Nuclear Facilities in the Russian Far East: A Weak Link in the War on Terrorism 21 Steps to Better Nuclear Security in the Russian Far East

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Issues & Insights
Vol. 10-No. 13

Honolulu, HI
May 2010

Pacific Forum CSIS

Based in Honolulu, the Pacific Forum CSIS (www.pacforum.org) operates as the autonomous Asia-Pacific arm of the Center for Strategic and International Studies in Washington, DC. The Forum's programs encompass current and emerging political, security, economic, business, and oceans policy issues through analysis and dialogue undertaken with the region's leaders in the academic, government, and corporate areas. Founded in 1975, it collaborates with a broad network of research institutes from around the Pacific Rim, drawing on Asian perspectives and disseminating project findings and recommendations to opinion leaders, governments, and members of the public throughout the region.

Table of Contents

Acknowledgements

I would like to express my deepest appreciation to the Pacific Forum CSIS staff for providing a welcoming, friendly, and inspiring environment. In particular, I would like to thank Carl Baker, Brad Glosserman, and Ralph Cossa for helping me with my research project as well as for their commitment to the Pacific Forum CSIS Young Leaders Program. This program has been a life-changing experience for me.

Special thanks go to Admiral Lloyd R. (Joe) Vasey, who devoted time to talk to me about international affairs, and inspired me to pursue a career in this field. I want to thank him for everything he has done for the USA and for his dedication to conservative values and traditions.

I thank my colleagues, Kei Koga (Vasey Fellow), Adrian Yi (Kelly Fellow), Diana Park (Kelly Fellow), and Justin Bishop (Pacific Forum CSIS Intern) for the challenging discussions we had throughout my Fellowship and for more to come. We were fortunate to have each other: being so different in our global views made us so close in our everyday life.

I would also like to thank Professor Matthew Bunn (Harvard University), Brian Finlay (The Henry L. Stimson Center), Professor Siegfried S. Hecker (CISAC Stanford University), and Dr. Gennady Pshakin (IPPE/Obninsk) for taking time to assist me with my research.

Special thanks also go to my parents and my husband without whose support I would not have been a Vasey Fellow at the Pacific Forum CSIS.

Executive Summary

Nuclear facilities in the Russian Far East have been an essential component of Russia's national defense strategy since the beginning of the Cold War. New millennium challenges such as the rising threat of illicit trafficking in nuclear materials, nuclear terrorism, global economic crises, and Russia's internal transition to a democratic state undermined the safety and security of nuclear facilities in the Russian Far East, making them a target for criminal groups, terrorist organizations and *profit-seeking* individuals.

Nuclear facilities in the Russian Far East pose a major threat not only to Russia, Newly Independent States (NIS), and Asian countries but to global security as a whole. Therefore a multilateral approach is needed to effectively address nuclear safety and security.

Although countries like the US, Canada, Great Britain, Germany, France, Japan, and Norway have assisted Russia in its disarmament and nuclear security efforts, these programs lacked a regional and culturally sensitive approach, which undermined their effectiveness.

It is therefore essential that a new, "regional" approach be implemented for Russian Far East nuclear facilities to address the growing threat of WMD proliferation among nonstate actors and nuclear trafficking.

This paper examines the Russian Far East nuclear complex, its status, and main concerns. Then it analyzes efforts undertaken on local, regional, state, and international levels to address some nuclear security and safety concerns in the region. A separate chapter is devoted to the threat of nuclear terrorism as the reality of this threat has been debated. Three case studies analyze nuclear facilities in the Russian Far East. The paper concludes with 21 recommendations targeting local, regional, and international stakeholders to strengthen nuclear security in the Russian Far East.

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Introduction/Background

Nuclear facilities in the Russian Far East have been an essential component of Russia's national defense strategy since the beginning of the Cold War. The new millennium challenges such as a rising threat of illicit trafficking in nuclear materials, nuclear terrorism, global economic crises, and the country's internal transition to a democratic state undermined the safety and security of nuclear facilities in the Russian Far East making them a desirable target for criminal groups, terrorist organizations and *profit-minded* individuals.

The Russian Far East is an isolated yet strategic region of Russia. It covers a vast amount of territory: from Ural Mountains to Okhotsk Sea (Pacific Ocean). During the Soviet era, many nuclear facilities, both for civil and military purposes, were built there. These nuclear assets were heavily guarded and measures were put in place to thwart smugglers, terrorists, and criminal groups. After the break-up of the Soviet Union, Russia struggled to manage its nuclear facilities. This was in part due to the country's transition from totalitarian to democratic state, in which elements of the formerly centralized decision making process were diffused and apportioned to individual regions. Collapse of the internal security system, faltering military indiscipline, a rise in institutional corruption as well as the overall poverty of the region added to the risk of mismanagement of nuclear facilities. Local corruption, a lack of funding, and weak institutional knowledge adds to the danger.

Nuclear facilities in the Russian Far East pose a major threat not only to Russia, Newly Independent States (NIS), and Asian countries but to global security. International terrorists seek weapons of mass destruction (WMD). As long as a preponderance of assets and efforts are dedicated to fighting terrorists in the Middle East, there is a neglected weak link in the global war on terrorism – unsecured nuclear weapons and materials, which are a prime target for terrorists.

This problem has not been completely neglected. The Nuclear Security Summit, held in Washington on April, 2010, ended with an action plan signed by 47 states. Although, due to disagreements on whether to continue making weapons-grade uranium and plutonium, nations did not come up with a binding document, the fact that for the first time they all agreed on the highest level that the threat of nuclear terrorism is real and the world needs to put more efforts on securing vulnerable materials and facilities is a big step in the right direction. The Russian government also adopted a federal target program on Nuclear and Radiation Safety Insurance in 2008 which runs until 2015. In addition, the United States has contributed expertise and funding through assistance programs conducted by the Department of Defense, the Department of Energy, and the

State Department. During the Nuclear Security Summit in 2010, Obama asked Congress to increase the US assistance to Russia in its efforts to secure vulnerable facilities and materials and shutting down nuclear reactors to $1.6 billion. Other countries such as Norway, Japan, Germany, France, and Canada have been funding disarmament, nuclear security, and waste management efforts in the region as well. Unfortunately, although these cooperative threat reduction programs have well-defined objectives, they do not take regional issues and cultural dynamics into account and hence are less effective. In addition, even with security measures in place, large amounts of nuclear material are transferred between and inside facilities, creating a constant security risk.

