevent potential incidents in which either WMD or the technology and materials used for their manufacture could be leaked. The WMD factor is gradually starting to play an increasingly noticeable role in events relating to the threat of terrorism in the Middle East.

NUCLEAR SECURITY IN THE REGION

In order to provide a comprehensive assessment of existing and future proliferation threats in the Middle East, we shall assess the current state of nuclear security in each

[126]2013 Lough Erne G8 Leaders' Communiqué. P.21. https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/207771/Lough_Erne_2013_G8_Leaders_Communique.pdf (last accessed December 20, 2013).
[127]Office of the Press Secretary, The White House. Nuclear Security Summit National Statement of the United States.2010, April 13, http://www.whitehouse.gov/the-press-office/nuclear-securitysummit-national-statement-united-states (last accessed December 20, 2013).
[128]Nolke Sabine, The G-8 Global Partnership Against the Spread of WMD. Speech at the conference. The Apex of Influence — How Summit Meetings Build Multilateral Cooperation. Chicago. 2012, 10 May, http://fora.tv/2012/05/10/The_G8_Global_Partnership_Against_the_Spread_of_WMD#fullprogram (last accessed December 20, 2013).
[129] This paper defined the Middle East as per the 1989 IAEA definition: "the territory from Libya in the west to Iran in the east, and from Syria in the north to Yemen in the south", with the addition of Turkey.

individual country either currently engaged in or planning to become engaged in civilian nuclear activities.

ALGERIA

Algeria has two nuclear reactors – Nur (1MW) and Es-Salam (15MW). Both reactors use LEU. The nuclear material and the installations have been placed under IAEA safeguards. Algeria has plans to develop atomic energy. In May 2013, Algeria's energy and mining minister, Youcef Yousfi, announced that the country's government was planning to build a nuclear power plant (1,000MW) by 2025[130]. According to statements from the country's foreign minister, Mourad Medelci, the Algerian Institute of Nuclear Engineering, which was founded in 2011, will be responsible for training specialists to work at the nuclear power plant, as part of a program that will include courses in nuclear safety and security[131]. The Nuclear Regulation Agency has been authorized to monitor nuclear security. In the meantime, despite the Algerian Foreign Ministry saying that nuclear security is an extremely important priority for Algeria, the Es-Salam reactor, which is too powerful only for conducting research, is capable of producing about three kilograms of plutonium per annum. When it carried out checks at Es-Salam in 1994, the IAEA did not find the three kilograms of enriched uranium that Algeria had declared[132]. Besides, Algeria has yet to sign the Additional Protocol that would have improved the effectiveness of IAEA checks. Nevertheless, aside from the Additional Protocol, the state is party to all agreements on nuclear security. Algeria is also a party to the Global Initiative to Combat Nuclear Terrorism (GICNT) and, as of 2012, to the Nuclear Smuggling Outreach Initiative (NSOI). It can be said, therefore, that Algeria has laid a solid foundation for the safe and secure development of civilian nuclear activities, a foundation that needs to be strengthened by the country taking practical measures to ensure nuclear security.

Algeria is involved in GP projects such as:

- The Export Control and Related Border Security (EXBS) Assistance Program. The United States made plans to fund this program, but no decision was reached on the timeframe for the program's implementation in the Middle East and North Africa, and so it failed to get off the ground.

- The International Nuclear Safeguards and Engagement Program (INSEP). The objective of this program was to train staff, hold seminars and transfer equipment in order to improve nuclear safeguards measures. Funding for this project was also earmarked for the period 2006-2011, but it did not materialize.

At present, Algeria is bringing its national legislation on nuclear security, on combating WMD proliferation and on export and border controls into line with the international standards laid down in the Convention on the Physical Protection of

[130] Algeria will build nuclear power plant by 2025, *Power-Engineering*, May 20, 2013, http://www.power-eng.com/articles/2013/05/algeria-will-build-nuclear-power-plant-by-2025.html (last accessed December 28, 2013).
[131] Algeria attaches the greatest significance to nuclear security, declares Mr. Medelci at the UN, Embassy of Algeria, http://www.algerianembassy.org.my/minister%20speech%20.htm (last accessed December 28, 2013).
[132]Algeria's Nuclear Secrecy, *ISN Zurich*, 2007, July 30, http://www.isn.ethz.ch/isn/Digital-Library/Articles/Detail/?lng=en&id=53530 (last accessed December 28, 2013).

Nuclear Material (CPPNM), International Convention for the Suppression of Acts of Nuclear Terrorism (ICSANT), the Code of Conduct on the Safety and Security of Radioactive Sources and the Guidance to the Code. At the Nuclear Security Summit in Seoul, Algeria also made a voluntary commitment to set up its own nuclear security training and assistance center[133]. In this regard, it seems necessary to make the following recommendations to address nonproliferation and nuclear security challenges in Algeria:

- ☐ Provide Algeria with expert assistance in bringing its national laws on nuclear security into line with international standards, as well as providing financial assistance for the GP projects previous planned by the United States.

- ☐ In addition, as shown by the seizing of hostages by Al-Qaeda in the Islamic Maghreb at the In Amenas gas plant in January 2013, when 38 hostages were killed along with 29 terrorists, Algeria's army and security forces do not currently possess the knowhow required to prevent terrorist attacks, even at strategic facilities. So a precondition for the construction of a nuclear power plant in Algeria must be the retraining of the agencies responsible for the physical protection of nuclear facilities.

- ☐ Improve the nonproliferation culture in Algeria by organizing training programs for nuclear industry specialists and officials.

EGYPT

Like Algeria, Egypt has a fairly advanced nuclear research program. There are two research reactors situated at Inshas, near Cairo – a Soviet ETRR-1 (2MW) and an Argentine ETRR-2 (22MW). Both reactors use LEU. Egypt also has a system of hot cells and a facility for the disposal of spent nuclear fuel. In 2013 Egypt announced it was reviving its plans to develop nuclear energy. The nuclear power plant will be situated in Dabaa, and the Egyptians are expecting the first reactor to start operating by 2020[134]. The nuclear sector is regulated by the Nuclear and Radiation Control Authority. The department of nuclear and radiation engineering at Alexandria University trains specialists to work at nuclear facilities. At present, the curriculum at this department does not include the study of nuclear security[135]. Teachers working in this department need to be trained in this discipline so that they can introduce a similar course at the university.

Egypt has not signed the CPPNM or the Additional Protocol, nor has it ratified the ICSANT, but it has made commitments under the Code of Conduct on the Safety and Security of Radioactive Sources and the Guidance to the Code. Egypt's failure to engage fully in nuclear nonproliferation agreements and initiatives stems from Cairo's fundamental position that the country should not assist in nuclear nonproliferation

[133] The 2012 Nuclear Security Summit and the Middle East, *Arms Control and the Regional Security for the Middle East*, http://www.middleeast-armscontrol.com/2012/04/15/the-nuclear-security-summit-and-the-middle-east/ (last accessed December 28, 2013).
[134] El-Akkad Dalia. The best way forward: nuclear or renewables for Egypt, *the Nature*, http://www.nature.com/nmiddleeast/2013/130425/full/nmiddleeast.2013.61.html (last accessed December 28, 2013).
[135] Alexandria University. Nuclear and Radiation Engineering Department. Proposed Study Plan. http://www.alexeng.edu.eg/eng/dept/nuclear/wiki/studyplan (last accessed December 28, 2013).

until Israel abandons its own nuclear weapons and agrees to the Middle East becoming a WMD-free zone [136]. Meanwhile, Egypt recognizes the risk of possible acts of nuclear terrorism and the sabotage of nuclear facilities.

Egypt is involved in GP projects such as:

- The Export Control and Related Border Security (EXBS) Assistance Program. The United States made plans to fund this program, but no decision was reached on the timeframe for the program's implementation in the Middle East and North Africa, and so it failed to get off the ground.

- The International Nuclear Safeguards and Engagement Program (INSEP). The objective of this program was to train staff, hold seminars and transfer equipment in order to improve nuclear safeguards measures. Funding for this project was also earmarked for the period 2006-2011, but it did not materialize.

- The Second Line of Defense Program, designed to improve export and border controls over the circulation of nuclear material. The United States was scheduled to provide funds for the period 2002-2011, but the project was never implemented.

Given the instability in the country and the government's plans to develop nuclear energy, it seems necessary to make the following recommendations:

- Cooperating with Egypt under the GP is an extremely significant part of the nuclear nonproliferation agenda in the Middle East.

- Aside from the U.S. projects listed above, which ought to be implemented over the next 10-15 years, funding must be provided to help Alexandria University add to its curriculum by introducing a course on nuclear security for students studying nuclear-related subjects.

IRAN

Iran has an energy reactor at Bushehr and a research reactor in Tehran, and is also building a heavy-water reactor at Arak. Stocks of low-enriched uranium are stored at Natanz and at Qom. At present, these stocks amount to 6,357 kilograms of uranium-235 at 5percent enrichment and 182 kilograms of uranium-235 at 19.75percent enrichment[137]. Iran is actively boosting its capacity to launch a complete nuclear fuel cycle. In 1988 and 1993, Iran carried out experiments to recover spent nuclear fuel, and is believed to have isolated 100 grams of plutonium-239.

Since Iran has not signed a single international document on nuclear security, from the standpoint of proliferation, the threat arising from its nuclear activities has been

[136]Representative of the Egyptian embassy in Moscow. Interview with the author. Moscow, May 27, 2013.
[137]Implementation of the NPT Safeguards Agreement and relevant provisions of Security Council resolutions in the Islamic Republic of Iran. IAEA Board of Governors. GOV/2013/27. 22 May 2013.

considered at the political level to be serious. Iran made active use of the services of the notorious A.Q. Khan network[138].

Nevertheless, some positive trends have emerged since the election of a new president in Iran. These trends are opening up the prospect of Iran's full participation in international cooperation on WMD nonproliferation and nuclear security. On November 24, 2013 the Iranian delegation and representatives of the P5+1 group (the five permanent UN Security Council members plus Germany) signed an interim agreement in Geneva on resolving the Iranian nuclear problem. A final settlement of this contentious issue is expected in mid-2014, when the parties plan to sign a comprehensive agreement. It is important that both sides, i.e. Iran and the international community, are demonstrating willingness to seek a lasting compromise on the Iranian nuclear program – although, unfortunately, some forces in the United States, Iran and some Middle Eastern states (especially Israel and Saudi Arabia) are trying to derail the *nuclear deal*. Nevertheless, the chances of the deal being signed are improved by the fact that the new Iranian president was the head of the Iranian team of nuclear negotiators in the past.

In fact, Rouhani has been the most successful of all the Iranian negotiators because he came closer than anyone else to achieving a peaceful resolution of the Iranian nuclear problem in 2003-2004. PIR Center experts believe that Rouhani is a sufficiently moderate politician to achieve a lasting and comprehensive compromise on the nuclear program and to engage his country in international cooperation on WMD nonproliferation. What is more, Iran's spiritual leader, Ayatollah Khamenei, appears to support Rouhani's moderate course. Even before Rouhani's election as president, Khamenei softened his previously uncompromising stance on nuclear negotiations, and started to hint in his statements at the possibility of Tehran making some concessions on this issue[139].

Obviously, efforts to achieve a compromise on the Iranian nuclear problem and build trust in Iran's relations with other countries would also benefit from Tehran's active participation in international cooperation in the area of WMD nonproliferation and nuclear security.

Iran should be encouraged to sign and ratify international agreements and conventions that pertain to nuclear security. The international community should also pursue cooperation with Iran in strengthening the physical protection arrangements at the Bushehr NPP and other nuclear facilities. Such cooperation would be beneficial not only for Iran, which could make use of an opportunity to make its nuclear security provisions less costly and more effective. The international community would also benefit because cooperation in strengthening the physical protection of Iranian nuclear facilities would make the nuclear activities being pursued at these facilities more transparent.

Iran should be encouraged to participate in informal anti-proliferation mechanisms, especially the Global Partnership.

IRAQ

[138]Corera Gordon. Shopping for Bombs: Nuclear Proliferation, Global Insecurity, and the Rise and Fall of the A.Q. Khan Network. Oxford, 2006.
[139] Sveshnikova Yuliya, Roknifard Amir, Iranian Election Results: Change on Horizon? *Security Index*, 2013. No 4, Fall 2013, P. 70.

Until 1991, Iraq was in the process of developing its own nuclear weapons program. At present, the site of the former nuclear compound at Al-Tuwaitha, 18 kilometers from Baghdad, houses the radioactive substances caesium-137 and cobalt-60, as well as several tons of radioactive waste.

Iraq's radioactive material is currently being disposed of by the United States, which has been implementing the Iraq Nuclear Facility Dismantlement and Disposal Project since 2008. The program is coordinated by the U.S. State Department, and is funded by three countries: the United States, Britain, and Iraq. The program is mostly being carried out by U.S. organizations (the Sandia National Laboratory, Texas Tech University) and government agencies (the Department of Energy, the Environmental Protection Agency, the Nuclear Regulatory Commission). The Ministries of Science and Technology, Industry and the Environment are responsible for the implementation of the program.

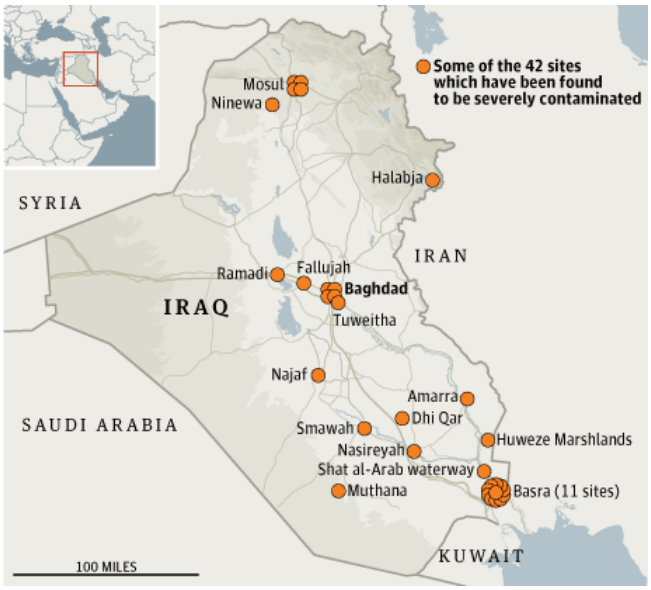
For the GP project, the United States earmarked some $831,000 for the period 2005-2010 to set up a program to regulate radioactive sources in Iraq[140].

In late 2012, the Iraqi government and the EU signed a memorandum of understanding, which included an agreement that the European Union would provide funding of 2.6million euros ($3.47 million) to develop a project to build a plant at Al-Tuwaitha to dispose of radioactive waste. The Iraqi Ministry of Science of Technology has said that the design of the facility will take account of the European Union's recommendations. Earlier, in 2009, Iraq and the EU also signed an agreement to train staff on how to handle radioactive material and decommission nuclear facilities left over from the Saddam era[141].

Another problem facing Iraq that could be resolved more quickly and effectively through Global Partnership projects is the need to decontaminate areas with higher levels of radiation created by the use of depleted-uranium weapons (shells, bombs, rockets) by American troops. To date, the Iraqi government has identified 42 sites suffering from high radiation levels and dioxin pollution[142] (see map 1).

Picture 1. *Radiation Pollution in Iraq*

[140] Global Partnership Working Group – GRWG Annual Report. Op.cit.
[141]Fakhir Adel. EU and Iraq sign deal on nuclear disposal, *the Nature*, http://www.nature.com/nmiddleeast/2013/130211/full/nmiddleeast.2013.22.html (last accessed December 28, 2013).
[142] Al-MuqdadiKadhim, Al-AnsariNadhir. The waste of wars in Iraq: Its nature, size and contaminated areas, http://www.ltu.se/cms_fs/1.85152!/file/2.3%20Almuqdadi%20and%20Alansari%201.pdf (Last accessed December 28, 2013).



Source: *The Guardian*, http://www.theguardian.com

In terms of export and border controls, there have been successes for Iraq in this area. In particular, in 2011, at the port of Umm-Qasr, the Iraqi authorities used radiation detectors to uncover material with heightened levels of radiation that had been transported from Japan[143].

Iraq is the Middle East's largest recipient of funds intended to retrain nuclear weapons specialists. The United States has spent more than $42 million on projects under the Iraq Scientist Engagement Program[144].

Through the GP, projects should be launched as soon as possible to decontaminate areas of Iraq polluted by radiation, as well as support the construction and operation of a plant to dispose of radioactive waste.

ISRAEL

Israel is the only state in the Middle East with a nuclear arsenal of between 100 and 200 warheads. The state's stocks of fissile material are estimated to include 300 kilograms of highly enriched uranium (HEU) and approximately 820 kg of plutonium-239[145]. Israel has two research reactors, at Dimona and at Soreq. The latter reactor has been placed under IAEA safeguards. Both reactors use LEU. Israel has enrichment and recovery facilities[146], which raises the risk of nuclear material proliferation in the absence of any international safeguards. The country's nuclear sector is regulated by the Israeli Atomic Energy Commission. Nuclear specialists are trained at the department of nuclear engineering at Ben-Gurion University, the School of Physics and Astronomy at the University of Tel Aviv, the Shalhevet Fryer Center and the

[143]Radiation-Contaminated Japanese Materials Seized in Umm Qasr, *The Iraq-Business News*, 2011, October 18, http://www.iraq-businessnews.com/2011/10/18/radiation-contaminated-japanese-materials-seized-in-umm-qasr/ (last accessed December 28, 2013).
[144] Global Partnership Working Group – GRWG Annual Report. Op.cit.
[145] Michelle Cann, Davenport Kesley, Balza Margaret. The Nuclear Security Summit: Assessment of National Commitments. http://www.armscontrol.org/files/ACA_NSS_Report_2012.pdf (last accessed December 28, 2013).
[146] Negev Nuclear Research Center (NNRC), *NTI*, http://www.nti.org/facilities/418/ (last accessed December 28, 2013).

Weizmann Institute. None of these higher education institutions provide a specialist education in the physical protection of nuclear material, or separate courses on this subject.

Of the various GP projects, the United States included Israel in the Second Line of Defense Program, designed to improve export and border controls over the circulation of nuclear material. The project did not materialize. According to the Israel Hayom newspaper, the physical protection arrangements for the Israeli reactor at Dimona were upgraded in 2011[147]. It is protected from aerial rocket attacks by the Iron Dome missile defense system. In the meantime, it seems expedient to make the following recommendation:

Israeli troops protecting this nuclear facility should increase their involvement in joint exercises with other countries that have signed up to the GICNT, in order to acquire the cutting-edge experience that has accumulated there, as well as sharing its own experience, since experts estimate that Israel has produced some very advanced work in the area of combating nuclear terrorism. It would also be useful for Israel to tap into the experience of improving physical protection arrangements accumulated under the GP. For this to happen, it would be useful for Israeli specialists to take part in consultations with the relevant experts from GP member states.

JORDAN

Jordan does not have any fissile material. At present, the Korean company KEPCO is building a research reactor (5MW) in Jordan. Jordan intends to build a nuclear power plant with Russia's assistance. In late October 2013 the Jordanian government announced its willingness to award a 10bn-dollar contract for the construction of the country's first NPP to *Atomstroyexport*, a Rosatom division.

Since 2007, the Jordanian University of Science and Technology has been providing a course in "nuclear engineering". None of Jordan's higher education institutions offer any courses on nuclear security. Civilian nuclear activities are regulated by the Jordanian Energy Regulation Commission.

A positive achievement for Jordan is that it has adopted a new law on nuclear security. At the same time, at present the Jordanian system of export controls does not regulate the transportation and sale of nuclear and dual-use material. In addition, although Jordan has introduced penalties for the transportation of nuclear material with intent to commit an act of terrorism, there is no provision for the criminal prosecution of those suspected of transporting dual-use material[148].

Jordan has taken part in the following GP projects:

- In 2012, along with Oman and Yemen, Jordan took part in the US Export Control and Related Border Security (EXBS) Assistance program through the GP.

[147]Shoval Lilach. Security at the nuclear facility in Dimona is disgraceful, http://www.israelhayom.com/site/newsletter_article.php?id=2008 (last accessed December 28, 2013).
[148] Middle East and North Africa 1540 Reporting, NTI, http://www.nti.org/analysis/reports/middle-east-and-north-africa-1540-reporting/ (last accessed December 28, 2013).

- In December 2011, in conjunction with the European Union, Jordan opened a nuclear security training center.

Subject to the GP's future involvement in improving nuclear security in Jordan, donor countries need to concentrate on supporting an existing project on export and border controls, as well as on funding measures to improve the nuclear security culture and competence among future nuclear industry employees, using the training center set up by Jordan and the EU as a foundation.

LIBYA

Libya has a research reactor at Tajura. The reactor uses LEU. Tripoli has signed all the agreements on nuclear security except for the Code of Conduct on the Safety and Security of Radioactive Sources. At present, the instability in Libya poses a threat to the security of the radioactive material held at the research reactor[149]. In that context, projects need to be undertaken in Libya to strengthen the physical protection of radioactive materials.

Libya has previously received funds from the GP under the following programs:

- An export controls improvement program ($598,154);
- The International Nuclear Safeguards and Engagement Program (INSEP). The objective of this program was to train staff, hold workshops, and provide equipment in order to improve nuclear safeguards measures. Funding for this project was also earmarked for the period of 2006-2011, but it did not materialize;
- A program focusing on the security of nuclear and radioactive materials (1.5million Canadian dollars);
- The Export Control and Related Border Security (EXBS) Assistance Program. The United States made plans to fund this program, but no decision was reached on the timeframe for the program's implementation in the Middle East and North Africa, and so it failed to get off the ground.

In view of the difficult situation in the country, programs to strengthen the protection of nuclear and radioactive materials through the GP must continue to be funded.

MOROCCO

Morocco has a research reactor in Rabat, which uses LEU. The country has signed all the documents on nuclear security except for amendments to the CPPNM and the Code of Conduct on the Safety and Security of Radioactive Sources. Morocco has plans to develop its own nuclear energy program by 2020-2024[150]. Nevertheless, in terms of fulfilling the conditions set out in Resolution 1540 (2004), Morocco trails

[149] Dahl Fredrik. Nuclear experts warn of Libya "dirty bomb" material, *The Reuters*, http://www.reuters.com/article/2011/08/24/us-libya-nuclear-heinonen-idUSTRE77N1MZ20110824 (last accessed December 28, 2013).
[150] France to help Morocco's nuclear energy drive, *Expatica*, http://www.expatica.com/fr/news/local_news/france-to-help-morocco-s-nuclear-energy-drive_80826.html (last accessed December 3, 2013).

near the back of the field, alongside Libya[151]. In this context, the following recommendation needs to be made:

Provide expert support through the GP to help ensure the incorporation of the provisions of Resolution 1540 into national legislation.

SAUDI ARABIA

Riyadh plans to build 16 energy reactors by 2030[152]. Saudi Arabia plans to complete its first nuclear power plant in 2020[153]. Despite the fact that the country has set the bar fairly high in terms of its nuclear energy ambitions, even so it can be said that Riyadh has already made arrangements for the construction of a nuclear power plant in the next few years. As a result, as these plans develop, new threats will emerge, with the risk of the proliferation of nuclear materials. What makes the nuclear security situation even more serious is that Saudi Arabia does not intend to abandon the idea of enriching uranium.

In its January 2013 report, the 1540 Committee describes the country's legislation on export and border controls as deficient in those areas that relate to control lists and export and re-export standards[154]. In addition, Saudi Arabia does not wish to abandon the idea of enriching uranium.

Through GP projects, Saudi Arabia can be provided with expert assistance to strengthen its export and border controls regime.

SYRIA

Syria has a nuclear research reactor situated in what is effectively a conflict zone. Should government forces lose control of the site even temporarily, the nuclear material held there may find its way into the hands of extremists or criminal groups. The fate of the nuclear facility at Al-Tuwaitha in Iraq provides a vivid example of what can happen. Following the fall of the Saddam regime, according to IAEA inspectors, several tons of radioactive material was lost[155].

Meanwhile, the problem of the physical protection, control and accounting of nuclear materials in Syria cannot be resolved through international cooperation mechanisms without the authorities in Damascus taking a decision to this effect.

TURKEY

Turkey has two research reactors, both of which use LEU – ITU-TRR (250KW) and TR-2 (5MW). Ankara and the Russian company *Atomstroyexport* have signed an

[151]Crail Peter. Measuring Nuclear Export Controls in Nuclear Powered Nations and Nuclear Aspirants, CSIS, http://csis.org/files/publication/110916_Crail.pdf (last accessed December 28, 2013).
[152]Saudi Arabia to build its first 16 nuclear reactors by 2030. *Trend*. June 1, 2011, http://www.trend.az/capital/energy/1884819.html (last accessed December 28, 2013).
[153] Saudi Arabia increases plan for nuclear generation capacity by 1 GW. *Rossiyskoye atmonoye soobshchetvo*. December 10, 2012, http://www.atomic-energy.ru/news/2012/12/10/37630 (last accessed December 28, 2013).
[154] Middle East and North Africa 1540 Reporting, NTI, http://www.nti.org/analysis/reports/middle-east-and-north-africa-1540-reporting/ (last accessed December 28, 2013).
[155] UN admits that uranium has been stolen from Iraqi storage facilities, *Nuclearno*, http://nuclearno.ru/text.asp?6135 (last accessed December 28, 2013).

agreement for the latter to build a nuclear power plant at Akkuyu(4,800MW). Turkey also plans to build two further nuclear power plants. The sector is regulated by the Turkish Atomic Energy Authority.

As Turkey has already started to implement its plans to develop nuclear energy, it needs to be supplied with comprehensive technical and expert assistance on matters of customs and border controls (the Second Line of Defense program) and nuclear security.

UNITED ARAB EMIRATES

The UAE does not have any nuclear facilities. In July 2012 the South Korean consortium KEPCO began building the country's first nuclear power plant at Barakah. The first reactor is expected to begin operating in 2017. Given that, at one time, the UAE was a hub for the A.Q. Khan network, a great deal of work has been done to strengthen its export control regime. In its January 2013 report, however, the 1540 Committee notes that the UAE's export controls legislation does not contain any basic standards, and staff in the customs and border services lack the required training[156].

As the UAE is seeking to comply fully with all the requirements made of a state that plans to develop nuclear energy, the country should be given expert assistance in bringing its export controls legislation into line with international standards, as well as providing assistance in the development of a culture of nonproliferation among future nuclear sector employees. Funding could be provided by the government in Abu Dhabi, or shared equally between the UAE and its partners.

CHEMICAL WEAPONS IN THE REGION

Combined with the instability some of these countries are experiencing and the clear threat of terrorist attacks, these circumstances indicate that there is a strong possibility that WMD will be used in the region. It is well known that, in the second half of the 20th century and the early years of the 21st century, the Middle East has witnessed several instances when chemical weapons were used. In 1967, Egyptian President Gamal Abdel Nasser gave orders for poisonous substances to be used against rebels during the civil war in North Yemen. Between 1980 and 1988, during the Iran-Iraq War, both sides used chemical weapons against each other. In April 1987 and March 1988, Iraqi President Saddam Hussein launched chemical attacks on Kurdish settlements. In 1987, Libyan leader Muammar Gaddafi's regime used rockets armed with chemical weapons against the forces of Chad[157].

In 2012-2013, during the ongoing civil war in Syria, the warring sides leveled accusations at each other in connection with several episodes where chemical weapons may have been used. These instances show that the threshold beyond which WMD are used in the region is relatively low. As a consequence, there is a high probability that, should such weapons fall into the hands of radical, non-governmental groups, they may be used against supporters of government forces and against the wider civilian population.

[156] Middle East and North Africa 1540 Reporting, NTI, http://www.nti.org/analysis/reports/middle-east-and-north-africa-1540-reporting/ (last accessed December 28, 2013).
[157] Barletta Michael and Jorgensen Erik. Reported Use of Chemical Weapons, Ballistic Missiles, and Cruise Missiles in the Middle East, MIIS, http://cns.miis.edu/wmdme/use.htm (last accessed December 28, 2013).

EGYPT

Egypt began to develop chemical weapons in the 1950s. The size of Egypt's chemical weapons stocks is not known. Egypt has yet to sign the CWC, and has not announced that it has disposed of its chemical weapons. Egypt's decision not to sign the CWC, or the CPPNM, is based on its attitude to Israel's decision not to sign up to the NPT. In this context, the GP is unlikely to introduce programs to destroy Egypt's chemical weapons or retrain its chemical weapons specialists at present.

IRAN

In 2008, under the auspices of the OPCW, Iran hosted a training event on providing medical assistance in the event of a chemical attack[158]. Tehran is strongly opposed to the use of chemical weapons, after Iranian service personnel were targeted with chemical weapons by Iraqi troops during the 1980-1988 war. It is thanks in part to Iran's efforts that the crisis over the Syrian chemical weapons has been resolved. After the international community learned about the use of chemical weapons outside Damascus in August 2013, Iranian president Rouhani made a statement condemning the use of chemical agents or any other WMD. There are reasons to believe that, using its clout as the Syrian government's closest foreign ally, Iran leaned on Bashar Assad to agree to the Russian initiative on destroying the Syrian chemical stockpiles.

It appears that with the arrival of a new president, Iran can now play a constructive role in achieving a Syrian settlement and participate more energetically in strengthening the WMD nonproliferation regime. We would recommend engaging Iran in achieving a settlement in Syria, where Tehran has a lot of influence. Iran's participation in multilateral talks on Syria (i.e. the Geneva II conference) could help the implementation of the international initiative on the destruction of the Syrian chemical stockpiles. Given that Iran is in possession of advanced chemical technologies, Iranian specialists could be invited to participate in technical measures related to the initiative's implementation.

IRAQ

Iraq began developing its own chemical weapons program a relatively long time ago, in the mid-1960s. In 1991, Iraq declared its reserves of chemical weapons – 3,080 tons of mustard gas, 812 tons of sarin, 250 tons of tabun, and 58 tons of VX gas precursors. In total the country declared 127,941 separate warheads that could be used in order to deploy chemical weapons[159]. It is believed that all stocks of Iraqi chemical weapons were destroyed in the 1990s, with the assistance of the UN Special Commission on Iraq. Even so, some 500 old chemical weapons have been discovered since 2003. As US Defense Intelligence Lt-Gen Michael Maples pointed out, Saddam Hussein's regime did not maintain precise records of its destruction of chemical

[158]Polster Claus-Peter. Ninth International Course on Medical Defence Against Chemical Weapons. Organization for the Prohibition of Chemical Weapons, 9 November 2008, http://www.opcw.org/news/article/ninth-international-course-on-medical-defence-against-chemical-weapons/ (last accessed December 28, 2013).
[159]Iraq's Chemical Weapon Program, *The Iraq Watch*, http://www.iraqwatch.org/profiles/chemical.html (last accessed December 30, 2013).

weapons[160]. So at present the possibility cannot be excluded that, although they may have lost their combat properties, there are toxic weapons in the country dating back to the 1980s and 1990s. A potentially similar state of affairs exacerbates the risk of chemical weapons proliferation in the region. For example, a report from the U.S. National Ground Intelligence Center revealed by U.S. Director of National Intelligence John Negroponte said that some of Iraq's chemical weapons may have ended up on the black market, and it may fall into the hands of terrorists and local militants[161].

In addition, there is a problem with the former chemical weapons manufacture and storage facility at Al-Muthanna. The facility has two bunkers containing chemical weapons that are in a condition that would pose a danger to anyone who tries to remove them[162].

It is clear that resolving challenges relating to the destruction of the chemical weapons remaining in the depots is one of the tasks that could be accomplished through the program activities of donor countries as part of the GP. In particular, Germany and Britain have already assumed obligations to provide funding in 2012-2013 to help destroy the chemical weapons at Al-Muthanna, to the tune of 2million euros and 100,000 pounds sterling respectively.

In terms of the destruction of chemical weapons, Russian experience may be of use. Russian and U.S. specialists may be able to provide expert support.

In addition, on 1 June 2013, with the support of foreign security agencies, security officials from the Iraqi Defense Ministry discovered three plants belonging to a local Al-Qaeda cell and designed to manufacture sarin and mustard gas[163]. The Iraqi authorities have said that the chemical weapons were intended for use in Europe and North America. The fact that members of the terrorist group were able to manufacture chemical weapons with technological precision shows that the country faces serious challenges in exerting control over the circulation of precursors for the manufacture of chemical weapons and dual-use materials. Donor countries contributing to the GP program should pay attention to strengthening export controls.

ISRAEL

Despite the fact that Israel is suspected of being in possession of chemical weapons (tabun, sarin, VX), Tel Aviv is a possible partner on export controls in the area of chemical weapons nonproliferation. Although it has not ratified the CWC, Israel has

[160] Samantha L. Quigley. Weapons Found in Iraq Meet WMD Criteria, Official Says, June 29, 2006. http://www.defense.gov/News/NewsArticle.aspx?ID=15918 (last accessed December 30, 2013).
[161] Letter from Director of National Intelligence John D. Negroponte to the Honorable Peter Hoekstra, Chairman, Permanent Select Committee on Intelligence, U.S. House of Representatives, providing declassified "Key Points" from a National Ground Intelligence Center report on the recovery of chemical weapons in Iraq, dated June 21, 2006.
http://www.foxnews.com/projects/pdf/Iraq_WMD_Declassified.pdf (last accessed December 3, 2013).
[162]Comprehensive Report of the Special Advisor to the DCI on Iraq's WMD. CIA, 2004, September 30, https://www.cia.gov/library/reports/general-reports-1/iraq_wmd_2004/chap5_annxB.html (last accessed December 30, 2013).
[163]Chasmar Jessica. Iraq foils al Qaeda chemical weapons plot: report. *Washington Times*, June 2, 2013, http://www.washingtontimes.com/news/2013/jun/2/iraq-foils-al-qaeda-chemical-weapons-plot-report/ (last accessed December 3, 2013).

said that it intends to abide by the fundamental principles of the Australia Group, and operates one of the most effective export and border control systems.

Therefore, Israel could be engaged in GP projects by being involved in measures to exchange experience and technologies in respect of export controls for chemical agents, precursors and dual-use materials.

JORDAN

Jordan has never developed chemical weapons and is a party to the CWC. Nevertheless, there is a need for international cooperation in Jordan on export and border controls for chemical agents, precursors and dual-use materials, since the country has a border with Syria, where there are serious concerns over the potential proliferation of chemical weapons. Through the GP, the United States is already undertaking projects to strengthen border controls. This cooperation must be supported and strengthened by continuing to fund the program.

LIBYA

Until 2004, Libya operated a program to produce chemical weapons. When Libyan leader Muammar Gaddafi signed the CWC, he also made a commitment to destroy the country's stocks of chemical weapons by 2011. In total, Libya's chemical weapons arsenals contained 24.7 cubic meters of mustard gas and 3,563 chemical air bombs. By February 2011, 51 percent of the reserves of mustard gas and 40 percent of the precursors for mustard gas had been eliminated[164]. The Interim National Council of Libya (INCL) confirmed its CWC obligations and began to cooperate actively with the Organization for the Prohibition of Chemical Weapons (OPCW) on the elimination of Libya's WMD arsenals. Moreover, the INCL also uncovered two more chemical weapons depots that Gaddafi had not declared[165].

The main GP projects implemented in Libya focused on the destruction of chemical weapons and the retraining of chemical weapons specialists. The chemical weapons destruction program was scheduled to continue until 2016[166]. Since this project has not reached its conclusion, then, in order to counteract the proliferation of WMD, this area of work should continue to be financed through the GP program until all of Libya's chemical weapons stocks have been destroyed. Efforts to retrain chemical weapons specialists should focus on using their experience not so much for research purposes as in areas of industry (such as pharmacology) that need to be developed in order to tackle the country's overall economic slump.

Moreover, given the instability in Libya, GP participants should develop a project to strengthen the physical protection of chemical weapons.