Russian Far East Nuclear Industry: Current Status

Russia is the largest country in the world and straddles two continents: Asia, and Europe. To the north, its Asian part is bordered by the Arctic Ocean: the Barents, Kara, Laptev, East Siberian, and Chukchi Seas. To the east, it is bordered by the Pacific Ocean: the Bering Strait, the Bering Sea, the Sea of Okhotsk, and Sea of Japan/East Sea. In the southeast, Asian Russia borders the northeastern part of North Korea. To the south, it shares a border with China, Mongolia, Kazakhstan, the Caspian Sea, and Azerbaijan. There are also several islands in the Russian Far East including Franz Josef Land archipelago, the New Siberian Islands, Wrangel Island, the Kuril Islands, and Sakhalin (see map below).

Russia has the world's largest stocks of weapon-usable fissile materials, most of which are a legacy of the Cold War. The Asian part of Russia plays the most important strategic role in the country's nuclear complex: lightly populated and far from European borders, it contains the country's largest nuclear facilities. Most of the weapons-grade material in these facilities is plutonium and highly enriched uranium previously used in

weapons. Almost all this material is sent to Russia's nuclear-closed cities, the number of which is not known to public, but there are at least 10 in Russia, and 8 out of the 10 are located in the Russian Far East (see map).

[1]

It is impossible to accurately determine the amount of fissile material located in the Russian Far East: even the official estimates by Rosatom have a large degree of uncertainty: the Soviet Union produced up to 1,400 tons of highly-enriched uranium (HEU)[2]. After the HEU-LEU US-Russia deal and Russian nuclear tests, it is believed that as of 2008, the amount of HEU remaining is 950 tons. The amount of weapon-grade plutonium is estimated to be about 145 tons plus 45 tons of separated civilian plutonium as of 2007.[3] Russia is estimated to have about 350 tons of HEU and 56 tons of weapons-grade plutonium in warheads (if an average warhead has 25 kg of weapons-grade uranium and 4 kg of plutonium). Rosatom is also estimated to have a certain amount of material (about 100 tons) for future use in naval reactors. Russia is also running a

[1] Russia: *Closed Nuclear Cities Map*, NTI Research Library, (2000), http://www.nti.org/db/nisprofs/russia/weafacl/nukcity.htm (accessed 11.20.09)
[2] Oleg Bukharin, *Analysis of the Size and Quality of Uranium Inventories in Russia*, Science and Global Security, Vol.6, No 1 (1996), p. 68
[3] *Communication received from the Russian Federation Concerning Its Policies Regarding the Management of Plutonium*, IAEA, (2008), INFCIRC/549/Add.9/10

commercial plutonium program located in the Asian Russia (Ozersk) that produces about 42 tons of reactor-grade plutonium per year.

Fissile material is constantly transferred from one facility and region to another, which makes it hard to estimate the percentage of the Russia's nuclear stockpile in the territory of the Russian Far East. Taking into account the number of nuclear facilities in the region, it is estimated that 65 percent is located in the Ural and Siberia regions.

Although the current status of the main nuclear facilities is mostly classified, we know several things about the main nuclear facilities in the Asian part of Russia. Mayak Production Association (Ozersk) continues to store weapon-grade plutonium and uranium as it continues to produce pits and HEU components for nuclear weapons. It is also involved in the production of radioisotopes and tritium. The US has assisted Russia in building a nuclear materials storage facility that was completed in 2007; the facility is now used for storage of excess weapons-grade plutonium. The second main nuclear facility located in the Asian part of Russia between the cities of Novosibirsk and Krasnoyarsk is a Siberian Chemical Combine (Seversk/Tomsk-7). It continues to store weapons-grade plutonium pits and HEU components for nuclear weapons; it also recently began to store weapons-grade plutonium oxide under US monitoring. The third facility of high importance to the Russian nuclear complex located in the region is a closed nuclear city – Snezhinsk, located not far from the Mayak Facility, in Tomskaja Oblast. Russia's second weapons laboratory is located there (All-Russian Research Institute of Technical Physics). There is speculation that Snezhinsk is now involved in the development of new nuclear warheads, storage and handling of nuclear weapons. The fourth nuclear facility of high importance to the Russian nuclear complex is Novosibirsk Chemical Concentrates Plant, located in Novosibirsk, the largest city in Siberia. The plant is one of the manufactures of nuclear fuel and research reactor fuel for Russian and foreign nuclear-power plants (NPPs).

Although Russia's uranium complex does not produce highly-enriched uranium any more (except for Novouralsk, which is believed to have a license to produce 30 percent enriched HEU) it does have the capability to produce highly enriched uranium.

In general, although there has been significant progress by Russia in reducing the chances of proliferation in the last 18 years, the amount of nuclear material is unlikely to change significantly in the next decade. The deal that Russia has with the US on down-blending of highly enriched uranium to low-enriched uranium (LEU) won't make a big change as the uranium will come from disassembled weapons. In addition, Russia declared it would stop down-blending in 2013, when the contract ends. And although Russia committed to eliminate about 34 tons of plutonium, the process will probably not begin for a number of years.[4]

[4] *Global Fissile Material Report 2007*, International Panel on Fissile Materials, (2007) http://www.fissilematerials.org/ipfm/site_down/gfmr07.pdf (accessed 09.28.2009)

Russian Far East Nuclear Industry: Challenges and Concerns

After the collapse of the Soviet system, Russia had a rapid change in its political, economic, and social structure. Due to these sudden and rapid changes to a "well-established Soviet system" of central government control and authoritarian hierarchy, the country faced unprecedented challenges such as freedom of choice, and social and financial responsibilities to name a few. These "issues" are usually welcome in the Western world and are considered to be great achievements for the development of a civil society. These "achievements" when applied in a society that never actually "achieved" the civil society goods but received them in developed form ready to use has meant that Russia struggled with their implementation. Russia became a democracy over night, with all the "Western" freedoms and responsibilities that come with it. Some took it as an opportunity to start a new, productive, and successful life; others decided to take an advantage of an "old," yet new for Russia, type of regime. Over time, many industries found advantages in the new system and used it to develop themselves. For some industries however, rapid regime change was not to their advantage; on the contrary, they faced many new challenges that they did not know how to address. The Russian nuclear complex is one industry that has not done well during the country's transition: not only have existing problems escalated (institutional corruption, cultural dynamics, and lack of proper security system), but new problems have arisen (lack of central government control, lack of information transparency, and a threat of nuclear terrorism/sabotage).