SYRIA

The start of the civil war undermined the security of chemical weapons (CW). The use of chemical weapons by unknown perpetrators outside Damascus on August 21, 2013

[164] Max Arthur. Watchdog says Libya destroys chemical weapons. *The Associated Press*, 23 February 2011.
[165]Karadsheh Jomna. Jibril: Two chemical weapons sites found in Libya. *CNN*, 30 October 2011.
[166] Libya: Facts and Figures. http://www.opcw.org/the-opcw-and-libya/libya-facts-and-figures/ (last accessed December 28, 2013).

raised the possibility of a military operation against Syria by the United States and its allies. That military operation was averted thanks to the Russian initiative on the destruction of Syrian chemical stockpiles, which Damascus immediately accepted. On October 14, 2013 Syria officially joined the Organization for the Prohibition of Chemical Weapons (OPCW).

The United States was also forced to accept the initiative after bilateral talks between foreign ministers Lavrov and Kerry in September 2013. As of the writing of this article, the first phase of the Lavrov-Kerry plan for the destruction of Syrian chemical weapons has been implemented successfully and within the agreed deadline. On October 31 the OPCW announced that all the chemical weapons production equipment declared by the Syrian government had been destroyed. [167] On the same day it was announced for the first time how much of the various chemical agents Syria has: there are 1,300 tonnes stored at 23 facilities (with 41 separate buildings at these facilities).

The plan is that during the second phase of the initiative, the OPCW will develop a specific set of measures to destroy the Syrian chemical stockpiles. Some problems still remain with this particular part of the project. Destroying chemical weapons in a country torn by civil war is not a realistic possibility. Removing Syrian chemical stockpiles to other countries is hardly possible, either, because one after another, Russia, Jordan, Turkey, Norway and Albania have already refused to accept these stockpiles. The United States has said that the Syrian chemical weapons can be destroyed on board the USS Cape Ray, but for this operation to proceed, the U.S. warship with Syrian chemical weapons on board must be allowed to enter one of the Mediterranean ports. So far, not a single Mediterranean country has offered the use of its ports.

In this context, the international community, and primarily Russia and the United States, have an interest in forging a compromise in their approach to the civil war in Syria. The only acceptable way in which the main interested parties will be able to achieve a peaceful solution will be to secure a cease-fire between the warring sides. A truce between the Syrian government and all the opposition groups will not be secured, because the opposition consists of a conglomerate of forces that are competing with one another and occupy different ideological positions, positions that are sometimes diametrically opposed to each other. However, given Russia's proposal for Syria's chemical weapons to be placed under international control and subsequently disposed of[168], interested parties could make use of this new window of opportunity and focus their efforts on securing agreements with Damascus on this issue and developing a detailed plan for the implementation of this initiative.

At present, there is potential for Syria to participate in the GP projects, and to involve it in the renewed Nunn-Lugar Program, or the New Partnership, as it is referred to by experts at the PIR Center. In the meantime, the prospects for Syria's participation are directly linked to the efforts of the interested parties to establish peace by resolving the country's civil war. For this to happen, the international community needs to take

[167] Syria discloses the chemical weapons formula. *Kommersant*, October 31, 2013. http://www.kommersant.ru/doc/2332343 (last accessed December 28, 2013).
[168]Statement for the media by Russian Foreign Minister Sergey Lavrov over the situation with Syrian chemical weapons. Moscow, September 9, 2013, http://mid.ru/brp_4.nsf/0/4B6CF9DF7225584344257BE1005104AF (last accessed December 28, 2013).

decisive political steps in order to convince the Syrian government to eliminate the country's existing chemical arsenals. Putting the Russian initiative into practice might be one of these steps.

TURKEY

Turkey has never been regarded as a country that possesses chemical weapons. It is a member of the CWC and the Australia Group. Given the fact that Turkey is a neighbor of Syria, it would be wise for the GP to implement projects to improve the country's export and border controls over the circulation of chemical agents, precursors and dual-use materials.

UNITED ARAB EMIRATES

As far as is known, the UAE has never possessed chemical weapons. The country is a member of the CWC.

In 2013, construction of a new chemical industry complex not far from Abu Dhabi – the Chemical Industry Park – is expected to be completed[169]. This will increase the volume of dual-use materials being imported into the country and exported out of it. In this context, efforts need to be made through the GP to provide the UAE with expert and technical assistance to help ensure export controls.

BIOLOGICAL THREATS IN THE MIDDLE EAST

Biological security is currently a less widespread and yet no less significant component of international cooperation on efforts to combat the proliferation of WMD in the Middle East. The threat of bioterrorism is viewed with the same level of seriousness as other forms of WMD terrorism – nuclear and chemical. In the Middle East, biological weapons may proliferate from sources such as military laboratories involved in developing this form of weaponry, virological research institutes, and medical research centers.

At the same time, the activities of civilian institutions are often fairly difficult to monitor, since these activities are dual in nature. The greatest danger stems from laboratories involved in biological research of a military and offensive nature. As a rule, such laboratories are located in countries that are developing or have developed programs to produce biological weapons. A biological threat may, however, also come from other institutions involved in research in fields such as microbiology, virology, immunology, bioengineering, genetics, and in other related areas of research and medicine.

Back in December 2008, a report published by the U.S. Congress Commission on the Prevention of Weapons of Mass Destruction Proliferation and Terrorism, titled "World At Risk", noted that terrorists found it simpler and more appealing to acquire pathogens in order to carry out a biological attack, rather than to try to obtain nuclear materials. Therefore, in the opinion of the document's authors – Bob Graham, Graham Allison et al – if urgent measures were not taken to combat the proliferation

[169] Chemical Industrial City to be located at Khalifa Industrial Zone at Taweelah. http://www.adpc.ae/en/news/media-centre/press-releases/chemicals-industrial-city-to-be-located-at-khalifa-industrial-zone-at-taweelah.html (last accessed December 28, 2013).

of materials for the production of WMD, including biological WMD, then it was highly probable that an act of WMD terrorism would be carried out by the end of 2013[170]. At present, the risk from bio-threats is fairly high, particularly in the Middle East, given that the region has countries that have not adopted the Convention on the Prohibition of the Development, Production and Stockpiling of Bacteriological (Biological) and Toxin Weapons and on their Destruction (BTWC) (Egypt and Syria have signed the convention but not ratified it, while Israel has not signed it), and given that the region has facilities involved in carrying out research in the field of microbiology and genetics.

According to observations made by Russia's Foreign Intelligence Service (SVR), it is believed that six of the region's countries have the capability to develop a biological program: Iraq, Libya, Syria, Egypt, Israel, and Iran[171]. The specialists working in these countries, the pathogens these countries use, and the stocks of biological weapons these countries possess make them potentially dangerous sources for the proliferation of biological weapons and of bioterrorism.

EGYPT

At present there is no information on any offensive biological weapons programs that may have been developed in Egypt. The country has a fairly developed biotechnology infrastructure, which could potentially become the foundation for the manufacture of biological weapons. Between 2007 and 2012 Cairo modernized laboratories and centers involved in biological research[172]. These measures may have significantly increased Egypt's capacity to develop applied military research programs as part of an offensive biological weapons program. According to some estimates, Egyptian laboratories may well have worked with biological agents, such as agents for the plague, cholera, rabbit fever, malleus, brucellosis, anthrax, melioidosis, psittacosis, Q fever, Japanese B encephalitis, Eastern equine encephalitis, and smallpox[173]. Many of the outcomes from the research carried out by Egyptian scientists may have a dual use.

Below are two solutions that could strengthen biosecurity in Egypt and could be delivered through the GP program:

- ☐ Educational seminars for Egyptian biologists on the subject of biosecurity and bio-protection.

- ☐ The provision of technical and expert assistance on export controls, although Egypt joining the Australian Group is an important precondition for the successful implementation of this project.

IRAN

[170]Graham Bob, Allison Graham. World at Risk: The Report of the Commission on the Prevention of Weapons of Mass Destruction Proliferation and Terrorism. First Edition. New York: Vintage Books, 2008. P. XV.
[171]Kalinina Natalia. International and national issues of biological security and the prospects for their resolution. Moscow: IMEMO RAN, 2012. P. 56-62.
[172] Egypt. Biological. NTI, http://www.nti.org/country-profiles/egypt/biological/ (last accessed December 30, 2013).
[173]Shoham Dany. The Evolution of Chemical and Biological Weapons in Egypt. ACPR Policy Paper No. 46, 1998. p. 14.

Tehran signed the BTWC in 1972 and ratified it in 1973. Even so, this did not prevent it from pursuing a biological weapons program during the Iran-Iraq war, which ran from 1980 to 1988. There is no precise information on whether Iran has biological weapons. It is believed that Tehran does not possess this type of weaponry. According to the latest estimates, however, Iran is annually expanding its biotechnology infrastructure and developing dual-use technologies[174]. The country is carrying out major biotechnological research in the areas of medicine, agriculture, and food production. In 2005, Tehran adopted a 10-year biotechnology development program, supervised by the Biotechnology Committee under the president of the IRI. At present, there are several dozen research centers in Iran focusing on various types of biotechnology. Of these, the largest are the National Research Center for Genetic Engineering and Biotechnology, the Pasteur Institute of Iran, the Agricultural Biotechnology Research Institute of Iran, the Institute of Biochemistry and Biophysics, the Institute of Vaccines and Serum, and others. The country is actively developing nanotechnologies and genetic engineering (in 2006 Iran managed to clone a sheep, in 2008 a goat). Under the 10-year plan mentioned earlier, Tehran's objective in nanotechnology is to become one of the top 15 countries by 2015. Iran is carrying out intensive biotechnological research in the agrarian sector and in the area of petroleum chemistry[175]. It is fairly difficult to assess the risks of proliferation arising out of the research and production activity being pursued by the country's biochemical facilities, since there are no openly available statistics recording the theft or smuggling of biological agents or pathogens in Iran.

In December 2012 there was a report, citing a source in the Islamic Revolutionary Guards Corps, that Iran was developing biological weapons at a secret facility called Shahid Bahonar. It was reported that Iran was secretly working on 18 biological agents (anthrax agents, the Ebola virus, cholera, smallpox, the plague, and others), and had supplied one of them, which was called "yellow grain" and was developed with the help of North Korean research, to the Hezbollah group[176]. This sort of information cannot be verified, however, and so it should be treated with a significant degree of skepticism until information confirming such statements appears from other sources.

Meanwhile, it is worth noting that, according to Natalia Kalinina, chief researcher at the Center for International Security at the Russian Academy of Sciences' Institute of World Economy and International Relations, Iran is one of the most disciplined countries in terms of the nonproliferation of biological weapons and declaring its own biotechnology activities.

At present, Iran is not covered by GP projects, and it is unlikely that it will be inclined towards engaging in international cooperation on the nonproliferation of WMD under this program. Donor countries, however, need to pay attention to the prospects for possible projects to develop the system of export controls over the circulation of bio-

[174]Unclassified Report to Congress on the Acquisition of Technology Relating to Weapons of Mass Destruction and Advanced Conventional Weapons, Covering 1 January to 31 December 2011, DNI, http://www.dni.gov/files/documents/Newsroom/Reports%20and%20Pubs/2011_report_to_congress_wmd.pdf (last accessed December 28, 2013).
[175]Vartanyan Artur. The phenomenon of science and technology jihad in Iran, IIMES, 2010, November 7, http://www.iimes.ru/rus/stat/2010/07-11-10a.htm (Last accessed December 30, 2013).
[176] Reza Kahlili. Iran Makin Anthrax at Secret Plant, http://www.wnd.com/2012/12/iran-making-anthrax-at-secret-plant/#LIc23emRYpSe6XzB.99 (last accessed December 29, 2013).

materials in states neighboring Iran. The same applies to Iran itself, in light of the recent statements by the new Iranian president in which he has demonstrated his country's willingness to participate in international cooperation on WMD nonproliferation.

IRAQ

Iraq joined the BTWC in 1991. Between 1985 and 1991, the country was developing its own program to manufacture biological weapons. An indirect sign that Iraq possessed such a program was offered by Iraq's suspiciously excessive activities to manufacture vaccines (up to 15 types of vaccines and 12m doses per annum, for a population requiring 2m doses or maybe even fewer)[177]. In 1995, Iraq acknowledged that it had been developing systems that could be used for offensive purposes, and declared that it had an arsenal of biological weapons. The same year came news of the size of this arsenal: 166 air bombs, 25 warheads for Scud/El-Hussein-type ballistic missiles, experimental airborne spray tanks with a capacity of 2,000 liters each, 155mm shells, and 122mm rockets packed with biological agents[178]. Iraq announced that of the 19,180 liters of botulinum toxin, 8,445 liters of anthrax spores, 2,200 liters of aflatoxin and 340 liters of clostridium perfringens toxin it previously possessed, 7,665-7,735 liters of botulinum toxin, 3,412 liters of anthrax spores, 900-970 liters of aflatoxin and 338 liters of clostridium perfringens toxin were destroyed in 1991[179]. However, the UN Special Commission on Iraq (UNSCOM) noted that there was no convincing evidence that the declared volumes of pathogens had been destroyed, or that Iraq actually had the facilities to destroy them. Between 1995 and 2002, UNSCOM, and from 1999, the UN Monitoring, Verification and Inspection Commission (UNMOVIC), were unable to find reliable data on the precise scale of Iraq's biological weapons program.

Following the start of the Iraq war in 2003, inspectors from the UN and the United States were unable to find any signs of biological weapons in the country[180]. Nor was it confirmed that Iraq had any mobile installations for the production of biological weapons[181]. At present, there is no information proving that Iraq has biological weapons or any related projects. The resumption of inspections to check whether the country has biological weapons should help to clarify the situation.

This state of affairs, where there is a fundamental lack of reliable information (based not on estimates, but on confirmation) on the presence of biological weapons and the materials used to manufacture them poses a serious threat that they may proliferate. In this context, it is worth noting that, as part of the GP, individual countries are already implementing projects to improve the system of bio-security in Iraq:

- The training and retraining of biochemists to work on civilian projects (United States, Italy);

[177] New challenge after the Cold War: proliferation of weapons of mass destruction (1993 open report by the Foreign Intelligence Service of the Russian Federation), The Foreign Intelligence Service of the Russian Federation, http://svr.gov.ru/material/2-1.htm (last accessed December 30, 2013).
[178] Iraq: The UNSCOM Experience. SIPRI Fact Sheet. October 1998. P. 4.
[179] UNSCOM - Report to the Security Council - 25 January 1999. Annex C. Status of Verification of Iraq's Biological Warfare Programme.
[180] Borger Julian. There were no weapons of mass destruction in Iraq. The Guardian, 7 October 2004.
[181] Warrick Joby. Lacking Biolabs, Trailers Carried Case for War. *The Washington Post*, 12 April 2006.

- Bio-security training for specialists at laboratories and production units (Switzerland);
- Support for research being carried out by Iraqi biologists (Britain);
- Training intended to strengthen the system of healthcare, bio-security and epidemiological oversight (Britain);
- Improving the system of physical protection for bio-laboratories (Britain) (plans have been drawn up for the project, but funding has not been made available);
- The development of capacity in Iraq to detect, diagnose, provide timely notification of and react to bio-threats (United States);
- Working with scientists to improve their skills in ensuring bio-protection and bio-security (United States).

Given the considerable threat of bioterrorism, the measures currently being taken need to be supplemented with additional GP projects in the following areas:

- Funding the development of systems of biomaterials export controls in Iraq, as well as in neighboring countries (Turkey, Jordan, Saudi Arabia).
- Organizing civil defense training exercises in how to respond to a biological attack, as well as taking measures to resume the search of biopathogens by international inspectors from the UN.

ISRAEL

Israel is carrying out comprehensive biological research at a high level. In cooperation with the United States, Israel is carrying out work on developing defenses against biological weapons. Since 2004, Israeli legislation has been brought into line with the Australia Group's requirements on control over the export of biological material. Israel takes a fairly urgent view of the threat of bioterrorism, and holds exercises to improve measures to deal with acts of terrorism carried out using biological weapons, and to counteract their possible consequences[182]. Overall, despite the fact that Israel has the ability to refocus its biochemicals industry fairly rapidly towards manufacturing biological weapons, nevertheless, the proliferation of biological agents and pathogens is seen as a clearer threat. At present, however, there are no statements or assessments that suggest that Israel requires major financial assistance to address biosecurity.

LIBYA

Libya has a certain volume of production capacity that is currently engaged in pharmaceutical and agricultural production, but could, according to certain estimates, be refocused towards producing biological weapons[183]. The country also has several centers involved in research in the area of microbiology: the research complexes at Sebha and Rabta, and a pharmaceuticals facility at Gharyan. However, Libyan scientists can only work with dangerous pathogens if the right materials, equipment and technology have been obtained. Given the country's current instability, it seems unlikely that it will develop biological weapons in its laboratories. The main

[182] Katz Yaakov. Israel Conducts Major Bioterrorism Drill. *Jerusalem Post*. 13 January 2010; Ashton Daigle. Israel prepares for biological, chemical attacks, http://www.bioprepwatch.com/news/israel-prepares-for-biological-chemical-attacks/219116/ (last accessed December 3, 2013).
[183]Kalinina Natalia. International and national issues of biological security and the prospects for their resolution. Op.cit., p.58.

proliferation threat stems from the knowledge amassed by biologists. In this context, for Libya it would be wise to propose a project to retrain these scientists and engage them in research outside the country.

SYRIA

Syria has signed the BTWC, but it has yet to ratify this agreement. There is very little freely available information on Syria's capacity for the production of biological weapons. There is no evidence of Damascus's potential to pursue its own offensive biological program. The country has fairly developed pharmaceutical, medical and biotechnological industries, but this work depends on supplies of material and equipment from abroad. It is believed that any work on anthrax agents, botulinum toxin or ricin is being pursued strictly as part of efforts to protect against biological weapons[184].

In December 2012 there were reports that Iran intends to set up a facility in Syria to produce a vaccine against foot-and-mouth disease, with a production capacity of between 10m and 20m doses. These intentions were made public by the Iranian government and Iran's Razi Institute of Vaccine and Serum Research in Karaj. The director of the Razi Institute, HadiQadakchi, and the director of the Syrian Agriculture Ministry's department of livestock-breeding and livestock health, Hussein Salih as-Salmas, both noted that plans to set up this type of production facility were being driven by Syria's everyday requirements[185]. Given the ongoing situation in Syria, this news is perplexing, since the country currently has far more pressing issues than the development of livestock farming.

On the other hand, from the standpoint of WMD proliferation, such statements cause concern, since the production of vaccines against foot-and-mouth disease is effectively a dual-use technology. For example, in Russia the virus that causes foot-and-mouth disease features on the list of micro-organisms, toxins, equipment and technology that are subject to export controls[186], and the vaccine cannot be manufactured without producing the virus itself. In addition, the planned volume of production also provides food for thought – 20m doses of vaccine per annum. At the same time, a 1993 report from Russia's Foreign Intelligence Service highlights the fact that in the early 1990s Iraq was producing 12m doses of vaccine against foot-and-mouth disease[187].

The environment of the civil war massively increases the risk that terrorists may obtain the restricted number of bio-agents and pathogens supposedly held in Syrian laboratories.

In this context, the following recommendations can be made on how to use the experience of the GP in respect of biosecurity in Syria:

[184]Markovich I., Simonova A. Biological weapons: issues of nonproliferation and terrorism, and policy of counteraction. Moscow: LKI Publishing, 2011. P. 36-37.
[185]Iran to build foot-and-mouth vaccine production facility in Syria with an output of up to 20m doses, *Regnum*, http://www.regnum.ru/news/fd-abroad/medicine/1601756.html (last accessed December 30, 2013).
[186]Collection of lists of controlled products and technologies, 2010, http://www.ippe.ru/nd/pdf/kont-sp.pdf (last accessed December 30, 2013).
[187] New challenge after the Cold War: proliferation of weapons of mass destruction (1993 open report by the Foreign Intelligence Service of the Russian Federation), op.cit.

- To launch a project to engage Syrian biologists involved in virological, medical and biochemical research in research and production. The project should be carried out in the GP's donor countries, as it is not currently possible for it to be implemented in Syria itself.
- To improve the technical infrastructure for systems of export control over biomaterials in countries neighboring Syria.

CONCLUSIONS AND RECOMMENDATIONS

A general conclusion that can be reached is that there are areas of promise for the development of the Global Partnership program in the Middle East, but also objective obstacles. Over the last 10 years, a certain amount of experience has been accumulated by implementing GP projects in the region, in areas such as the retraining of scientists specializing in nuclear, chemical and biological weapons; developing the professional skills of staff working for export and border control services and supplying these services with new equipment; and providing technical assistance in order to strengthen nuclear security. At the same time, the majority of measures planned under the GP program have yet to be implemented. To a considerable extent, this stems from the shortage of public funds available to the program's donors (the United States, the EU, Japan). Up to 2013, the majority of projects were financed by diverting the balance of funds remaining from other projects, as Russia and the post-Soviet space were the key areas for the GP.

Given the burgeoning threat of WMD proliferation in the region, as well as the fact that many projects in Russia and the CIS are nearing completion, the refocusing of the GP towards the Middle East would seem to be the best direction of travel for the program. At a meeting of the working group on international cooperation on WMD nonproliferation and nuclear security, which took place at the PIR Center on June 19, 2013 following the G8 Summit, it was noted that since the GP's participating countries involved in the summit confined themselves to general statements, the issue of specific international cooperation projects on matters of nuclear security and WMD nonproliferation as part of the GP remains open.

The refocusing of the GP towards other regions will make it possible to update projects in the Middle East that were planned but have not been implemented under the program. It is therefore of fundamental importance that political commitments be made to implement programs specifically in the Middle East.

Up until recently, there were no real prospects for the implementation of GP projects in the *problem* countries of the Middle East, i.e. Syria and Iran, due to their diplomatic isolation. Recently, however, there have been some encouraging changes. Both Iran and Syria are showing willingness to address contentious issues and strengthen the WMD nonproliferation regime in cooperation with the international community. We would recommend the following course of action to foster these positive trends: Iran and Syria should be encouraged to participate in international mechanisms of countering WMD proliferation and strengthening nuclear security, and in the Global Partnership in particular.

The development of GP projects in the Middle East is being hindered by the non-involvement of a number of the region's countries in international agreements, organizations and initiatives that focus on combating WMD proliferation: the NPT,

the CPPNM, ICSANT, the Additional Protocol, the Code of Conduct on the Safety and Security of Radioactive Sources, the CWC, the BTWC and the GICNT. Therefore, above all, the United States and Russia face the task of involving the region's countries in these international institutions.

Restrictions on the implementation of joint Russian-U.S. projects in the Middle East are imposed by:

- Russia's interest in spending funds to combat WMD proliferation in the region only in a relatively narrow area focusing on nuclear security;
- the principled position adopted by the United States on matters relating to WMD nonproliferation, such as completion of the destruction of chemical weapons and the formulation of measures to verify compliance with the provisions of the BTWC;
- the fact that projects in Russia, in which Moscow has a keener interest in investing its funds as part of the GP, are yet to be completed.

On the other hand, it is safe to say that in light of recent developments, these restrictions are gradually disappearing. For example, the first and the third items on the list above are becoming less relevant; Russian Foreign Ministry representatives say in informal discussions that in 2014, when Russia will hold the rotating presidency of the Global Partnership, Moscow will be ready to spend money on projects to strengthen the WMD nonproliferation regime and nuclear safety in third countries. The example of Syria demonstrates that Russia is already in a position greatly to facilitate that process. According to the *Kommersant* daily, Moscow is ready to spend about 2m dollars on the destruction of Syrian chemical weapons stockpiles, and it will probably provide the transport to remove those stockpiles from Syria. In addition, Russia will send its nuclear, biological and chemical protection specialists to Syria.[188]

Now that effective solutions are being identified for such seemingly hopeless situations as the crisis over the Syrian chemical weapons, we believe that Russia and the United States will also be able to find mutually acceptable options for biosecurity issues, which remain a matter of controversy for now. Nevertheless, that optimism should be seasoned with caution: despite the recent positive trends, the aforementioned restrictions and limitations are still capable of hindering a more energetic Russia-U.S. and multilateral cooperation on WMD nonproliferation and nuclear security.

The prospects for involving Middle Eastern countries as donors to other countries are fairly slim because overall, these countries are focused more on ensuring security within their own borders and in neighboring countries. These states are also demonstrating little interest in cooperation in combating WMD proliferation.

The governments of a number of the region's states (Egypt, Jordan, Syria) will make launching the implementation of GP projects in their countries contingent on progress in the creation of a nuclear weapons-free zone (WMD-free zone) in the Middle East, since they made their position clear a long time ago: there can be no support for nonproliferation until Israel starts the process of nuclear disarmament. Since Israel is

[188] Albania to accept Syrian poisons. *Kommersant*. November 1, 2013, http://www.kommersant.ru/doc/2333193 (last accessed December 30, 2013).

still refusing even to consider the possibility of relinquishing its nuclear arsenal, the establishment of a WMD-free zone in the Middle East seemed, until recently, a matter of distant future at best. But the beginning of Syria's chemical disarmament has revitalized the idea of a Middle Eastern WMD-free zone, which appeared to be dead in the water.

Some of the first steps towards the establishment of such a zone would be for Israel and Egypt to follow Syria's example and join the OPCW and the Chemical Weapons Convention. Developments in Syria have forced the majority of experts to revise their previous views to the effect that for a WMD-free zone to be established in the Middle East, the region must first be freed of nuclear weapons, with chemical and biological arsenals to follow at a later point[189]. Obviously, now that we have the precedent of Syria's chemical disarmament, there is certain logic to doing things the other way around.

Experts also say that steps towards the establishment of WMD-free zone in the Middle East could include establishing a zone free of the complete nuclear fuel cycle. Such a measure would remove even the theoretical possibility of the region's countries acquiring the material and capability for building nuclear weapons.

In terms of the GP's main areas of activity, it would be sensible to highlight:

- Export and border control (supplying modern equipment, training of staff through the EU CBRN Centre of Excellence in Jordan, expert legal assistance in bringing national laws into line with international law);
- Retraining of weapons scientists: nuclear (Iraq), chemical (Libya, Iraq, Syria), and biological (Iraq). It would make sense to use the GP's existing experience, held by the EU, Italy, and the United States;
- Engaging researchers currently or formerly involved in work relating to dual-use technologies in international research projects (Libya, Syria, Iraq, Iran, Jordan, the UAE);
- Assistance in the destruction of chemical weapons (recovery of damaged chemical weapons from two bunkers at Al-Muttanna in Iraq and continued funding for the destruction of chemical weapons in Libya through to the end of the program, scheduled for 2016);
- Improving the nonproliferation culture and providing training in the fundamentals of nuclear security (training future specialists in nuclear material protection, control and accounting for Egypt, Jordan, Turkey, Libya, the UAE, and Morocco);
- Technical and Expert Assistance in strengthening nuclear security systems (Turkey, Egypt, Jordan, Algeria, Libya, Morocco); strengthening the protection of chemical agents and precursors (Libya, the UAE); and biosecurity (Iraq, Egypt, the UAE) in laboratories and facilities;
- Disposal of radioactive waste in Iraq (providing financial support for the EU project).

[189] Such ideas were outlined at workshops organized by PIR Center in 2012-2013 on the subject of a WMD-free zone in the Middle East. See: WMD-Free Zone in the Middle East: Obstacles and Opportunities. *Security Index*. No 4, Fall 2013. p. 50.

A differentiated approach needs to be applied to the provision of funding for GP projects in the Middle Eastern countries, taking their different levels of economic prosperity into account. For countries experiencing instability and a serious economic slump (Iraq, Libya), the recommendation is for projects to be funded by aid from donors. For the remaining countries, and above all for those that have an interest in developing nuclear energy (the UAE, Jordan, Turkey, Saudi Arabia, Morocco, Algeria, and Egypt), funding should be split 50-50.

Since GP projects create a market for certain services and goods, the Russian government should take part in those projects where Russian companies could be engaged to implement them (for example, the Aspekt Research and Production Center, which manufactures radiation monitoring tools and detectors, and the Moscow Engineering Physics Institute, which can train specialists in nuclear material protection, control and accounting).

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Chapter 7. PROSPECTS FOR RUSSIA'S PARTICIPATION IN INTERNATIONAL COOPERATION ON WMD NONPROLIFERATION AND NUCLEAR SECURITY IN SOUTHEAST ASIA

Alexander Cheban

Over the past two decades, the twin goals of countering WMD proliferation and increasing nuclear security have remained acutely relevant for Russia. After the collapse of the Soviet Union, Russia was left with huge stocks of weapons of mass destruction (WMD) and their precursors, which had to be either disposed of, or stored with an appropriate level of security. Since Russia had the wherewithal for neither, there was the threat that these poorly guarded nuclear materials would fall into terrorists' hands.

To deal with this dangerous threat, all hands were brought on deck: Russia received aid from the United States as part of the Nunn-Lugar program, and from other countries as part of the Global Partnership (GP). Over the past 20 years, it had become a matter of course that international cooperation to address nonproliferation of weapons of mass destruction and nuclear security was focused mainly on projects in Russia, where the lion's share of funding for the Nunn-Lugar program and the Global Partnership was being directed.

Today, thanks to the Nunn-Lugar program and the GP, Russia has seen its key nuclear-industry-related issues eliminated, and is furthermore capable of solving such challenges independently in the future. Indeed, it will have to do quite a lot of work on its own, i.e. unloading spent nuclear fuel from the reactors of decommissioned nuclear submarines, raising sunken nuclear facilities in the Arctic, destroying the remaining stockpiles of chemical weapons, etc. At the same time, Russia will still have to re-equip its army, solve social issues, and do much more.

In short, given that Russia has no shortage of its own problems, it is hard to imagine the country – a recent recipient of international aid – providing this very assistance to other countries in the near future. Especially unlikely in many experts' view is Russia's ability to provide assistance to countries in a region such as Southeast Asia. At first blush, it would seem that Russia has neither the resources nor the interest to engage in such exotic endeavors. It is generally accepted that Russia might still provide limited help to resolve issues arising from the Soviet nuclear legacy in CIS countries, particularly Central Asian ones, its local partners in the Customs Union and the Collective Security Treaty Organization (CSTO). At the same time, Russia providing real help to solve nuclear industry issues in regions as far away as Southeast Asia – that seems far-fetched, at least for the moment. Besides, the question arises: just what issues need solving there, and how exactly would Russia profit from doing so?

The aim of this chapter is to demonstrate that nuclear issues in Southeast Asia already exist, and that in the near future they will only get worse due to the ambitious plans of many of the countries in the region to develop nuclear energy. Russia could assist in solving these issues, and this would suit its own interests. In fact, Russia is already actively involved in certain Asian countries' nuclear energy development plans. Therefore, it is reasonable that Russia would take part in the abatement of the risks

that inevitably result from the development of nuclear power in any country. These risks – the threat of the spread of nuclear materials and the problem of their security – are directly related to the subject of this chapter. The author aims to offer recommendations on how Russia should abate these risks in Southeast Asia while not interfering with its own interests, and at the same time making a valuable contribution to international cooperation.

And so, first, let us examine briefly which nuclear industry issues are in need of being solved in Southeast Asia; then we will move on to an analysis of how Russia could participate in international cooperation to address these issues, and what it would gain from doing so.

The essence of the problem of WMD and nuclear security in Southeast Asia

At first glance, it might seem that it is too early to discuss WMD and nuclear security challenges in Southeast Asia, since most of the countries in the region have neither weapons of mass destruction nor materials for their production, nor nuclear power, nor, really, a well-developed nuclear infrastructure. Therefore, it would seem that there is no urgent need to combat the spread of nuclear materials or ensure an adequate level of security for them. Yet a detailed study of the region finds that many Southeast Asian countries have poorly guarded research reactors and radioactive sources that are potentially attractive to terrorists. What's more, in the near future, the threat of nuclear and radiological terrorism could become even more dangerous, as some Southeast Asian countries begin developing nuclear energy without the benefit of experience in the abatement of the associated risks. These risks can be countered only by fostering international cooperation.

The countries of Southeast Asia have the following nuclear-related issues:

1. The countries of the region do not have experience in the development of nuclear energy, yet are determined to develop it;
2. These countries have nuclear and other facilities that pose a radiation threat; these facilities need better physical protection;
3. Southeast Asian countries have yet to solve the problem of increasing the effectiveness of national export control systems, and this is a problem not only for those who are going to develop nuclear energy, but also for those countries that have no such plans, but could potentially be involved in the illegal transit of nuclear and other radioactive materials. For instance, in 2003 in Thailand a group of smugglers was caught trying to sell highly toxic Cesium-137, which had been ferried across from Laos[190]. This case demonstrates the weakness of the export-control system in Southeast Asian countries, opening up opportunities for illicit trafficking in nuclear materials;
4. The threat of terrorism in Southeast Asia is high. In addition to Al-Qaeda, the region also has such Islamist terrorist organizations like Jamaat Islamiyya and Abu Sayyaf, which so far have not shown interest in nuclear or radiological terrorist attacks, but nevertheless represent a serious threat;
5. Given the terrorist threat, the support systems of Southeast Asia's nuclear facilities clearly must be able to function in emergency situations. Apart from terrorist attacks, emergencies may include natural disasters. Countries in the region are vulnerable to

[190] Southeast Asia Planning New Nuclear Plants. *Spero News*. 2007, 12 June. http://www.speroforum.com/site/article.asp? idcategory=33&idSub=122&idArticle=9873

such disasters, e.g. earthquakes. Southeast Asia often experiences tsunamis, which, as we know, led to the accident at Fukushima. Some countries in the region are located in a high-seismic-activity zone (the so-called Ring of Fire) – a horseshoe-shaped band of volcanoes and tectonic faults engirdling the Pacific Ocean. The Philippines and Indonesia are the most affected by high seismic activity[191]. At the same time, both countries at one time actively pursued the development of atomic energy; the Philippines still has (an inactive) nuclear power plant, while Indonesia has not yet canceled an ambitious plan for the development of nuclear energy. In this regard, the issue of the safe and secure operation of nuclear power plants is a highly relevant one for the region's countries[192].

Thus, when developing their nuclear energy sector, Southeast Asian countries need to consider both the terrorist challenges and the existing threat of earthquakes, consequently improving the safety and security of nuclear facilities under construction (and, again, this is something that will not happen without international assistance). This threat has actually already affected the nuclear ambitions of some countries. For example, post-Fukushima, Indonesia and Thailand shelved their plans to develop nuclear energy for several years[193]. The Philippines, which had frozen construction of a nuclear power plant in Bataan after Chernobyl notwithstanding the fact that the facility was 90% complete[194], is now, post-Fukushima, certainly not considering putting the plant into operation, despite the fact that the nuclear facility is regularly monitored by IAEA inspectors[195]. What's more, the Philippines is planning to scrap its research reactor[196].

This article will focus on those countries with nuclear facilities and/or plans for the construction of a nuclear power infrastructure. Below is a list of these countries, with a brief description of their nuclear facilities, radioactive sources, and their plans to develop nuclear energy as well as the nuclear infrastructure for scientific, medical, agricultural, industrial and other non-energy purposes. In Southeast Asia, these countries include:

1. **Vietnam**:
• has one research reactor with a capacity of 500 kW at the Institute for Nuclear Research, in the city of Dalat;
• has about 1 kg of highly enriched uranium (HEU) with a 36% degree of enrichment;
• has 220 organizations that make use of radiation sources. There are 4,000 such sources in Vietnam;
• plans to acquire another research reactor by 2015[197];

[191] Incorporated Research for Seismology [2009–2010]. http://www.iris.edu/seismon/ (Retrieved on June 22, 2013).
[192] Klyuchanskaya Svetlana. Main areas of nuclear energy development in ASEAN in late 20th and early 21st century. *Istoriya*. January 12, 2010. http://sun.tsu.ru/mminfo/000063105/333/image/333-071.pdf (Retrieved on June 27, 2013)
[193] Sumsky Viktor. Interview with the author. Moscow, June 18, 2013
[194] Options for the Conversion of the Bataan Nuclear Power Plant to Fossil Fuel Firing. *M.E.T.T.S.* http://www.metts.com.au/bataan-nuclear-ps.html (Retrieved on June 27, 2013).
[195] Representatives of the Philippine embassy in Russia. Interview with the author. Moscow, May 27, 2013
[196] Representatives of the Philippine embassy in Russia. Correspondence with the author by email. Moscow, July 24, 2013
[197] Interview with Vuong Hu Tan, head of the Vietnam Atomic Energy Institute. *AtomInfo.Ru*. October 23, 2009. http://www.atominfo.ru/news/air7828.htm (Retrieved on June 27, 2013).