These problems within Russia's nuclear complex have escalated in the Russian Far East more than they have in regions closer to Moscow because the country has always had a politics of "double standards": regions, closer to the capital received more financial attention and "privileges" than those distanced from Moscow. On the other hand, regions that were far from the center, particularly Russian Far East, always enjoyed a larger degree of freedom. Lack of central government control over Russian Far East nuclear facilities is arguably the main challenge the region's nuclear complex faces. The Soviet system of control heavily relied on local authorities and their "trust and honesty" to the Party as well as countless KGB offices. With Russia transitioning to democracy, this control no longer exists. Instead, local authorities are given a lot of freedom, but not many responsibilities. Neither does the country have the means or legal bases to put a prototype of the KGB at every facility. Low salaries and corruption complements low standards and morals in the government. There have been several corruption scandals involving senior local government officials trying to sell nuclear materials or helping criminal groups get access to facilities. Inter-state governmental corruption takes place as well. On September 19, 2007, for example, Energoatom[5] officials were suspicious of smuggling NPP parts from Russia to Ukraine.

The main security challenge is the lack of a proper security system. This was never a problem during the Soviet era as there was strict control over the amount of nuclear and radioactive material and there were KGB agencies in every facility monitoring activities. The collapse of the Soviet Union triggered the collapse of the

[5] Energoatom is Ukraine's National Nuclear Generating Company

"Soviet" nuclear security system. Without a proper security system, many nuclear facilities became immediate and "appealing" targets to both state and non-state actors. Programs financed by the US, Japan, Norway, Germany, and other states as well as the Russian government have been launched to establish a proper security system for the Russian Far East nuclear complex.[6] But their implementation ignored regional issues and cultural dynamics and hence was less successful. Many of these programs were based on Western-type NGOs. Although Russia is officially a democratic state, it does not have a "culture of NGOs" – they are not given authority, their effectiveness is undermined, and they are often treated as a "foreign spy." NGOs are a new and underdeveloped phenomenon in Russia – it is hard for Russians to understand how a non-government organization can solve state problems (those who have decision-making power in Russia are a Soviet generation with a very clear and straight understanding of how the country should work –attempts to question their thinking is seen as an "insult" and a forceful imposition of a Western-type state). It was therefore crucial for foreign governments to work directly with the Russian government instead of creating groups to work directly with nuclear facilities. This is a much more bureaucratic yet effective way in the long-run. In the 90's for example, President Yeltsin inherited a very weak state: dealing with the access to and the secrecy of nuclear facilities was not among his priorities. A philosophy of that time was "*Whoever pays more, gets access to the information and facility*" as the country was desperate for money. At that time international NGOs started their assistance programs on disarmament and security for Russia's nuclear arsenal. However, in 2000 when Vladimir Putin came to power, he made national security a priority for his presidency, which also meant far fewer international NGOs were involved in the Russian nuclear complex.

In addition, international programs were not coordinated: there were many cases where different countries visited the same facilities and offered the same services without coordinating and for the most part not even knowing the others' activities. This lack of coordination led to "bidding-wars" by managers of nuclear facilities. This further deregulated Russia's nuclear complex as it became a money-driven rather than a security-driven effort. As a result, very few countries and international organizations now have a "right" to assist Russia as it tries to secure and safeguard its nuclear facilities. Had there been government-to-government contracts and a proper coordination system among stakeholders, the number of assistance programs would have been higher and the process of securing Russia's nuclear complex more effective.

Cultural dynamics are another challenge that is overlooked by international organizations working on nuclear security and threat reduction in Russia but which is directly related to physical security of nuclear facilities and materials. There is a term that Russians use - "*Avos,*" which means something like: "*We will do it the way we think is right and maybe we will be lucky and it will work.*"[7] The "*may-be*" is a key element here – it is not part of Russian culture to read manuals before putting together electronics or furniture. The same mindset applies in case of fire or radiation even among people who

[6] International assisting programs are discussed in a detail in the chapter "Efforts to solve problems and what is left to be done."

[7] The Russian slang-term "Avos" cannot be accurately translated into English, as it is a cultural slang word.

work with radioactive materials. Russians rely on "*Avos,*" which has resulted in disasters and deaths. When Western NGOs and governments come with rules and regulations regarding nuclear safety and security, they are not given proper attention and respect either by workers or the administration as the thinking is, "*It won't happen to us,*" and it is impossible to convince them otherwise.

Another problem tied to cultural dynamic as well as the lack of central government control is that Russian government does not impose control on how facilities follow governmental rules and regulations on safety and security of nuclear materials and facilities. Some workers, for example, simply turn off alarm systems intended to detect radiation and/or provide general physical nuclear security as they are annoyed by constant "false alarms." Some nuclear facilities always have their main gates open for the "convenience" of transportation[8]: such gates are in many cases the most reliable security mechanism of these facilities. One official of the closed Russian nuclear plant in the Russian Far East, Seversk, reported that security personnel on this facility often patrol without loaded guns to avoid accidental shootings.

Cultural dynamics are also an indirect cause of corruption in Russia's nuclear complex. Corruption is a very sensitive issue for every country – states do not voluntarily admit that their government is corrupt. "Russian corruption" is a widely used term: the collapse of the Soviet system allowed its rise in different areas of society. Corruption in the nuclear complex not only "destroys" a society from within but also undermines the country's national security. Institutional corruption has been the main reason international programs that deal with nuclear security have not been effective. Some threat reduction initiatives have been shut down or never started due to fears of corruption.

Interestingly, there are two different types of international companies working on issues of nuclear security and safety throughout the world. The first type is private companies that were never engaged in any kind of work in Russia. Their approach to the idea of engaging in Russia, particularly the Russian Far East, is that "it is crazy" mainly due to high level of corruption along with other problems such as language and cultural barriers, as well as the political "dislike" of Russian government towards them. The second type is private companies that somehow have already been engaged in Russia's nuclear complex. They say that although corruption is a challenging barrier, "the ends justify the means." The value to Russian science, lab-to-lab exchanges, etc. makes the work worth the challenges that they are faced with while working in Russia's Far East nuclear complex.

Another challenge that the region faces is a rise in smuggling. Issues such as corruption, lack of governmental control, and lack of a proper security system combined

[8] Such facilities have many vehicles going in and out. It is obligatory for security personnel to close the gate after every car and check IDs even if they know the vehicle and the driver. In order to "make life easier" many security officers simply leave the main gate open and waive to vehicles instead of following a protocol.

with large, unpopulated areas of the Asian Russia make it easy for smugglers to steal and transport nuclear and radioactive materials in the region.

The Center for Nonproliferation Studies at the Monterey Institute of International Studies maintains a Nuclear Smuggling Database, and it includes both confirmed and unconfirmed cases of nuclear smuggling. Below is the list of NIS reported thefts and seizures in 2008 and 2009, the origins of which could be nuclear facilities of the Russian Far East based on the locations they were detected:

- *Dec. 25, 2008: Two men convicted for smuggling uranium in Novoshakhtinsk, Rostov oblast;*
- *Dec. 22, 2008: Five men convicted for stealing uranium from the Chepetsk Plant in Russia;*
- *Dec. 22, 2008: Radioactive cargo detained in Vladivostok;*
- *Dec. 1, 2008: Radioactive cargo detained at Ilyichevsk seaport in Ukraine;*
- *Nov. 4, 2008: Four individuals convicted for stealing metal from the Chernobyl exclusion zone;*
- *Oct. 2, 2008: A device containing strontium stolen in Saratov;*
- *Sept. 1, 2008: Moldova-bound train with radioactive cargo passes through Kazakh borders undetected;*
- *Sept. 9, 2008: Three individuals arrested for smuggling depleted uranium from Kyrgyzstan to China;*
- *July 17, 2008: Individual from Uzbekistan accused of attempted tantalum smuggling from Russia to Iran;*
- *June 19, 2008: Radiation sources discovered in Vladivostok port;*
- *June 17, 2008: Magnitogorsk customs officials detain vehicle with radioactive turn indicator;*
- *June 6, 2008: Vehicle with radioactive potassium cyanide detained at Russo-Ukrainian border;*
- *May 30, 2008: Ukrainian law enforcement officials arrest smugglers of radioactive scrap metal;*
- *May 27, 2008: Latvia-bound train with radioactive cargo detained on Russo-Kazakh border;*
- *April 21, 2008: Truck with radioactive medical isotopes detained at Ukraine-Moldova border;*
- *Jan. 28, 2008: Individual suspected of financing nuclear trafficking arrested in Russia;*
- *Nov. 13, 2007: Belarusian customs officials detain trucks with elevated radiation cargo;*
- *Nov. 8, 2007: Kola peninsula-bound railway car with radioactive shipment detained in Murmansk;*[9]

The list indicates several uranium smuggling[10] cases in 2008 directly from Russian nuclear plants, which not only shows the demand for such material, but also the

[9] NIS Nuclear Trafficking Database, http://www.nti.org/db/nistraff/index.html (accessed 09.24.09), modified

lack of security on these sites. Even in closed cities, where the security system is believed to be effective and modern, smuggling cases occur, which indicates "insider help" to criminals. There are also frequent smuggling activities around Vladivostok port, which poses a threat to China and Japan. The origin of the radioactive materials discovered in these cargos is unknown but there is speculation that most are smuggled from Siberian and Ural nuclear facilities.

A new area where nuclear smuggling is being detected is the Chinese border, particularly the Kyrgyz-China border. China is a new market for smugglers from Russia and Central Asian states due to wide, mostly unprotected borders which make it easy to smuggle radioactive materials into China, as well as an increasing demand in China for smuggled radioactive and nuclear materials, mostly for further export.

Nuclear smuggling activities in the Russian Far East are on the rise. It is hard to accurately tell the number of cases each year and the origin of smuggled materials due to the lack of transparency in the region's nuclear complex. As previously mentioned, because of the distance from Moscow, the region does not have a well-regulated institutional system of information sharing. The region's close location to the Russia-Georgia border, for example, plays a negative role in information transparency. Current Russian-Georgian conflicts over disputed territories, Abkhazia and South Ossetia, and the US support of Georgian actions "distanced" Russian officials from cooperation with the US and Georgian Secret Services. It is crucial that information transparency regarding nuclear trafficking and radiation detection exists among the three countries as the Russia-Georgia border is a key smuggling route. Although cooperative agreements between the US and Russia to counter nuclear terrorism have been signed in the last 20 years, including the Global Initiative to Combat Nuclear Terrorism, little intelligence sharing has occurred relating to illicit trafficking of nuclear materials due to the Cold War legacy in U.S-Russian relations. Only when both countries realize that the threat posed by unsecured nuclear materials is real and immediate and that a great deal of cooperation between intelligence and law enforcement agencies is required will initiatives and agreements become effective.

Threat of nuclear terrorism[11]

The Russian Far East nuclear complex is faced not only with "traditional" internal threats as corruption and lack of security, but also with the rise of a "nontraditional" threat – extremism within Russia, along its borders, and in Central Asia. The movement has deep roots and many linkages: it dates back to Tsarist Russia's occupation of the region when the Basmachi movement arose to oppose the Bolshevik takeover in 1920. The Soviet invasion of Afghanistan was followed by closer ties between Central Asia and

[10] IAEA uses the term "illicit trafficking" instead of "nuclear smuggling" to include not only nuclear, but all radioactive materials. "Illicit trafficking" also differ from "criminal and unauthorized act" as the first only refers to cross-border crime while the second term includes both: within State and between States

[11] Although a rise in extremism and the threat of nuclear terrorism are key challenges for Russia, a separate chapter is devoted to them due to the scope of the problem and the lack of attention given to it

the Afghan Islamic insurgency. Many extremist movements, such as the Islamic Movement of Uzbekistan (IMU) are allied with the Taliban and have links to al-Qaeda.

Aside from the border with Central Asian states, Russia is also faced with the rise of Islamic radicalism within the state. Arguably, it was the Russian government itself that started using terrorism as a tactic against its own population in the 19th century (e.g., the Red and the Great Terror Campaigns). Currently, Russia's most serious terrorist activities take place in the Caucasus region (Chechnya, Dagestan, and Ingushetia) as well as in big cities such as Moscow, Novosibirsk, etc. There are different explanations for the Islamic radicalism in Russia. Some believe that the rise of extremism began with two Russian-Chechen wars. Others say terrorism occurred due to "harsh" counter-terrorism efforts the Russian government applied, particularly after the Dubrovka terrorist act. Some believe that large terrorist organizations such as al-Qaeda and the Taliban are behind Russia's Islamic organizations and their main objective is to weaken Russian state from within and turn it into Islamic state. Whatever the reasoning behind the phenomenon of terrorism, one thing is clear – it is on the rise in the region and throughout the world.