• plans to build 6 nuclear power reactors with a total capacity of 6,000 MW by 2025[198].

2. **Indonesia**:
• has 3 research reactors, of which two are in operation and one is temporarily offline;
• has the region's most developed infrastructure for the use of radioactive sources for non-energy purposes;
• plans to build four nuclear power reactors with a total capacity of 4,200 MW by 2025[199]. Indonesian government agencies expect that by 2025 the nuclear power plants will produce roughly 23% of the country's electricity, this figure rising to about 31%[200] by 2050.

3. **Malaysia**:
• has one research reactor with an operating capacity of 1,000 kW at the Nuclear Technology Institute in Kuala Lumpur[201];
• has a developed infrastructure for the use of radiation sources for non-energy purposes[202];
• plans to build two nuclear power reactors with a total capacity of 2,000 MW by 2022[203].

4. **Thailand**:
• has one active research reactor with an operating capacity of 2000 kW at the Thailand Institute of Nuclear Energy in Bangkok[204];
• has a developed infrastructure for the use of radiation sources for non-energy purposes;
• due to the increasing electricity consumption, plans to build four nuclear power reactors with a total capacity of 4,000 MW by 2030[205].

All in all, over the next two decades, the countries listed above officially plan to build 16 nuclear energy reactors. Experts do note that the Fukushima disaster, as well as technical obstacles, will likely alter those plans. For instance, after Fukushima, Thailand[206] and Indonesia decided to postpone their plans to develop nuclear energy. In Indonesia, the future of nuclear energy will become clear after the 2014

[198] Vietnam to install 15 GW of nuclear generation capacity by 2030. http://www.rosatom.ru/ru/about/press_centre/worldatomenergy/index.php?from4=11&id4=20125 (Retrieved on June 27, 2013)
[199] Indonesia to Push Ahead with Nuclear Plans. *Defence Talk*. 2010, 21 February. http://www.defencetalk.com/indonesia-to-push-ahead-with-nuclear-plans-10485/ (Retrieved on June 27, 2013).
[200] Representative of the Indonesian embassy in Russia. A fax message to the author. Moscow, July 10, 2013.
[201] Peaceful atom in Malaysia. http://www.atominfo.ru/news2/b0478.htm (Retrieved on June 27, 2013).
[202] Energy Information Administration. Country Analysis Briefs: Malaysia. http://www.eia.doe.gov/cabs/Malaysia/Full.html (Retrieved on June 27, 2013).
[203] Malaysia considering the possibility of using nuclear energy not before 2025. http://www.rosatom.ru/ru/about/press_centre/worldatomenergy/index.php?from4=59&id4=14238 (Retrieved on June 27, 2013).
[204] Geoffrey Gunn. Southeast Asia's Looming Nuclear Power Industry. *Japan Focus* http://www.japanfocus (Retrieved on June 27, 2013).
[205] Thailand's electricity output projected to rise by 43.9 per cent between 2008 and 2018. http://asianenergy.blogspot.com/2009/07/thailands-electricity-generation-is.html (Retrieved on November 2, 2012).
[206] Maxmilian Wechsler. Nuclear Claims Deserve Skepticism. *Bangkok Post.* 2011, 27 April. http:// www.rebound88.net/sp/junta/snuclear1.html (Retrieved on June 27, 2013).

presidential election[207]. For now, experts estimate that by 2025 Southeast Asia will see just six new nuclear power reactors instead of the planned 16 – four in Vietnam and two in Malaysia[208]. The events in Fukushima did not affect the two countries' plans to develop nuclear energy, and so it is likely that they will be able to overtake Indonesia, which currently has arguably the most advanced nuclear infrastructure in Southeast Asia.

In any case, the appearance of six nuclear reactors in a region lacking experience in the development of nuclear power is a serious challenge to international security – one with which Southeast Asian countries are unlikely to cope without international assistance, on their own.

The other countries in the region have no research reactors, and certainly do not have power reactors[209]; they also have no plans to develop nuclear energy in the near future. At the same time, almost all the countries of Southeast Asia (apart from the above four, these would be Brunei, Cambodia, Laos, Myanmar, Singapore, and the Philippines) possess a more or less developed network of radioactive sources currently used for medical, scientific or industrial purposes; these sources are not physically secured at the appropriate level. In addition, all of these countries have a flawed export-control system, which opens up opportunities for terrorists to use them as transit areas for the illicit trafficking of nuclear and other radioactive materials.

For example, a very poor level of export and import control is characteristic of Myanmar. According to experts[210], the country's officially declared import volume is only two-thirds of the figure reported by the countries exporting their products to Myanmar. This suggests that about one-third of all products imported into Myanmar is not controlled, which opens up broad opportunities for smuggling, including the smuggling of nuclear and other radioactive materials[211]. The problem is compounded by the fact that most of the customs installations in Myanmar are not even equipped with computers – not even mentioning radiation monitors for the detection of radioactive materials – as Myanmar does not have the funds to purchase them (the country is not rich enough to afford such technology)[212]. The lack of these radiation

[207] Sumsky Viktor. Interview with the author. Moscow, June 18, 2013.

[208] Prospect for Nuclear Security Partnership in Southeast Asia. James Martin Center for Nonproliferation Studies (CNS), the Center for Energy and Security Studies (CENESS), and the Vienna Center for Disarmament and Non-Proliferation (VCDNP). - May 2012. - Monterey, Moscow, and Vienna: CNS, CENESS, and VCDNP, http://cns.miis.edu/opapers/pdfs/120515_seasia_nuclear_security_partnership.pdf (Retrieved on June 27, 2013).

[209] The only exception is the Philippines, which has one energy reactor (the NPP in Batan), and one research reactor. But the NPP was never completed and launched. Influenced first by the Chernobyl tragedy, and then by the accident in Fukushima, the country's leadership has postponed the implementation of its nuclear energy plans indefinitely, and the NPP remains in its nearly-completed state. Besides, Manila is now considering the possibility of dismantling the research reactor. See: Philippine Nuclear Research Institute Annual 2011 Report. http://www2.pnri.dost.gov.ph/documents/PNRI%20ANNUAL%202011%20FINAL.pdf (Retrieved on June 27, 2013)

[210] Koji Kubo and Nu Nu Lwin. Smuggling and Import Duties in Myanmar. IDE Discussion Paper No. 258 (October 2010).

[211] Koji Kubo and Nu Nu Lwin. Smuggling and Import Duties in Myanmar. IDE Discussion Paper No. 258 (October 2010).

[212] Myanmar in ASEAN: the region's issues and Russia's interests. *Indeks Bezopasnosti*. 2011. No 4 (99). P.90. http://pircenter.org/media/content/files/0/13406289720.pdf (Retrieved on June 27, 2013)

detectors at the customs and border facilities is a major problem for the rest of Southeast Asia.

Another major export-control challenge for Southeast Asian countries is their own rapid economic growth. For instance, a sharp increase in exports out of Vietnam has caused difficulties for its customs authorities; on account of equipment that was not designed for such rapid growth, they struggle to inspect all the exported and imported goods at the borders. Thus, the Vietnamese are already short on radiation monitors, which were in short supply to begin with. This, again, opens up additional opportunities for illicit nuclear trafficking and the use of nuclear and other radioactive materials for terrorist purposes.

Finally, another aggravating factor in the Southeast Asian export-control landscape lies in the region's geographical peculiarities. Most Southeast Asian countries have a long coastline, especially so the island countries: the Philippines and Indonesia (the latter made up of over 10,000 islands, large and small). This factor represents a serious challenge to customs and border enforcement, because it is very difficult to control the movement of goods between the many islands, especially given the lack of modern equipment in ports, including equipment for measuring radiation. Another problem worth mentioning in this context is piracy in the Strait of Malacca. If Southeast Asian countries start developing nuclear energy, then, in the interests of nonproliferation, they would need to be supplied with fuel for nuclear power plants, with spent nuclear fuel subsequently removed (such services are offered by Russia). These shipments will most often be by sea. If a ship with spent nuclear fuel or nuclear material on board falls into pirates' hands, the consequences could be disastrous.

If, on the other hand, the spent nuclear fuel is left in Southeast Asia, this, too, could lead to serious risks. To begin with, we cannot exclude the risk of natural disasters, which could lead to highly active spent nuclear fuel seeping into the environment. After the earthquake and tsunami at the Fukushima nuclear power plant, in addition to the reactors being shut down, there was the problem of spent fuel – stored at the very power plant – leaking[213]. It is also likely that terrorists could attack storage facilities for spent nuclear fuel in order to cause adverse environmental effects comparable with the Fukushima tragedy. Finally, another risk inherent in leaving spent fuel in Southeast Asia is that certain countries in the region could potentially attempt to extract the plutonium in the fuel with the aim of creating nuclear weapons.

Due to the presence of these risks, the US is seriously discussing plans to develop a program of assistance in reducing Southeast Asian proliferation threats. This program will likely be similar to the Nunn-Lugar program implemented in the former Soviet space[214]. It is clear that Russia, which has been directly involved in the Nunn-Lugar program and has extensive experience in its implementation, could join the United States in its efforts to reduce the Southeast Asian threat.

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[213] Baklitskiy Andrey. Remarks at a PIR Center Midweek Brainstorming session titled "Nuclear Energy in the Middle East: Current State and Nascent Trends". Moscow, May 15, 2013. See: Nuclear Energy in the Middle East: Current State and Nascent Trends. *PIR Press*. May 31, 2013. http://pircenter.org/news/6461-nuclear-energy-in-the-middle-east-current-developments-and-observed-trends (Retrieved on June 27, 2013)

[214] Lugar to Promote Expanding CTR to Southeast Asia. Oct. 23, 2012. http://www.nti.org/gsn/article/lugar-promote-expanding-ctr-southeast-asia/ (Retrieved on June 27, 2013).

Thus, the objectives of international nuclear-themed cooperation in Southeast Asia are as follows:
1. to assist in the improvement of export-control systems;
2. to improve security in the area of research reactors and radioactive sources and, most importantly, to ensure the appropriate level of nuclear security at the nuclear power reactors that are in the works;
3. to prevent environmental and proliferation threats associated with spent nuclear fuel;
4. to educate the specialists working in the nuclear industry.

The last point is especially necessary. Nuclear issues in Southeast Asia arise not only out of purely technical obstacles (e.g. lack of computers and radiation detectors at customs facilities, antiquated system of nuclear facility security, and the like;) the human factor is also of great importance in ensuring the security of nuclear facilities and radioactive sources, as well as improving the efficiency of export, customs, and border control. The problem in Southeast Asian countries is the lack of qualified specialists in the area of the first and second line of defense, and the only way to solve this problem is through international cooperation, giving people from Southeast Asia the opportunity to obtain the necessary knowledge either abroad or at home, from foreign experts. There is a need for training specialists, both in technical areas and in the humanities.

The task before the technical specialists is to maintain the physical protection systems at nuclear facilities, while effectively utilizing modern technologies to counter the illicit trafficking of nuclear and other radioactive materials across the border. Humanities specialists – while of little help in solving specific first and second line of defense challenges – can often influence the development of national legislation, including legislation impacting export controls and the management of nuclear materials, and can also determine related foreign policy. This is why there is a need for educational efforts aimed at legislators, foreign ministries, and other government offices in Southeast Asian countries. It is only because Foreign Ministry officials do not understand the peculiarities of modern nuclear law, and consequently do not realize its importance, that some Southeast Asian countries refuse to accede to the basic international instruments in the field of nonproliferation and nuclear security: the Additional Protocol to the Comprehensive Safeguards Agreement with the IAEA, the Convention on the Physical Protection of Nuclear Material (CPPNM), the International Convention for the Suppression of Acts of Nuclear Terrorism (ICSANT), and others[215].

Another problem is that government officials in Southeast Asian countries and their associates are sometimes not aware of the serious risks inherent in any plans for the development of nuclear power. As a result, inadequate funds are allocated to the improvement of national systems of the first and second line of defense. It is precisely for this reason that there is a need for the participation of foreign specialists in trainings for foreign ministries and other government departments of Southeast Asian countries with the aim of raising their understanding of nonproliferation and nuclear

[215] Prospect for Nuclear Security Partnership in Southeast Asia. James Martin Center for Nonproliferation Studies (CNS), the Center for Energy and Security Studies (CENESS), and the Vienna Center for Disarmament and Non-Proliferation (VCDNP). - May 2012. - Monterey, Moscow, and Vienna: CNS, CENESS, and VCDNP, http://cns.miis.edu/opapers/pdfs/120515_seasia_nuclear_security_partnership.pdf (Retrieved on June 27, 2013).

security (that is, the understanding that nonproliferation and nuclear security are crucial, and worthy of close attention and adequate financing). Such training should take into account the fact that the officials being trained seldom have a technical background.

International cooperation to address the proliferation of WMD and nuclear security in Southeast Asia: Prospects for the participation of Russia

Solving proliferation and nuclear security challenges in Southeast Asia is of particular interest to Russia because it has begun the promotion of its nuclear services in Asian countries. Of particular promise to Russia are those Southeast Asian countries that have announced plans to develop nuclear energy. Among these, Vietnam stands out first and foremost, on account of being the most active and consistent in the region in moving toward the construction of the first nuclear reactors. Another promising market is Indonesia – if, after the presidential election in 2014, it commits firmly to the realization of its previously adopted ambitious plans to develop nuclear energy.

Cooperation with Southeast Asian countries on the development of nuclear energy will lead to the need to improve nuclear security at the local nuclear facilities under construction, as well as the need to improve the systems of export and customs control. At first glance, second line of defense issues are only indirectly related to the specific details of construction of nuclear power facilities mentioned in contracts. Still, Russia needs to have an interest in the development of this area as well.

Incidentally, this interest makes sense not only because of abstract arguments to the effect that improvements to the export control system in Southeast Asian countries will make a valuable contribution to the improvement of international security, including the security of Russia. There are specific and pragmatic factors to be considered: if Russia provides assistance to Southeast Asian countries in improving their systems of the second line of defense, as well as improving the security of their radioactive sources and research reactors, this will create the preconditions for these Asian countries – having once received aid from Russia – choosing Russian companies as contractors for the construction of power reactors. What's more, a significant portion of the funds for improving the first and second lines of defense for Russia's potential nuclear services clients may be covered by the Russian state budget. Such expenditures would be fully justified: they would be no greater than in the millions of dollars, and in return might bring contracts to build nuclear reactors worth hundreds of millions or even billions of dollars.

Russia has already signed a $9 billion contract with Vietnam to build two commercial nuclear reactors[216], and has signed an agreement with Myanmar worth $250-$500 million to build a nuclear research center[217]. It makes sense to foster cooperation with these countries on matters of first and second lines of defense in order to strengthen their confidence in Russia's reliability as a partner, and to ensure that, in the future, when new large orders are on the line, these countries would consider Russia as one of the potential contractors. Russia should be guided by similar motives in its

[216] *Rosatom* and Vietnam's Science and Technology Ministry sign a memorandum on cooperation. http://www.rosatom.ru/ru/about/press_centre/news_sector/index.php?from4=4&id4=12454 (Retrieved on June 27, 2013)
[217] Gavrilov K., Kim D. Russia to help Myanmar build a nuclear research center. *Eurasian Home*. May 17, 2007. http://www.eurasianhome.org/xml/t/digest.xml? lang=en&nic=digest&pid=2082 (Retrieved on June 22, 2013)

cooperation in the area of the first and second lines of defense with other Southeast Asian countries, (such as Indonesia, for instance) which are potential customers for its services in the nuclear sphere.

Current state of Russia's nuclear cooperation with Southeast Asian countries

The primary reason for Russian involvement in international cooperation to address the problem of WMD proliferation and nuclear security in Southeast Asian countries is the fact that Russia is already cooperating with these countries in the nuclear domain.

We have already mentioned Russia's contract to build two reactors in Vietnam[218]. Nuclear cooperation with Vietnam may be considered a big plus for Russia, since, of all the Southeast Asian countries, it is Vietnam that is currently the closest to building and launching the first nuclear power plant in the region. The fact that Russia has captured a leading position in the nuclear market of the country that leads the region in nuclear matters is a clear victory for Russian diplomats and businessmen. It is noteworthy that Russia's cooperation with Vietnam is also happening in the crucial area of nuclear education. There are currently 314 foreign students, including 168 from Vietnam, being trained in Russia as part of Rosatom's educational programs[219]. The December 7, 2012 opening of the Information Centre for Nuclear Energy in Hanoi has also been important to the development of nuclear education. This center was the first overseas location in a network of Russian nuclear centers (19 locations comprise the network, 17 of which operate in Russia, one in Vietnam, and one in Turkey)[220].

Students are the guests the Hanoi center sees most often, but educational programs focusing on nuclear energy are also of interest to older visitors[221]. Thus, the activities of the Information Center in Vietnam are not aimed at in-depth training of nuclear scientists. At the same time, it has a positive effect in that it helps to raise the awareness of high school students and university applicants of the possibility of getting a university degree in an area related to nuclear energy. The Center also promotes the dissemination of information about the development of nuclear energy nationally, about the importance of maintaining the security of nuclear facilities, etc. – generally promoting the culture of nuclear security and nonproliferation at the grassroots level. This is why the experience of creating such centers should be applied

[218] Agreement between the governments of Russia and Vietnam on cooperation in the construction of a nuclear power plant in Vietnam. *PIR Center website*. October 31, 2010. http://pircenter.org/articles/1225-soglashenie-mezhdu-pravitelstvom-rossijskoj-federacii-i-pravitelstvom-socialisticheskoj-respubliki-vetnam-o-sotrudnichestve-v-sooruzhenii-atomnoj-elektrostancii-na-territorii-socialisticheskoj-respubliki-vetnam (Retrieved on June 27, 2013)

[219] Moscow hosts the 1st Forum of Nuclear Education Providers. *Communications department of the Rosatom State Corporation*. April 3, 2013. http://www.rosatom.ru/journalist/news/695bac004f1fe9808813ca3ff30db4e9 (Retrieved on June 27, 2013).