In 2007, the IAEA together with European Police Office, International Police Organization, and the World Customs Organization published four main ways stolen radioactive materials can be used by non-state actors:

- nuclear explosive devices;
- nuclear material to build an improvised nuclear explosive device;
- radioactive material to construct a radiological dispersal device;
- the dispersal of radioactivity through sabotage of installations in which nuclear and other radioactive material can be found or of such material in transport;[12]

A major threat to regional and global security is the prospect of non-state actors acquiring radioactive material for use in an RDD, or a "dirty bomb," which is constructed from radioactive material with conventional explosives and, when detonated, could disperse radioactive material over a wide area, contaminating people and the environment. Non-explosive means could also be used to disperse the radioactive material with damaging effects. For purposes of countering the threat of RDD incidents, nuclear security measures should focus on the kinds of material that have the potential for causing the greatest and most long-lasting damage.[13]

Those who insist that terrorists can't build a nuclear bomb use Iraq as their main argument. The country spent billions of dollars trying to build a nuclear bomb from existing nuclear materials and failed. But no line can be drawn between production of a safe, reliable nuclear bomb and a simple, unreliable and primitive one. Recently two students and one scientist from the Manhattan Project were able to construct a bomb

[12] *Combating Illicit Trafficking in Nuclear and Other Radioactive Material*, Technical Guidance, http://www-pub.iaea.org/MTCD/publications/PDF/pub1309_web.pdf (accessed 09.25.2009)
[13] *Combating Illicit Trafficking in Nuclear and Other Radioactive Material*, Technical Guidance, (2007), http://www-pub.iaea.org/MTCD/publications/PDF/pub1309_web.pdf (accessed 10.12.09)

similar to the one used in Hiroshima bombing during their summer semester. Expert groups have concluded that terrorist groups are capable of building a sophisticated nuclear bomb even before Al-Qaeda showed its incredible ability to gather intelligence and work with individual terrorist cells on Sept. 11, 2001.

It is important to note here that there have not been any terrorist acts involving nuclear or other radiological materials. The March 1995 Tokyo subway terrorist chemical attack using sarin gas, the 2001 anthrax attack, and the September 11 attacks have shown that terrorists are ready to use the most violent means to achieve their objectives. It is therefore important to accurately assess all aspects of a possible nuclear/radioactive threat.

Terrorist groups are more and more interested in acquiring radioactive materials. In 2006, Russia named 17 terrorist groups that threaten Russia's national security and operate on Russian territory. This list includes such terrorist organizations as al-Qaeda and the Afghan Taliban[14] as well as Hizb ut-Tahrir[15], Muslim Brotherhood, the Islamic Party of Turkistan, Pakistan-based Lashkar-e-Toiba, the Congress of the Nations of Ichkeria and Dagestan, among others. The list does not include Hammas and Hezbollah even though these two organizations are recognized by most countries as terrorist organizations because they are believed not to pose a direct and immediate threat to Russia's national security and do not meet all criteria by which Russia evaluates organizations' activity, such as connection with terrorist organizations in Northern Caucasus and efforts to weaken Russian state.[16] All these groups make acquiring and using WMD against non-believers as their main strategic priority in the 21st century. Bin Laden once said that "acquiring WMD is a religious duty for al-Qaeda." Different materials and manuals were found in al-Qaeda camps in Afghanistan that show how to build a nuclear bomb. There were several attempts by this terrorist organization to hire professionals in the nuclear field to assist them with in acquiring a nuclear weapon. There are also official Russian documents showing that the terrorist group that was behind the October 2002 terrorist attack in Moscow was looking into attacking a fissile material storage facility in Moscow: there is enough nuclear material there to build several dozen nuclear weapons. Russian officials have reported that in 2001 and 2002 there have been four attempts by Chechen terrorists to acquire nuclear warheads: two on the territory of the nuclear storage facility and two during the transportation of radioactive material.[17] It is clear that terrorist groups operating in Russia, Central Asia, Afghanistan, Pakistan, and other countries are searching for ways to acquire radioactive material.

[14] It should be noted that FSB (Federal Secret Service) list does not include Palestinian Hamas and the Lebanese guerilla group Hezbollah which US includes in their terrorist list

[15] Hizb ut-Tahrir is a radical Muslim group which wants an Islamic Caliphate across Central Asia and the Middle East

[16] T.Borisov, *17 Osobo Opasnyh*, Interview with U.Sapynov, Rossijskaja Gazeta, (2006), http://www.rg.ru/2006/07/28/terror-organizacii.html (accessed 11.10.2009)

[17] V. Saprykin, *Jadernaja Ygroza so Storony Terroristov Realna*, Zerkalo Nedeli, (2001), http://www.zn.ua/1000/1600/33091/ (accessed 11.15.2009)

Efforts to Solve Problems and what is to be done

There have been many attempts by NGOs, governments, and interest groups to assist Russia in securing and safeguarding its nuclear facilities and materials. Some efforts were more effective than others, but overall the results could have been much better considering the amount of money and time spent in this field. This paper does not examine all such efforts, but one is worth mentioning as it was the starting point for recognition of the problem and its scope. In 1991 a bipartisan initiative led by Senators Sam Nunn and Richard Lugar addressed the "proliferation nightmare." Under this initiative, which later became legislation, $400 million was transferred to the Department of Defense's Cooperative Threat Reduction (CTR) program. At first this program focused on assisting Belarus, Ukraine and Kazakhstan and later Russia in securing their nuclear stockpiles.[18] Both Russia and the US realized the real threat posed by "loose nukes" to their national security and developed joint programs to improve fissile material protection, control, and accounting (MPC&A). The programs shifted from Department of Defense to Department of Energy to establish a more accurate identification of facilities for following upgrades as well as provide a more clear definition of responsibilities among participating organizations. Although the programs themselves were less than effective for various reasons, such as corruption and lack of transparency, they were first steps in establishing a foundation for more comprehensive limits.

Unfortunately, due to many issues discussed in the previous chapter, particularly information transparency and a Cold-War mentality, the Russian government has been trying to cope with the problem of security and safety of its nuclear complex by itself. These efforts have been less than effective for different number of reasons; until the country deals with nuclear safety as part of a larger set of problems, most efforts will be useless.