[220] Moscow hosts the 1st Forum of Nuclear Education Providers. *Communications department of the Rosatom State Corporation*. April 3, 2013. http://www.rosatom.ru/journalist/news/695bac004f1fe9808813ca3ff30db4e9 (Retrieved on June 27, 2013).

[221] Rosatom deputy chief K. Komarov visits Nuclear Energy Information Center in Hanoi. *ANO Nuclear Energy Information Centers press service*. February 28, 2013, http://www.rosatom.ru/journalist/news/95f4cb804eb8283fa1dce1764b2108b1 (Retrieved on June 27, 2013)

in other Southeast Asian countries. In the near future, Russia plans to open similar centers in Dhaka (Bangladesh) and Minsk (Belarus)[222].

The signing in November 2011 of a Russian-Vietnamese agreement on the establishment by Russian experts of the Nuclear Science and Technology Center near Hanoi is a landmark event[223]. Per the agreement, the Russian company Atomstroyexport will construct an IRT-10 nuclear research reactor with a capacity of 10 MW, presumably by 2015-2016 (details of the contract are still being discussed)[224].

The periodic visits by Vietnamese specialists to Russian nuclear research institutes are also focused on education. On April 11, 2013, a delegation of the Republic of Vietnam visited The All-Russian Scientific Research Institute for Nuclear Power Plant Operation (VNIIAES). The delegation was headed by Tran Chi Thanh, Director of the Vietnam Institute of Atomic Energy (VINATOM). VNIIAES Experts demonstrated to representatives of the Vietnam Institute of Atomic Energy, and of Vietnam Electroconstruction Consulting Company (PECC1) the experience and capabilities VNIIAES can bring to bear in aiding the comprehensive implementation of the nuclear power plant construction project in Vietnam[225]. The Rosatom State Corporation plans to continue developing nuclear education projects for Vietnamese industry professionals[226].

Another area of nuclear cooperation between Russia and Vietnam is the U.S.-aided removal to Russia of highly enriched uranium (HEU) from a Vietnamese research reactor. This uranium is enriched to a level of 36%. The first task was to extract approximately 4 kg of fresh uranium fuel, which Russia did back in 2007[227]. By December 2011, the reactor was fully converted to the use of low-enriched uranium (LEU)[228]. The only task left to be completed was to remove the highly enriched spent nuclear fuel (SNF) already used by the reactor[229]. Russia did this in July 2013.[230]

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[222] Rosatom deputy chief K. Komarov visits Nuclear Energy Information Center in Hanoi. *ANO Nuclear Energy Information Centers press service*. February 28, 2013, http://www.rosatom.ru/journalist/news/95f4cb804eb8283fa1dce1764b2108b1 (Retrieved on June 27, 2013)

[223] Agreement between the governments of Russia and Vietnam on cooperation in the construction of a nuclear research and technology center in Vietnam. *PIR Center website*. November 21, 2011. http://pircenter.org/articles/1269-soglashenie-mezhdu-pravitelstvom-rossijskoj-federacii-i-pravitelstvom-vetnama-o-sotrudnichestve-v-sooruzhenii-centra-yadernoj-nauki-i-tehnologij-na-territorii-vetnama (Retrieved on June 27, 2013)

[224] ZAO *Atomstroyexport.* Nuclear Market: the Outlook. http://www.atomstroyexport.ru/nuclear_market/prospects/ (Retrieved on June 27, 2013)

[225] Vietnamese delegation visits OAO VNIIAES. *OAO VNIIAES press service*. April 15, 2013, http://www.rosatom.ru/journalist/news/e19a74804f44fcb185d5fd7ea2a04c6d (Retrieved on June 27, 2013).

[226] Vorobyev Sergey. Remarks at the second sitting of the PIR Center Working Group on International Cooperation in WMD Nonproliferation and Nuclear Security. Moscow, June 19, 2013.

[227] Interview with Vuong Hu Tan, head of the Vietnam Atomic Energy Institute. *AtomInfo.Ru*. October 23, 2009. http://www.atominfo.ru/news/air7828.htm (Retrieved on June 27, 2013)

[228] Kondratyev Sergey. Commentary. *Press center of the nuclear energy industry*. http://www.minatom.ru/comments/18078_19.03.2010 (Retrieved on June 27, 2013)

[229] Agreement between the governments of Russia and Vietnam on cooperation in the removal of irradiated nuclear fuel from the research reactor to Russia. *PIR Center website*. Rosatom, March 16, 2012. http://pircenter.org/articles/1271-soglashenie-mezhdu-pravitelstvom-rossijskoj-federacii-i-pravitelstvom-vetnama-o-sotrudnichestve-po-vvozu-v-rossijskuyu-federaciyu-obluchennogo-yadernogo-topliva-issledovatelskogo-reaktora (Retrieved on June 27, 2013).

It should be noted that, until recently, Vietnam was the only Southeast Asian country with stocks of HEU. All the other countries in the region had gotten rid of their small stocks of HEU earlier, having removed them to the U.S. And so, in the future there should not be a problem of handling HEU, but the experience of cooperation in this sphere could be used for working on other projects.

Russia has also taken steps to develop cooperation in nuclear education with Indonesia,[231] although due to the uncertainty surrounding Indonesia's plans to develop nuclear energy, cooperation with this country in the nuclear sphere is not yet as close and mutually beneficial as it is with Vietnam. So far, as far as Indonesia is concerned, Russia is necessarily limited to conducting joint scientific and practical workshops on nuclear power. For example, on March 14 2013, the Russian company Rusatom Overseas organized a technical workshop entitled "Russia's experience in the peaceful use of nuclear energy: technology, security, financing, personnel." The participants discussed the trends in nuclear energy markets post-Fukushima, and, separately, considered the following key elements of Rosatom's comprehensive offering: training, attracting financing, local manufacturing content in the construction of nuclear power plants, the establishment of a regulatory framework in the field of nuclear energy, etc. In addition, Russian and Indonesian experts discussed the prospects of nuclear power in Indonesia, as well as plans to build one or more nuclear power plants there[232].

Another Southeast Asian country with which Russia is on a cooperation course in the nuclear sphere is Myanmar - although, despite initial great prospects for full-scale, close cooperation, the situation there is not as positive as in the case of Vietnam.

Despite the fact that Myanmar's demand for electricity is growing[233], this country had never declared plans for fostering a nuclear energy industry, which may be partly attributed to the small reserves of uranium in the country, formed as a by-product of gold mining. At the same time, due to the almost total absence of a nuclear infrastructure, even these small stocks could not be used, and therefore Myanmar was forced to export them to China[234]. Given the relatively small amounts in question, Myanmar's leadership decided to find a more rational use for the local uranium: it was to be used for the production of radioisotopes for scientific, medical, and agricultural purposes. This required the construction of a research reactor, which Myanmar planned to build at the future Center for nuclear research, to be located in the central part of the country. Myanmar turned to Russia for assistance in the

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[230] Highly enriched nuclear fuel from the research reactor in Dalat, Vietnam, removed back to Russia. *Russian Atomic Community website*. July 4, 2013. http://www.atomic-energy.ru/news/2013/07/04/42580 (Retrieved on July 24, 2013)

[231] On December 1, 2006 Russia and Indonesia signed a peaceful nuclear energy cooperation agreement. *Press center of the nuclear energy industry*. http://www.minatom.ru/news/3011_04.12.2006 (Retrieved on June 27, 2013).

[232] Rusatom Overseas to hold a workshop in Indonesia on Russian experience in using nuclear energy. *Rusatom Overseas press service*. February 21, 2013. http://www.rosatom.ru/journalist/announces/453673804ea208eb9d0efd764b2108b1 (Retrieved on June 27, 2013).

[233] World Bank Indicators. Myanmar: Energy Production and Use. http://www.tradingeconomics.com/myanmar/alternative-and-nuclear-energy-percent-of-total-energy-use-wb-data.html (Retrieved on June 27, 2013).

[234] Konukhov Dmitry, Khlopkov Anton. Russia, Myanmar, and nuclear technologies. *Center for Energy and Security Studies website*. P. 1, http://ceness-russia.org/data/doc/MyanmarRUS.pdf. (Retrieved on June 27, 2013).

establishment of the Center and the construction of a research reactor there. As a result, in June 2001 the Russian company Atomstroyeksport, which was selected as the general contractor for the construction of the Center, signed a contract with the Myanmar side to develop a conceptual design for the construction of a research reactor. In July of the same year Russia and Myanmar initialed a cooperation agreement on the construction of a nuclear research center in Myanmar[235].

However, for a number of reasons, the signing of an intergovernmental agreement, the draft of which was fully agreed upon by the parties in the spring of 2002, was postponed. Per the results of a visit to Myanmar by IAEA experts[236] doubts were expressed as to whether Myanmar's specialists have the required expertise to operate the research reactor, and Myanmar's ability to ensure an adequate level of security for the nuclear materials and the environment during the implementation of the project. (As an alternative to the domestic production of radioisotopes, IAEA experts recommended that Myanmar consider the option of purchasing them from similar, already existing centers in Thailand or Malaysia.)[237]. In addition, Russia and Myanmar were unable to agree on the funding mechanism for the construction of the Center. The Myanmar side expressed a desire to receive a loan, paying it back in the form of food and raw materials. There were also questions about Myanmar's solvency[238].

Negotiations between Myanmar and Russia resumed in 2005. On May 15, 2007, a cooperation agreement on the construction of a nuclear research center in central Myanmar was signed by the two countries' governments[239]. A draft document prepared in 2002[240], with some changes and additions made in 2004 and 2007, was used as the basis of the agreement[241]. S.V. Kiriyenko, head of the then Federal Agency on Atomic Energy, signed the agreement for Russia, and U. Thaung, Myanmar's Minister of Science and Technology, signed for Myanmar[242]. The final version of the Agreement provides for:

1. the construction of a nuclear research center with a pool-type research nuclear reactor with a thermal power capacity of 10 MW, with a light-water moderator and coolant;

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[235] Luchin Anatoliy, Fedchenko Vitaliy. Myanmar's nuclear future. *Yaderny Kontrol*. 2003. No 1 (67). P. 144. http://pircenter.org/media/content/files/1/13415805560.pdf (Retrieved on June 27, 2013)

[236] The conclusion was made based on visits to Myanmar by IAEA experts in the summer and autumn of 2001. Myanmar was informed about the commission's conclusions by IAEA deputy director-general Jiang Jihuei (China). See: Fedchenko Vitaly. Myanmar as a new destination for Russian nuclear exports. *Voprosy Bezopasnosti*. June 2002. No 11 (125). http://www.pircenter.org/data/publications/vb11–2002.html (Retrieved on June 27, 2013).

[237] Hibbs Mark. IAEA Probes Myanmar Data, Discourages New Research Reactors. *Nuclear Fuel*. 2009, August 10. http://www.carnegieendowment.org/static/npp/pdf/myanmar_reprint.pdf (Retrieved on June 27, 2013).

[238] Fullbrook David. ASEAN and Myanmar's Nuclear Reactor. *Opinion Asia*. 2007, 27 May. http://opinionasia.com/ASEANandMyanmarsNuclearReactor (Retrieved on June 27, 2013).

[239] Kornysheca A. Dictatorship to be connected to a reactor. *Kommersant*. May 16, 2007. No 82 (3658), http://www.kommersant.ua/doc.html?docId=811828 (Retrieved on June 27, 2013)

[240] Bertil Lintner. Myanmar Gets a Russian Nuclear Reactor. *The Wall Street Journal*. 2002, 3 January, http://www.asiapacificms.com/articles/myanmar_nuclear/ (Retrieved on June 27, 2013).

[241] Draft Agreement between the governments of Russia and Myanmar on cooperation in the construction of a Nuclear Research Center in Myanmar with changes and additions of August 24, 2004 http://www.jurbase.ru/texts/sector069/tes69674.htm (Retrieved on June 27, 2013).

[242] Intergovernmental cooperation agreement signed between Russia and Myanmar. *Press service of the Federal Agency for Atomic Energy*. May 15, 2007. http://www.minatom.ru/news/4667_15.05.2007 (Retrieved on June 27, 2013).

2. the use of fuel enriched to less than 20% of uranium-235 isotope;
3. the establishment as part of the Center of activation-analysis and medical-isotope laboratories, as well as an installation for the nuclear doping of silicon, etc;
4. the installation and launch into operation of the primary technological equipment, and a commitment by the Russian side to supply nuclear fuel and spare parts;
5. the return of irradiated fuel to Russia;
6. Myanmar's commitment not to use the nuclear or special non-nuclear materials it receives in the manufacture of nuclear explosive devices or for other military objectives, and to place those materials under IAEA safeguards for the duration of their being in Myanmar;
7. Myanmar's commitment not to use the equipment, materials, and technology supplied by Russia at facilities not placed under IAEA safeguards;
8. the training at Russian universities of 300-350 professionals in the field of nuclear energy for future employment at the Center[243].

Thus, the Agreement cemented the creation of a legal framework for cooperation between Russia and Myanmar in two key areas:

1. project development, construction, and maintenance of the Center for Nuclear Research;
2. training of domestic, Myanmar personnel for work at the Center.

The agreement also establishes a procedure for further work on the project, per which the contract for the construction of a nuclear research center is signed after Myanmar puts in effect the Additional Protocol with IAEA. The Agreement entered into force on the day of the signing, and is in effect until the obligations stipulated by the parties are fully carried out.

Consultations on the implementation of the Agreement was terminated by the parties in the autumn of 2007[244] due to the events in Myanmar known as the "Saffron Revolution"[245] and so far have not been resumed. From 2005 to the present day, Myanmar has refused to accept the Modified Small Quantities Protocol, which requires early notification of the Agency on the part of the government in case of plans to build new nuclear facilities (the so-called Modified Code 3.1). Currently, in the absence of significant quantities of nuclear material in Myanmar, the Small Quantities Protocol is in effect[246].

At the moment, the construction of a research reactor in Myanmar is not in any way reflected in the annual reports of Rosatom or mentioned among the projects of

[243] Intergovernmental cooperation agreement signed between Russia and Myanmar. *Press service of the Federal Agency for Atomic Energy*. May 15, 2007. http://www.minatom.ru/news/4667_15.05.2007 (Retrieved on June 27, 2013).
[244] Klyuchanskaya Svetlana. Main areas of nuclear energy development in ASEAN in late 20th and early 21st century. *Istoriya*. January 12, 2010. http://sun.tsu.ru/mminfo/000063105/333/image/333-071.pdf (Retrieved on June 27, 2013)
[245] A confrontation between the ruling military regime and the opposition represented by Buddhist monks, students, and the Democratic Alliance of Burma. As a result, the ruling regime managed to retain its grip on power, even though splits appeared between the generals themselves.
[246] Andrew Selth. Burma and Nuclear Proliferation: Policies and Perceptions. *Regional Outlook Paper*. 2007. № 12. P.10. http://www.griffith.edu.au/ data/assets/pdf fi le/0015/18240/regional-outlookvolume-12.pdf (Retrieved on June 27, 2013).

Atomstroyexport[247]. A statement by an official representative of Myanmar at the IAEA General Conference in September 2009 said that construction of the reactor had not begun, and a similar report in September 2010 contained no information whatsoever about the project[248]. U.S. State Department documents published in The Guardian mention that the only connection Myanmar's current nuclear program has with Russia is the training of personnel[249].

Thus, the potential for large-scale cooperation with Myanmar is not being taken advantage of at the moment. Still, Russia is giving Myanmar serious assistance in the area of nuclear education. The preparation of professionals for future employment at the Center for Nuclear Research is part of a broader cooperation effort to train Myanmar citizens in Russia. Beginning in 2001, as part of an effort initiated by the Myanmar Ministry of Science and Technology, the first of what should be some 500 undergraduate and graduate students annually came to Russia for paid training at civilian universities[250]. Many of these students are directly involved in nuclear education. The leading institution of higher education in Russia that trains specialists for the Nuclear Research Center is the National Nuclear Research University (MEPhI) which has taken in an average of 100 students from Myanmar annually in the years 2001-2008. Roughly half of these specialists trained in specialties related to the use of nuclear technology and related professions. By 2011, the total number of Myanmar students trained in Russia had reached the level provided for by the May 2007 intergovernmental agreement (up to 350 people), and by summer 2011, MEPhI had completed instruction as part of the master's track program for the Myanmar students[251].

The specialties that Myanmar citizens are studying in Russia are selected by the Myanmar side from the list of courses permitted by the legislation of the Russian Federation. Typically, a representative of the Embassy of Myanmar in Moscow negotiates directly with a particular institution of higher learning the number of students sent and the list of specialty training programs. The curriculum is also approved by the Russian Ministry of Education and Science (in the early years of the program, there had to be additional approval from the Russian Ministry of Atomic Energy, now *Rosatom*). The tuition is paid in full by the Myanmar government.

Thus, of all the Southeast Asian countries, vis-à-vis the nuclear sphere, Russia has the most developed relations with Vietnam, with some ongoing cooperation happening with Indonesia and Myanmar. At the moment, cooperation with these countries is not a very close one, but this could be remedied in the nearest future, as Russia is as interested in closer cooperation as are its Southeast Asian counterparts. Russia's

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[247] Atomstroyexport website. http://www.ase.atomstroyexport.ru/projects/ (Retrieved on June 27, 2013).

[248] Statement by the Leader of Myanmar Delegation H.E. U Tin Win to the 54th Annual Regular Session of the IAEA. 2010, September 20-24. Vienna. http://www.iaea.org/About/Policy/GC/GC54/Statements/myanmar.pdf (Retrieved on November 12, 2012 г.)