The Russian government has identified corruption as top of its priorities. Unfortunately, not much has changed in 10 years. Although Putin's program, known as "Putin's Plan," and his tough stance did raise public awareness of this issue, the problem still exists, particularly when more state and non-state actors seek to acquire nuclear materials. There is also a "National Plan to Fight Corruption" that has proved to be somewhat effective. Recently, President Medvedev signed a set of "anti-corruption rules and regulations" that put more governmental regulations on nuclear plans and facilities. The main aspect of such regulations is the fact that now not only regional and local governmental officials, but also members of their families have to fill out tax forms. Although it might sound as nothing new to the West, it is the first time that Russia has a juridical basis to prosecute those who do not declare all their assets and income.[19] The main problem however is that no practical implementation for these regulations has been established, giving room for different interpretations and nuances. Another problem that needs to be addressed is the cultural aspect of the problem – corruption should not only

[18] Under CTR program a nuclear material storage at Mayak was built, which is discussed in a detail under "Case Study" section.

[19] U.Chernega, *Antikorupzionnyj Zakon Proshel v Kremle*, Kommersant, (2008) , http://www.kommersant.ru/doc-rss.aspx?DocsID=1095298 (accessed 11.09.2009)

be illegal, but also immoral which might be a much more difficult task to achieve. Lack of governmental control over the Russian Far East nuclear complex is arguably the issue that gets a lot of attention from the West. Although the Soviet system did grant a lot of authority to the "*regiony*" and "*oblasti,*" Moscow controlled KGB agents were in place in every facility of national security and in every local administration. Although "autonomous freedom" was granted, Moscow knew about every incident in nuclear facilities. Every small accident, wrong action, or even work-related dialogue among workers in public places was reported to the "center." Soviet propaganda was therefore arguably the best way to provide safety and security for the Russian nuclear complex. After the collapse of the Soviet system however, "regional autonomy" stayed on the same high level but the control of the central government over the nuclear complex weakened. President Medvedev established a set of governmental goals in the field of nuclear and radiation security when he made "strengthening of control and role of a central government over safety of handling nuclear energy, modernization of collaboration among federal and local units as well as appointment of governmental officials 'in-charge' of such control" as a priority for the country in the period until and after 2010.[20] The Russian government recognizes the seriousness of the problem. However, the lack of funds and constant changes in the Russian budget due to changes in oil prices prevent the government from having specific programs that would incorporate Moscow into regional and local issues in the nuclear complex. It makes it even harder to establish governmental control at the Siberian and Ural nuclear facilities as Moscow officials are not eager to relocate there due to low salaries along with bad living and environment conditions.

Both the lack of governmental control and corruption are considered to be internal matters. It is practically impossible for other countries to get involved in solving these issues even when they undermine their national security as in the case of Russia's nuclear security. There are however other problems the Russian Far East nuclear complex faces that are impossible to deal with without external help. One such area is smuggling of nuclear and radioactive materials. The US intelligence community, for example, has been actively involved in detecting and preventing smuggling of nuclear and radioactive materials in Russia and former Soviet Union states. The good news is that the US does not have to be granted permission by Russian officials to lead investigations on Russian territory. This can be done from outside the country. The US is seen as a very appealing market to smugglers. They are in a constant search for buyers of nuclear and radioactive materials. There were several successful cases of FBI undercover investigations that prevented the smuggling of WMD into the US from Russia (possibly from the Russian Far East nuclear facilities). The first was in March 1995, when US customs agents in Miami launched a two-year undercover operation reaching into high-level official circles in Russia, Bulgaria, and Lithuania (among the names was the former Russian Minister of Defense Pavel Grachev). The operation was successful and the US was able to arrest several nuclear smugglers from Russia and the former Soviet Union.[21] Another way

[20] *Osnovy Gosydarstvennoj Politiki v Oblasti Obespechenija Jadernoj I Rediocionnoj Bezopasnosti Rossijskoj Federacii na period do 2010 I dalnejshyjy perspektivy*, Rossijskaja Gazeta Gosydarstvo, (2004), http://www.rg.ru/2004/04/07/radbezopasnost-dok.html (accessed 10.01.2009)

[21] Miami, *A Nuclear Smuggling Scenario, Russian Roullette*: http://www.pbs.org/wgbh/pages/frontline/shows/russia/scenario/ (accessed 10.01.09)

smuggling activity is addressed by the US, EU, and other stakeholders such as Australia, South Korea, and New Zealand, is cooperation with the "newly Western" post-Soviet allies such as Georgia and Ukraine. Both countries are "donors and recipients" of smuggled nuclear and radioactive materials. On Feb. 27, 2009, for example, the US ambassador to Georgia and the deputy ministers of the Georgian Ministry of Foreign Affairs, together with other ministers in Georgia signed the "Addendum to the Joint Document of US and Georgian Delegations on Georgia's Priority Needs to Improve Its Capabilities to Combat Nuclear Smuggling." The Addendum addresses the degradation of Georgia's anti-nuclear smuggling capabilities resulting from the August 2008 Russian-Georgian conflict and additional needs that became apparent since the original joint action plan was signed Feb. 2, 2007. With this new agreement, the Georgian government commits to improve its anti-nuclear smuggling capabilities, particularly on the Russian-Georgian border and the US government agrees to fund or seek foreign funding for an expanded list of assistance projects to support Georgia's anti-smuggling efforts.[22] European Union countries also have been actively involved in dealing with nuclear smuggling in the post-Soviet territories. On December 2009, the Nuclear Forensics and Law Enforcement Awareness Workshop in Karlsruhe, Germany took place. The primary purpose of the workshop, which was co-sponsored by the US Department of State, the European Union's Institute of Transuranium Elements, and the International Science and Technology Center, was to identify assistance projects to improve national responses to illicit uses of nuclear or radiological materials. More than 70 law enforcement and scientific experts from Armenia, Azerbaijan, Georgia, Russia, Tajikistan, Turkey, and the US[23] participated in the dialogue allowing countries to discuss their concerns related to nuclear trafficking off-the record and establish an atmosphere of respect and trust. Such cooperation with Russia's border states allows Western countries to address the problems of nuclear security in Russia and at the same time avoid direct involvement with the Russian government.

The problem of smuggling nuclear and radioactive materials and corruption is closely tied to the lack of nuclear information transparency particular to the Russian Far East nuclear complex due to the region's distance from Moscow. Nuclear information transparency is a sensitive issue and is considered a national security priority. A Cold War mentality and political differences between Russia and the US often contribute to the complexity of the problem which must be dealt with quickly to restrain competition, prevent the release of information that can put global security at risk, conceal violations of law, inefficiency, and corruption, as well as prevent any risk of accidental use of WMD.[24] Such secrecy is understandable however. It is crucial for national defense as it provides uncertainty regarding capabilities and intentions (as in the Cold War), uncertainty of arsenals for deterrence, uncertainty of locations to maintain second-strike

[22] *Republic of Georgia Signs Ammendum to Joint Action Plan*, NSOI (Nuclear Smuggling Outreach Initiative), http://www.nsoi-state.net/ (accessed 10.19.09)
[23] *Successful Forensics Workshop*, NSOI (Nuclear Smuggling Outreach Initiative), http://www.nsoi-state.net/ (accessed 10.19.09)
[24] Several threats of accidental use are known to history. For example, in 1995 Norway launched a research rocket which activated the Russian command and control system because computers mistakenly classified the rocket as a combat missile. Reports indicate that Russia was on the brick of launching a "response" to the non-existing contact.

capabilities. Secrecy helps hide country's weaknesses and vulnerabilities. In fact, the problem of nuclear information transparency was already clear in 1969, after the Arms Control and Disarmament Agency (ACDA) together with US Atomic Energy Commission and the Department of Defense launched Project Cloud Gap to demonstrate "the destruction of nuclear weapons to make HEU available for transfer to peaceful nuclear energy under international safeguards, and to halt the production of weapon-usable nuclear materials." [25] The principle behind this first nuclear transparency experiment was to provide visual access to the dismantlement process; however, more than anything it highlighted the tension between obtaining a certain level of confidence that the weapons were properly destroyed and a protection of sensitive information. This main finding still dominates efforts to design effective monitoring arrangements.

In Russia, as well as in other countries such as China and Israel, nuclear secrecy is also associated with privileges, status, helps set international political agendas, and preservation of autonomy in the decision-making process. With all the advantages an individual state has from keeping information on its nuclear capabilities classified, it is hard to convince it to do otherwise. Russia undertook (during Gorbachev's Perestroika and Yeltsin's era) a significant effort to increase information transparency mainly due to its commitment to global security issues.[26] In 1994 Yeltsin and Clinton took a first big step in creating transparency measures for Russian and US nuclear complexes by ensuring the "transparency and irreversibility" of nuclear weapon reductions through a bilateral working group. In 1995, however, Russia broke off the talks due to the US unwillingness to make its nuclear facilities available to Russia.[27] Although Russian and US laboratories have continued to interact on disarmament issues, information transparency was not possible. Since 1993, there have been several international agreements and initiatives that directly or indirectly deal with nuclear transparency among Nuclear Weapons States: Fissile Material Cut-off Treaty (FMCT), Russian-US HEU Agreement, 2000 Russia-US Plutonium Management and Disposition Agreement (PMDA), the Mayak Storage Facility Transparency Agreement,[28] Plutonium Production Reactor Agreement (PPRA),[29] among others. A Global Partnership Against the Spread of Weapons of Mass Destruction was launched in June 2002 by the G8 countries – France, the US, Germany, Canada, Britan, Italy, Japan, and Russia- which is committed to raising over $20 billion until 2012 to fund nonproliferation projects, particularly in Russia's closed cities. The Russian government's reaction to the Global Partnership initiative has been positive. Some Russian politicians however are critical of Putin's foreign policy, such as Communist Party leader Gennadiy Zyuganov and Leonid Ivashov, vice president

[25] A. Fisher, *Documents on Disarmament*, Conference on Disarmament, 6 March, 1966, p. 122

[26] US and U.K can be considered the most transparent states due to the PU production publications of both countries, compared to India, Pakistan, and Israel which are completely nontransparent

[27] Experts argue there are other reasons for Russia to break off any nuclear transparency talks, such as the US did not offer significant strategic and financial incentives or the historic legacy of tsarist and communist secrecy (as Mathew Bunn indicated in an interview for this project).

[28] This is analyzed in detail in the "Case Studies" chapter.

[29] Under the PPRA, states commit to stop producing plutonium and HEU for weapons. Russia continues to operate three plutonium-producing reactors on its facilities in Asian Russia (Seversk and Zeleznogosrk) as they supply heat and power to nearby developments. This agreement however has not yet been implemented.

of the Academy of Geopolitical Sciences, and criticized the G8 initiative as highlighting Russia's weakness, threatening to undermine Russia's defense capabilities, and preventing Russia from establishing itself as a counterweight to unilateralist US foreign policy. Others, however, praised the initiative and the formal recognition of Russia as a full member of the G8 as a victory for Putin.[30] It is important however to note that despite the existing international initiatives to increase global nuclear information transparency, no bilateral US–Russia efforts to negotiate a broad transparency regime for fissile materials and nuclear warheads are presently under way.[31]

A separate issue that is not characterized as a nontraditional security threat that weakens the security of nuclear and radioactive materials and facilities in Asian Russia is the rise of Islamic terrorism in Russia and Central Asian countries. After the Sept. 11 terrorist attacks shocked the world and showed the scope of the threat, various counter-terrorism efforts have been undertaken. Russia has faced an internal terrorism problem mainly because of two Chechen wars. After several terrorist attacks in Moscow and the Caucasus Region, Russia has implemented tough policies not only against suspected terrorists but also against Russia's Muslim population, making their lives hard by constant arrests and apartment searches. A legal basis for prosecuting terrorism has also been established. Another measure that specifically targeted distant regions in Russia was Putin's decision to end direct elections of governors for 89 regions. Instead, they are now appointed by the central government. This measure is somewhat effective as it helps Moscow monitor not only corruption, but also "clan solidarity" in Russia's Muslim republics. Another concern is the rise of extremism in Central Asian states (especially Tajikistan and Kyrgyzstan) which share large, mainly unprotected borders with Russia. Although most Central Asian states have close cooperation with the US in combating terrorism, these efforts seem to be less than effective due to close ties by regional groups to such large terrorist organizations like Al-Qaeda and Hamas as well as a "wave of rediscovering the past."[32] Other states in the region, particularly Turkmenistan, have adopted stringent control over all aspects of society which raises Western concerns over human rights, but on the other hand making it unlikely that Turkmenistan will become a terrorist safe haven. With some success in combating terrorism in Central Asia, the problem of extremism is on the rise mainly due to the support and influence of international terrorist organizations as well as some states like Iran and Pakistan.