[249] US Embassy Cables: Burmese Official Reports Burma and North Korea's 'Peaceful Nuclear Cooperation'. *Guardian*. 2010, December 9. http://www.guardian.co.uk/world/us-embassy-cables-documents/219888 (Retrieved on June 27, 2013)

[250] Website of the Russian embassy in Burma. http://www.rusembmyanmar.org/russia/russia-myanmar-relationship.htm (Retrieved on June 27, 2013)

[251] Konukhov Dmitry, Khlopkov Anton. Russia, Myanmar, and nuclear technologies. *Center for Energy and Security Studies website*. P. 1, http://ceness-russia.org/data/doc/MyanmarRUS.pdf. (Retrieved on June 27, 2013).

current interest in participating (financially, among other ways) in nuclear projects in other countries was confirmed by a representative of the Russian Foreign Ministry, although he did not go so far as to specify the actual countries to which Russia is prepared to provide financial assistance[252]. At the same time, we may assume that Southeast Asian countries will also be included on a list of recipients of Russia's financial aid to address issues associated with nuclear and other radioactive materials. So far, potential Russian nuclear cooperation projects with other countries are being developed by Rosatom, and therefore have not been announced. Yet in 2014, when Russia will hold the rotating presidency of the G8 and, accordingly, preside at the meetings of the Global Partnership Working Group at the G8, it will announce specifically in which countries it plans to implement aid projects, and along which areas of focus[253].

Below we will examine the possibilities viable in the nearest future for the improvement of the first and second lines of defense in these countries – possibilities that could become effective and mutually beneficial complements to the existing cooperation formats between Russia and Southeast Asia.

Obstacles to Russia's participation in international cooperation in Southeast Asia, and ways of overcoming them

Russia's part in international cooperation to address nuclear issues in Southeast Asia has of late generated great interest among a number of experts. When speaking of international cooperation to address nuclear issues in Southeast Asia, experts primarily mean the two most important potential participants of this cooperation – Russia and the United States. Indeed, the success of such cooperation is largely dependent on the degree to which the interests of Russia and the United States, as well as other powerful countries possessing nuclear technology, coincide. It should be noted that there is essentially no common ground between the interests of the United States and Russia. The only commonality is the desire to gain access to new markets for nuclear services, but this could only lead to competition rather than cooperation. For both Russia and the United States, dynamically developing Southeast Asia countries with plans to develop nuclear energy offer attractive opportunities to profitably market nuclear technologies and equipment abroad. Therefore, competition between the United States and Russia for nuclear markets in Southeast Asia is quite likely[254].

Unlike the United States, Russia is more concerned with nuclear safety than nuclear security, and Russia intends to address these issues first and foremost on its own territory and that of the neighboring countries (liquidation of the Soviet nuclear legacy). This interest of Russia is quite far from the primary concerns of the United States. Washington is primarily concerned with the threat of nuclear and radiological terrorism, including terrorism in Southeast Asia. Thus, there is a non-alignment of Russian and American interests vis-à-vis nuclear projects in Southeast Asia.

[252] Russian Foreign Ministry representative. Remarks at the PIR Center informal seminar Midweek Brainstorming. Moscow, June 3, 2013
[253] Russian Foreign Ministry representative. Remarks at the PIR Center informal seminar Midweek Brainstorming. Moscow, June 3, 2013
[254] Panasyuk Aleksandr. Remarks at the second sitting of the PIR Center Working Group on International Cooperation in WMD Nonproliferation and Nuclear Security. Moscow, June 19, 2013.

On the other hand, as already mentioned, Russia is becoming actively involved in Southeast Asia as a nuclear service provider – more involved even than the United States. This implies Russia's increasing interest in enhancing the security of nuclear facilities under construction and the improvement of export control systems. In order to obtain a competitive advantage in the nuclear markets of Southeast Asia, Russia could even finance some of the projects aiming to improve their systems of the first and second lines of defense.

Finally, the most serious obstacle to the participation of Russia in international cooperation in the countries of Southeast Asia may be the stance of these very countries. At present, Russia most actively cooperates with Vietnam, and progress in this cooperation is promoted by the consistent and realistic position of the Vietnamese government on the development of nuclear energy. Vietnam is keenly aware of its need for nuclear power, and is therefore deliberately planning the construction of nuclear power reactors with Russia's assistance, disbursing billions of dollars for the enterprise. At the same time, Vietnam is aware of the risks that the development of nuclear energy inevitably brings, and is taking steps to improve export controls and the security of its radiation sources. Vietnam still lacks the experience, specialists and equipment necessary to achieve these goals, but, most importantly, the country's leadership understands the importance of these issues. This means that it is ready to improve export controls, purchase radiation monitors and other equipment from other countries, invite their experts for the training of local personnel, and so on.

A country's readiness to adequately finance solutions to its nuclear issues is a key ingredient in the success of international cooperation in this area. To achieve a competitive advantage in the Southeast Asian markets for nuclear services, Russia and other countries could partially finance projects to improve export controls (albeit relatively low-cost projects). Today, not a single nuclear state is interested in constantly providing free assistance to countries in Southeast Asia or other regions[255]. Therefore, for international cooperation in this area to develop successfully, Southeast Asian countries must participate in the financing of these projects directly.

First, this would allow for equal partnership between the providers and recipients of nuclear technologies. Second, it would make the successful completion of ongoing projects more likely. In addition, the Southeast Asian countries are in need of international assistance for the development of nuclear power not because they lack funds (if that were the case, it would not make sense for them to have nuclear ambitions,) but for lack of technology, expertise, and equipment.

The goal of international cooperation is to respond to these needs quickly and effectively. Vietnam, for example, has made it known that the country needs radiation monitors. So far, the international community has not really responded to this demand. In view of the rapid growth of Vietnamese exports, this opens up opportunities for illicit trafficking of nuclear materials. It is clear that Southeast Asian countries need an effective mechanism for international cooperation in the nuclear field – one that would allow for a quick resolution of the issue of – for one – delivering radiation monitors to Vietnam. As part of this mechanism, it would be

[255] Berls Robert. Remarks at the first sitting of the PIR Center Working Group on International Cooperation in WMD Nonproliferation and Nuclear Security. Moscow, March 28, 2013. See: First sitting of the PIR Center Working Group on International Cooperation in WMD Nonproliferation and Nuclear Security. *PIR Press*. April 1, 2013. http://pircenter.org/news/6426-nuclear-security-after-nunnlugar-program (Retrieved on June 27, 2013).

important to quickly attract the attention of countries that can supply Vietnam and others in the region with radiation monitors and other equipment to improve the systems of the first and second lines of defense (Russia would be one such supplier) and to reduce to a minimum the bureaucratic and other delays associated with such deliveries.

Vietnam is one of the few positive examples in Southeast Asia demonstrating the broad opportunities for active participation in international cooperation to address its nuclear issues. As for the other countries in the region, unlike Vietnam, they are not fully aware of all the risks that may result from the development of nuclear energy. This is due to a lack of education on the part of the legislators, foreign ministries and other government agencies in these countries, resulting in a lack of understanding of nuclear power, and a subsequent low nuclear safety and security culture. As a result, while announcing their ambitious plans to develop nuclear energy or nuclear programs for non-energy, medical, industrial, or scientific purposes, countries such as Indonesia, Thailand, Myanmar and others refuse to allocate sufficient funding for the improvement of the systems of the first and second lines of defense. This is why it is difficult to get these countries to more actively participate in and fund the solutions to their nuclear challenges (of course, no one will solve these without funding, going on altruism alone).

Still, the refusal of some Southeast Asian countries to solve their export-control and nuclear security challenges does not at all mean that these challenges may go unsolved. For instance, despite the fact that, influenced by Fukushima, Indonesia has shelved its plans to develop nuclear energy, and may eventually give them up, the country continues to be a potential source of radiological terrorism, which cannot be of no concern to the international community. As we mentioned, Indonesia has many poorly secured radiation sources that are potentially attractive to terrorists; also, given its thousands of islands and the attendant difficulty of carrying out export controls, Indonesian territory lends itself all too easily to being used as a transit area for the transport of nuclear and other radioactive materials.

All this considered, it is imperative that Indonesia provide adequate funding for the improvement of the first and second lines of defense, as there is no one else to fund these projects (international cooperation can provide some assistance in this matter, but not major assistance; the primary financial burden will still have to borne by Indonesia, as the most interested party, with other countries providing mainly non-financial, technical or specialty/expert assistance). Thus, it is imperative to convince the leaders of Indonesia, as well as those of most other Southeast Asian countries, to allocate more funds to improve their systems of the first and second lines of defense.

This can be done by conducting workshops on nuclear security and nonproliferation with the participation of experts in the field (ideally those who are good lecturers and able to communicate what the existing challenges are clearly and convincingly) as well as officials from foreign ministries and other government agencies of Southeast Asian countries. These officials should also attend training courses and events on the subject. We have already mentioned Russia's efforts in this area, with a practical workshop organized in Jakarta in March 2013. In addition, it is necessary to focus on the promising young people from Southeast Asian countries, who may soon replace the present bureaucracy in the nuclear-energy field. Seminars, workshops, internships for young people, and graduate programs in nonproliferation should be used to facilitate the establishment of a new generation of professionals in Southeast Asia

possessing a high level of nuclear security and nonproliferation culture. This issue, as well as other aspects of the human potential in the nuclear industry, will be addressed below.

So far, we may conclude that there are three potential obstacles to Russia's joining in the international cooperation on nuclear issues in Southeast Asia:

1. the risk of competition arising in the Southeast Asian market between Russia, the United States, and other suppliers of nuclear services;
2. a non-alignment of priorities between Russia and the West: the former is more interested in projects in the former Soviet Union, primarily those relating to nuclear safety, while Western countries are more concerned with other regions and another area of focus – namely, nuclear security;
3. the unpreparedness of most Southeast Asian countries to fund projects to improve the systems of the first and second lines of defense.

At the same time, a more detailed analysis shows that none of the three obstacles is serious enough to prevent Russia from working on nuclear projects in Southeast Asia. The first obstacle today is still just hypothetical, since the nuclear market of the only country in the region most consistently moving towards nuclear power (Vietnam) has effectively been captured by Russia, with other players having resigned themselves to this. Other Southeast Asian countries are not yet ready for active development of nuclear power and are therefore unlikely to cause competition between Russia, the United States and other countries in the near future.

The second obstacle is offset by the fact that, by participating in the construction of nuclear reactors in Vietnam, Russia is increasingly becoming involved in solving the first and second lines of defense challenges – in Vietnam as well as the entire region.

The third obstacle is the most serious one, especially for Russia, which has yet to solve many of its own challenges related to the Soviet nuclear legacy, and is therefore unable to devote significant resources to financing nuclear projects in other countries. For the moment, it would be most appropriate for Russia to help solve the nuclear challenges of just one country in the region – Vietnam, with which it has signed multibillion-dollar contracts. Consequently, for the sake of fostering the relationship with Vietnam, Russia can afford to occasionally spend a few million dollars to help improve its nuclear security and export control systems. As for the other countries in the region, Russia can address their nuclear issues only on the condition that they agree to bear the corresponding financial burden.

And yet, even this obstacle can be overcome. Conducting regular training events and workshops for government agencies in Southeast Asian countries, as well as the fostering of a new generation of professionals in the field of nonproliferation of weapons of mass destruction and nuclear security in these countries, could lead to their starting to devote more resources to their nuclear issues, which will open up opportunities for bringing Russia as well as other countries with advanced nuclear technology in on this process.

Prospects for increasing the effectiveness of the first and second lines of defense in Southeast Asian countries: possible contributions by Russia and other countries in the context of international cooperation in this area

As shown above, Russian participation in the joint resolution of the nuclear issues in Southeast Asia is quite possible, especially since, as a supplier of nuclear services in the region, Russia has already taken first steps in this regard. Now, it is necessary to define specific new areas and projects in Southeast Asia that Russia could develop without harming its own interests, while at the same time contributing meaningfully to international cooperation in the field of WMD nonproliferation and nuclear security.

Quite naturally, such projects are few and far between, and yet it is extremely important that they happen. One of the areas in which Russia could work in Southeast Asia is the improvement of export control and border control systems in the region.

Prospects for cooperation on the second line of defense

In this area Russia already has a long history of working with other countries, primarily the United States. In cooperation with the United States, Russia had installed the Yantar radiation detectors – first on its own borders, and then on the borders and at customs facilities of Albania, Armenia, Egypt, Jordan, Qatar, Serbia, Uzbekistan, Ukraine, South Africa, as well as one Southeast Asian country – Vietnam.

Collaboration on the installation of the Yantar detectors had several positive aspects, which should be taken into account in the further development of international cooperation in the field of export control. First, the costs of the installation of these devices were split fifty-fifty[256]. Second, originally intended for Russia, Yantar was manufactured in Russia, using Russian technology, with the manufacturers seeking to achieve U.S. standards for radiation detectors, which in the end they did.

These and other positive aspects of Russian-U.S. cooperation experience showed that international cooperation to address the nuclear issues of Southeast Asia, as well as other regions, can be effective – provided that the following conditions are met:
1. those countries receiving aid for projects to improve the systems of the first and second lines of defense should be involved in their financing. This will help to ensure an equal partnership and to avoid the problem of unequal relationships between aid donors and recipients (as was the case until recently in the development of the Nunn-Lugar program and the Global Partnership, when Russia and other recipients of international aid felt slighted);
2. where possible, local technology and the services of local experts should be used on projects. This will increase the motivation of countries to finance projects on their territory, as it would enable them to improve their scientific and technical potential via project implementation;
3. in order to have the opportunity to make use of local expertise and technologies in projects it is necessary to conduct courses and training sessions for local specialists. Offering education in the nuclear sphere is a key area of cooperation with countries in the area of WMD nonproliferation and nuclear security.

[256] U.S.-Russian Partnership for Advancing a Nuclear Security Agenda. Recommendation for U.S.-Russian cooperation in strengthening nuclear security in the former Soviet states and Southeast Asia. Editors: Anton Khlopkov and Elena Sokova. June 2012. P. 25, http://www.nti.org/media/pdfs/US-RussianPartnershipNuclearSecurityAgenda-KlopkovSokova-0612.pdf? =1341594568 (Retrieved on June 27, 2013).

At the first stage, while the countries of Southeast Asia have not yet developed their own technologies, it makes sense to provide them with already existing solutions, and Russia's contribution could be particularly valuable. The Russian Yantar radiation detectors could be provided not only to Vietnam, but also to other Southeast Asian countries. This possibility could be discussed with the United States, which is already carrying out extensive efforts to improve the export control system in Southeast Asia.

One such program is the U.S. Megaports initiative, which seeks to improve customs and border controls in many ports of Indonesia, the Philippines, and other Southeast Asian countries with long coastlines[257]. For example, as part of Megaports, the U.S. Department of Defense has invested some $26 million in export-control equipment and training at the Philippine port of Laem Chabang[258]. In July 2005, the United States signed an agreement with the Philippines on equipping the Manila port, and in 2010 a similar agreement was signed with Vietnam[259]. Given that Russia has provided Vietnam with its Yantar radiation detectors, one could say that today this Southeast Asian country is home to a joint solution of export-control issues by Russia and the United States. It is important to grow such mutual cooperation as time goes on, and the willingness to do so has already been demonstrated, at least by the American side. Thus, in addition to the Megaports initiative covering only Filipino and Vietnamese ports so far, the U.S. Department of Defense has agreed to provide radiation monitors to other major ports in the region[260].

An area even more important than the provision of radiation monitors and other equipment is the training of export-control and border-control professionals. Here again, Russia could make a significant contribution – in concert with the United States and other countries. Both Russia and the United States have experience training foreign specialists in this field. Russia prepares such specialists at the Russian Customs Academy, which has branches in St. Petersburg and Vladivostok. Both branches have opened special centers for training foreign specialists, and already have experience doing so. It would be helpful if these branches also trained representatives from Southeast Asian countries.

The United States, along with Russia, also has programs to train specialists in export control. However, in contrast to the multi-year Russian programs aimed at providing a specialized higher education in this area, the U.S. efforts are made up of short-term training sessions and seminars conducted as part of the Export Control and Related Border Assistance (EXBS) program. It is clear that holding such workshops and seminars makes certain sense, and Russia should explore making its own efforts in

[257] Representatives of the Philippine embassy in Russia. Interview with the author. Moscow, May 27, 2013.

[258] The Laem Chabang Megaports Initiative. *U.S. Embassy in Bangkok*. 20 September 2010, http://bangkok.usembassy.gov/embassy-activities/2010/sep/03.html (Retrieved on April 22, 2013); and "Philippines and U.S. Commission Megaports System to Increase Security at the Port of Manila", U.S. Embassy in the Philippines, 13 September 2011, http://manila.usembassy.gov/megaports.html. (Retrieved on June 27, 2013).

[259] Agreement Aimed at Preventing Nuclear Smuggling. U.S. DOE/NNSA website, 27 February 2008, http://www.nnsa.energy.gov/mediaroom/pressreleases/02.27.08 (Retrieved on June 27, 2013); NNSA and the Vietnamese Ministry of Finance Agreement. U.S. Department of State, 2 July 2010, http://fpc.state.gov/143928.htm (Retrieved on June 27, 2013).

[260] Commitments by Participating States as stated in National Progress Reports and National Statements," from the 2012 Nuclear Security Summit, April 2012, http://www.thenuclearsecuritysummit.org/eng_media/speeches/speeches_list.jsp. (Retrieved on June 27, 2013).

this area. For example, training export-control specialists at the Russian Customs Academy would yield as a result a small group of professionals who may be in demand in Southeast Asian countries, among others. This is why Russia should be joined by the United States, Japan, the EU, the Southeast Asian countries themselves, and possibly other donors, in its funding of educational programs for export-control specialists at specialized universities.

Prospects for cooperation on nuclear education for first-line-of-defense professionals

It makes the greatest sense to educate nuclear professionals from Southeast Asia in Russia, where educational centers for training in MPC&A have been established with the active participation of the United States. The National Nuclear University (MIFI) is one such center; similar MPC&A training programs exist at Tomsk Polytechnic University, and at Sevastopol National University of Nuclear Energy and Industry (Ukraine). Other countries have expressed interest in rolling out such training programs. The Pakistani Atomic Energy Commission, for one, would like to launch an MPC&A training program in Pakistan. The Pakistan Institute of Engineering and Applied Sciences (PIEAS) already offers master's degrees in nuclear engineering, with a specialization in the field of nuclear security[261].

A master's program in MPC&A is designed primarily for technical staff, yet there is clearly a need for educating humanities specialists in WMD nonproliferation and nuclear security. We have noted above that the non-technical personnel at the foreign ministries and other government agencies in Southeast Asia do not always realize the importance of nonproliferation and nuclear security, and for this reason do not even give consideration to the possibility of their countries' accession to the relevant international conventions. For example, in Vietnam, as well as in other Southeast Asian countries, the lack of trained professionals in this area hinders the reaching of an inter-agency agreement on the need for the country to join the Convention on Nuclear Safety, and the ratification of the Additional Protocol. Because of the same problem, many Southeast Asian countries either lack national committees to regulate nuclear power issues, or have committees that are not up to par. Experts believe the Vietnam Agency for Radiation and Nuclear Safety (VARANS) is still not the independent body it should be[262].

One way to address bureaucratic issues in the Southeast Asian nuclear sphere would be to develop educational programs for lawyers and international affairs specialists. The optimal format for such programs could be a joint master's degree offered by the leading Russian and American research centers and universities. This mechanism would be particularly useful if it targeted not only young professionals in Russia and America, but also those from other countries, including Southeast Asian ones, where

[261] Materials provided by the Pakistani embassy in Russia. Moscow, June 3, 2013.
[262] Prospect for Nuclear Security Partnership in Southeast Asia. James Martin Center for Nonproliferation Studies (CNS), the Center for Energy and Security Studies (CENESS), and the Vienna Center for Disarmament and Non-Proliferation (VCDNP). - May 2012. - Monterey, Moscow, and Vienna: CNS, CENESS, and VCDNP. – P. 63, http://cns.miis.edu/opapers/pdfs/120515_seasia_nuclear_security_partnership.pdf (Retrieved on June 27, 2013).

the nuclear-power infrastructure is developing and where the risks associated with proliferation are potentially on the rise[263].

The activities of the Nuclear Security Support Centers are also crucial to success in this field. Such centers are being established all over the world; at the moment they exist in South Korea and Japan, which are actively involved in the affairs of the Southeast Asian region, and whose centers may be used for training the region's specialists in nuclear security. In addition, it makes sense to consider eventually creating such centers in Southeast Asia proper.

Another good idea would be the formation, as part of ASEAN, of a Southeast Asian Atomic Energy Agency, focusing on issues of nuclear security. This organization could be modeled on Euratom[264], and also coordinate the activities of the region's training centers.

It should be noted that, in contrast to the rest of the proposals mentioned above, the creation of the regional atomic energy agency is unlikely to happen in the foreseeable future. One reason for this is the fact that today the efforts of Southeast Asian countries in the area of nonproliferation are focused mostly on the ratification of the Protocol to the Agreement on the establishment of a nuclear-weapons-free zone in Southeast Asia by all members of the Nuclear Five. At the moment, the nuclear weapon states are refusing to ratify the protocol because, in their view, it limits their freedom of maritime navigation. Cooperation on moving towards ratification of this protocol is essential to strengthening nonproliferation and nuclear security in Southeast Asia, although at first glance these issues are completely unrelated. While the protocol is not yet ratified, and Southeast Asian countries are forced to focus on getting to ratification, they cannot pay due attention to nuclear security and export controls. If the protocol is ratified, this will open the way for the establishment of a Euratom-type regional organization.

Conclusions

Based on the study of nuclear issues in Southeast Asia, as well as ways to address them, we have arrived at the following conclusions.

First, despite their poorly developed nuclear infrastructure, Southeast Asian countries already have issues with the security of nuclear materials in research reactors, as well as issues with other radioactive materials used in medical, agricultural, industrial, and other non-energy purposes. These nuclear materials need a more robust system of physical protection.

Second, Southeast Asian countries – even those not possessing significant amounts of nuclear or radioactive materials – must address the task of improving export controls, with international assistance. This question is particularly relevant for countries in Southeast Asia, many of which have long coastlines but do not have enough radiation detectors at ports and customs facilities. For this reason, Southeast Asian countries are potentially very attractive to those trafficking in nuclear and other radioactive materials.

[263] Orlov Vladimir, Cheban Alexander. Life after death. Will New Partnership replace the Nunn-Lugar Program? *Rossiya v globalnoy politike*. 2013. No 2 (March-April). P. 110.
[264] Symon Andrew. Southeast Asia's Nuclear Power Thrust: Putting ASEAN's Effectiveness to the Test? Contemporary Southeast Asia, Vol. 30, No. 1, 2008. Pp. 130-133.

Third, the increased nuclear security risks in Southeast Asian countries are due to the presence of terrorist threats and piracy in the region. This, again, emphasizes the need for close international cooperation to neutralize these risks, with which Southeast Asian countries are unlikely to cope on their own, especially in view of their lack of relevant experience.

Summing up, solutions to all of the issues mentioned are only possible within the framework of international cooperation. Such collaboration does have real obstacles, as countries that could help Southeast Asia solve its nuclear issues still need to be persuaded that such assistance should be provided, and that it would suit their interests. For international assistance to the countries of Southeast Asia to become reality, there should be a focus on the following:

1. Emphasis on nuclear education. The human factor in ensuring nuclear safety and security is even more important than the provision of modern security systems and radiation detectors. Therefore, the solution of Southeast Asia's nuclear challenges hinges on the training of professionals from the region in the field of export control and nuclear security. The moral: nuclear education is one of the most effective ways of addressing nuclear issues in Southeast Asia;
2. Whenever possible, projects should go forward with local professionals and local technology. This is related to the proposal regarding nuclear education. The goal of offering education to nuclear specialists from Southeast Asian countries is precisely to enable these countries eventually to address their nuclear issues using their own resources.
3. In addition to working with personnel in Southeast Asia, it is important to also carry out certain technical initiatives. First and foremost, there is a need to improve the national export control systems by providing Southeast Asian countries with radiation detectors.

As for Russia, the main reason for its interest in providing assistance to Southeast Asian countries in addressing their nuclear problem is Russia's aspiration to corner the promising Southeast Asian markets for nuclear services. Aiming to strengthen its position in these markets, Russia has an interest in helping these countries improve their export control systems, and in offering educational services to local nuclear specialists.

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CONCLUSION

Each individual section of the study offers a number of conclusions and recommendations. Based on these conclusions, we can highlight several key trends that characterize the current state of the bilateral and multilateral mechanisms of cooperation in WMD nonproliferation and nuclear security:

- Russia and the United States continue their nuclear cooperation; the two countries have signed a new framework agreement in that area. It is, however, quite obvious that in the new circumstances, the scale of that cooperation will inevitably be smaller compared to the period when the Nunn-Lugar Program was in effect. Russia remains ready for nuclear cooperation with the United States on the basis of equality. But it is unlikely to pursue similar cooperation with Washington in the area of bio-security (which is just as important) for as long as Washington continues to regard Russia as a potential proliferator of biological weapons.
- Now that Russia is no longer a member of the ISTC, the effectiveness of that organization's further programs is in doubt. As the same time, it is obvious that the ISTC will continue to exist after its headquarters are moved from Moscow to Astana. It is important that the ISTC leadership intends to conduct an internal reform, and use its accumulated experience to increase the number of the organization's members, improve its effectiveness, and increase the scale of its programs. There are reasons to believe that once the reforms have been implemented, and provided that there is adequate political support from the Kazakh leadership (especially from President Nazrbayev, who has proposed several important WMD nonproliferation initiatives) the ISTC may yet become an even more influential anti-proliferation instrument than it was previously.
- The need for international cooperation in addressing nuclear and radiation security challenges in third countries is becoming ever more pressing. Back in the 1990s and even 2000s the main focus of cooperation in this area was Russia and other CIS countries. Now, however, issues in these countries have for the most part been resolved. That is why the focus of the international community’s nonproliferation efforts is shifting towards the Middle East, Southeast Asia, and Africa. Many countries in these regions don't have any substantial nuclear infrastructure. Nevertheless, there are mounting concerns over their plans to develop a nuclear energy industry while many of their internal issues remain unresolved – including outbreaks of separatism, terrorist activity, and internal political instability. Such issues raise serious questions about these countries’ ability to provide adequate levels of nuclear security and safety at their nuclear facilities.

Based on the study 's conclusions, the following proposals can be made:

1. Russia and the United States need to develop detailed agreements about the specific areas of cooperation outlined in the framework Agreement of June 14, 2013. Clearly, more detailed documents are required for further development of such multilateral mechanisms as the Global Partnership. Of all the areas of Russian-U.S. cooperation outlined in the Agreement of June 14, 2013, the following appear to be the most promising and the least controversial:
   - Border controls for nuclear and other radioactive materials
   - Retrieval, storage and disposal of dangerous sources of radiation

2. Other areas of cooperation outlined in the Agreement of June 14 (MPC&A, HEU consolidation, and conversion of research reactors) are quite sensitive and can cause differences between the United States and Russia. Nevertheless, cooperation in these areas can be entirely feasible in third countries (the Middle East, Southeast Asia, and the CIS).
3. Russian-U.S. cooperation on WMD nonproliferation and nuclear security must not be limited to the Agreement of June 14, 2013. It would be very useful to implement another document - *Agreement between the Government of the Russian Federation and the Government of the United States on Cooperation in Nuclear- and Energy-Related Scientific Research and Development* which was signed on September 16, 2013 in Vienna.
4. In developing international science and technology cooperation, it is extremely important to make use of the ISTC's experience and potential, which has yet to be fully utilized. Even though Russia has quit the organization, it should consider the options for continued cooperation with the ISTC.
5. International cooperation on nonproliferation issues but not be limited to nuclear weapons and materials. The destruction of chemical weapons and bio-security are just as important. Russia and the United States could cooperate in the destruction of Syrian chemical weapons as part of the New Partnership and the Global Partnership. Russian-U.S. cooperation on bio-security will only become possible once Russia joins the Australia Group, which will enable this problem to be addressed via other multilateral formats, such as the Global Partnership.
6. As a first step towards cooperation on bio-security, the parties must develop a common set of principles in this area. To that end it would make sense to establish an international working group of experts, which would not only formulate these principles, but also develop a commonly accepted list of biological threats.
7. In parallel with measures against bio-threats, the parties must pursue international cooperation in fighting infections. This area of cooperation can be relatively free of political and economic differences related to military bio-security. Cooperation in fighting infections will make it possible to strengthen international monitoring and controls over dangerous weapons-usable pathogens. As a result, cooperation in fighting infections, which seemingly has little to do with nonproliferation or politics, could make a tangible contribution to reducing the risks of biological weapons proliferation.
8. Education - technical as well as humanitarian - has an important role to play in countering the spread of various types of WMD and strengthening nuclear security. Specialists with a technical education are responsible for the actual implementation of nuclear security measures. It is important to provide adequate financial incentives to students and young technical specialists in order to attract the young talent to the nuclear industry. Without such incentives, we are going to see a continuation of the trend whereby nuclear security increasingly becomes the domain of ageing specialists, who are not being succeeded by the younger generation. WMD nonproliferation training is also a necessary component of humanitarian education for those students who will work in the Foreign Ministry and other government agencies, and become directly involved in nonproliferation policymaking. That is why Russian-U.S. or multilateral cooperation in this area should include the roll-out of joint WMD-nonproliferation training programs at the leading schools of international relations. These programs must be offered to students from all over the world.
9. Humanitarian as well as technical education in the area of nonproliferation and nuclear security must nurture a nonproliferation and nuclear security culture among the young specialists. To establish a clearer definition of the term "nonproliferation

and nuclear security culture" and to develop the principles of that term's practical implementation, it would make sense to ask a group of reputable experts from several countries to produce a research paper on this subject.

10. It is a matter of extreme importance that the cooperating parties must have a tangible interest in the areas of cooperation being pursued. Determining such areas of tangible interest is not an easy task. That is why there seems to be a clear need for a new mechanism of coordinating interests, analyzing the issues, and determining possible areas of cooperation. That mechanism could be set up in the form of another specialized working group within the Global Partnership program. The workgroup should be tasked with conducting a detailed analysis of the proposals outlined in this study, and presenting these proposals to the relevant governments in a more polished and detailed form.

On the whole, this study by PIR Center is an opportunity to undertake a critical analysis of the current state of international cooperation in WMD nonproliferation and nuclear security; identify the obstacles facing such cooperation; and propose possible ways of overcoming those obstacles.

APPENDIX 1. INTERNATIONAL LEGAL FRAMEWORK FOR NUCLEAR SECURITY IN THE MIDDLE EAST

	Party to the NPT	IAEA member	Additional protocol	CPPNM	ICSANT	Code of Conduct on the Safety and Security of Radioactive Sources	CWC	BTWC
Algeria	Yes	Yes	No	Yes	Yes	Yes	Yes	Yes
Bahrain	Yes	Yes	Yes	Yes	Yes	No	Yes	Yes
Egypt	Yes	Yes	No	No	No*	Yes	No	No*
Iran	Yes	Yes	No*	No	No	No	Yes	Yes
Iraq	Yes	Yes	Yes	No	No	Yes	Yes	Yes
Israel	No	Yes	No	Yes	No*	Yes***	No*	No
Jordan	Yes	Yes	Yes	Yes	No*	Yes***	Yes	Yes
Kuwait	Yes	Yes	Yes	Yes**	No*	No	Yes	Yes
Lebanon	Yes	Yes	No	Yes**	Yes	No	Yes	Yes
Libya	Yes	Yes	Yes	Yes	Yes	No	Yes	Yes
Mauritania	Yes	Yes	Yes	Yes	Yes	No	Yes	No
Morocco	Yes	Yes	Yes	Yes	Yes	Yes***	Yes	Yes
Oman	Yes	Yes	No	Yes**	No	Yes***	Yes	Yes
Qatar	Yes	Yes	Yes	Yes**	No*	Yes	Yes	Yes
Saudi Arabia	Yes	Yes	No	Yes	Yes	No	Yes	Yes
Sudan	Yes	Yes	No	Yes	Yes	No	Yes	Yes
Syria	Yes	Yes	No	No	No*	Yes***	No	No*
Tunisia	Yes	Yes	No*	Yes	Yes	Yes***	Yes	Yes
Turkey	Yes	Yes	Yes	Yes	Yes	No	Yes	Yes
UAE	Yes	Yes	Yes	Yes	Yes	No	Yes	Yes
Yemen	Yes	Yes	Yes	Yes	No	Yes	Yes	Yes

* Signed but not ratified
** Have not signed the amendment to the CPPNM
*** Have not signed the Guidance to the Code

Source: PIR Center

APPENDIX 2. COMPANIES WHICH TAKE PART IN ISTC PROJECTS AS PARTNERS

AIRBUS SAS, Blagnac, France
AIRBUS SAS, Blagnac, France
AREVA/Areva NP GmbH, Erlangen, Germany
Argonne National Laboratory, Argonne, IL, USA
Argonne National Laboratory, Argonne, IL, USA
Battelle Energy Alliance LLC (BEA), Idaho Falls, ID, USA
CERN, Geneva, Switzerland
Cordin Company, Salt Lake City, UT, USA
Department for Energy and Climate Change (DECC), London, UK
Department for Energy and Climate Change (DECC), London, UK
Donor (INTAS), Moscow, Russia
Easy Bio System, Inc., Seoul, Korea
EPF — Electricite de France, Clamart, France
Electric Power Research Institute (EPRI), Palo Alto, CA, USA
ENEA, Bologna, Italy
ENEA, Rome, Italy
European Commission/European Aid Co Cooperation office (DG AidCo), Brussels, Belgium
Fraunhofer Gesellschaft, Munich, Germany
General Fusion, Burnaby, Canada
GSI, Darmstadt, Germany
High Temperature Technologies Corp., Chateauguay, QC, Canada
Hitachi Kokusai Electric Inc., Tokyo, Japan
Hitachi Ltd., Tokyo, Japan
INFN Instituto Nazionale di Fisica Nuclear, Rome, Italy
Institute for Applied Science, Inc., Reston, VA, USA
IRSN — Institut de Radioprotection et de Surete Nucleaire, Fontenay aux Roses, France
iZFP/Fraunhofer institute, Saarbrucken, Germany
Japan Atomic Energy Agency, Ibaraki, Japan
Kaneka Corporation, Osaka, Japan
Kao Corporation, Tochigi, Japan
Komatsu Ltd./Komatsu Electronics Inc., Kanagawa, Japan
Komatsu Ltd., Kanagawa, Japan
Laboratoire de Physique Subatomique et de Cosmologie, Grenoble, France
Lawrence Livermore National Laboratory, Livermore, CA, USA
Lockheed Martin Corporation/Bechtel BWXT Idaho, Idaho Falls, ID, USA
Los-Alamos National Laboratory, Los-Alamos, NM, USA
Los Alamos National Laboratory, Los-Alamos, NM, USA
Max-Planck Society/Max-Plank-Institute fur Biogeochemie, Jena, Germany
Ministry of Defense, London, UK
National Olympic Committee of Armenia, Yerevan, Armenia
Nissan Motor Co., Ltd., Tokyo, Japan
Oak Ridge National Laboratory, Oak Ridge, TN, USA
Royal Philips Electronics/PHILIPS Medical Systems, Hamburg, Germany
Sandia National Laboratories, Albuquerque, NM, USA
Science and Technology Facilities Council, Didcot, UK

SCK-CEN, Brussels, Belgium
The European Office of Aerospace Research and Development, London, UK
The European Office of Aerospace Research and Development, Ruislip, UK
United States Air Force/The European Office of Aerospace Research and Development, London, UK
United States Department of Agriculture/Agricultural Research Service, Beltsville, MP, USA
US Department of Agriculture/Agricultural Research Service, Beltsvile, MP, USA
US Department of Agriculture/Agricultural Research Service, Beltsville, MP, USA
US Pepartment of Pefense/Pefense Threat Reduction Agency, Pulles, VA, USA
US Pepartment of Defense/Pefense Threat Reduction Agency, Fort Belvoir, VA, USA
US Pepartment of Energy/Initiatives for Proliferation Prevention program, Washington, DC, USA

Source: ISTC Materials.