Although Russian terrorist groups are not "enjoying" international support, extremism is still on the rise. The problem with internal counter-terrorism measures that Russia has implemented is that they are all short-term measures. There is even a risk that

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[30] NTI Research Library, http://www.nti.org/db/nisprofs/russia/forasst/intnatl/intnatl.htm#G8 (accessed 11.12.09)

[31] Interview with Mathew Bunn, Associate Professor at Harvard University's John F. Kennedy School of Government and a Co-principal Investigator of Project on Managing the Atom.

[32] Under Communism, Central Asian States were not allowed to practice Islam – communism was a religion for everybody under the Soviet Union. Due to that, local identities were "put aside," and in many cases forgotten. After the Collapse of the Soviet Union Central Asian States started the process of "rediscovering" their ancestors' believes and cultures which not only has allowed room for different interpretations of Koran, but also "welcomed" an outside influence, mainly by Islamic extremists that saw Central Asian states as a new recruitment and training platform.

Russia's counter-terrorism measures will trigger a further rise of extremism as they promote racism and sympathy for the Russian Muslim population among international terrorist groups. It is therefore crucial for the Russia's government to reconsider its counter-terrorism measures and focus on cultural integration and understanding among different nationalities living in Russia as well as establish a long-term counter-terrorism strategy.

Arguably, the main challenge to nuclear security and safety that should be addressed first is physical security of nuclear materials and facilities. Since 1990, a lot of work has been done by Russia in the field of securing nuclear and radioactive materials, particularly targeting physical security of the facilities. On Dec 27 2002, a federal law was passed that directly deals with technical regulations and standards for handling nuclear energy which includes the handling, development, and exploitation of nuclear weapons, and nuclear facilities of military and dual usage. It also includes a set of rules on handling nuclear waste.[33] It can be viewed as a first legislative attempt by the Russian government to make technical regulations a priority in the nuclear security and safety field. In 2007, the Russian government adopted a federal target program on Nuclear and Radiation Safety Insurance for 2008-2015.

In addition, the United States has contributed expertise and funding through programs conducted by the Department of Defense, the Department of Energy, and the State Department. Other countries such as Norway, Japan, Germany, France, and Canada have been funding programs for disarmament, nuclear security, waste management in the region. The first U.S-Russian project on reducing and securing nuclear materials and facilities was the Nunn-Lugar Program, officially known as the Cooperative Threat Reduction Program. It was set up in 1992 and targeted dismantlement of sizable parts of the former Soviet nuclear complex, particularly located in the Russian Far East chemical and biological arsenal and safeguards remaining weapons and material. Since this project was successfully launched, other countries realized the threat that a weak security and safety system for nuclear facilities poses to the national security and launched different aid programs in the Russian Far East. Canada for example, has funded upgrades to the Bolshoi Kamen-Smolyaninovo railway line for it to accommodate special trains transporting nuclear fuel from FEP Zvezda which will allow all spent nuclear fuel to be removed from the Far East Region.[34] France has been assisting Rosatom State Corporation in reprocessing the SNF and rebuilding a hot cell at PA Mayak for handling damaged SNF assemblies that are to be removed from navy bases in north-west and the Russian Far East. The Japan-Russian Cooperation Committee, funded by Japan, has worked on submarine dismantlement (the project was complete in April 2009) and is now

[33] *Ob Ystranenii Admenistrativnyh Barjerov I Povyshenii Effektivnosti Normativnogo Pravovogo Regylirovanija Bezopasnosti pri Ispolzovanii Atomnoj Energii dlja Obespechenija Razvitija Atomnoj Otrasli v Sovremennyh Yslovijah*, Rosatom Official Website, http://www.rosatom.ru/common/img/uploaded/for_PDF-news/Atomexpo/Agapov.Ob_ustranenii_administrativnykh_barerov_i_povyshenii_effektivnosti_normativnogo_pravovogo_regulirovaniya_bezopasnosti_pri_ispolzovanii_atomnoy_energii_dlya.ppt#258 (accessed 11.10.2009)

[34] *Primorskij Bolshoj Kamen Izbavljaetsja ot Radiocionnyh Othodov*, Rosatom, RosRao, http://rosrao.ru/press_center/news/branch/detail.php?ID=172 (accessed 11.13.2009)

working on arranging cooperation on on-shore long-term storage facility for reactor compartment units in Razboynik Bay. The U.S is planning to recover and dispose over 800 sealed radioactive sources with a total residual activity of over 150 kilocuries throughout Russia under the Orphan Source Recovery Project.[35]

A lot can be said about the positive role the international community. The Russian and NIS governments have played in efforts to secure and safeguard nuclear weapons and materials not only in Asian Russia but throughout the former Soviet territories. There is a lot more to be done, however. The amount of HEU remaining in Russian possession is still estimated at about 950 tons. The amount of weapons-grade plutonium is estimated at about 145 tons plus 45 tons of separated civilian plutonium as of 2007.[36] Russia is estimated at about 350 tons of HEU and 56 tons of weapon-grade plutonium in warheads (if an average warhead is about 25 kg of weapons-grade uranium and 4 kg of plutonium). Rosatom is also estimated to have a reserve amount of material (about 100 tons) for future use in naval reactors. It becomes harder every year for the international community to assist Russia with securing and safeguarding nuclear facilities due to changes in Russia's political course and national security objectives.

In order to describe the problem in its complexity and avoid generalizations, the next chapter looks at three different nuclear facilities in the Russian Far East: their main challenges and implications in respect to nuclear security. They were chosen to show the different level of cooperation between Russia and the international community as well as the dynamics of such cooperation. The first facility is the Mayak Production Association at Ozersk/Chelyabinsk, particularly the Fissile Material Storage Facility (FMSF) at Ozersk that the US helped Russia in building, but once the project was complete has not been allowed on its territory due to disagreements related to transparency measures. The second facility – Novosibirsk Chemical Concentrates Plant – stopped cooperation with the US some years ago due to changes in Russia's political agenda relates to national security as a whole. The facility has been the origin of smuggled HEU for the past number of years. The third facility is the Siberia Chemical Combine at Seversk/Tomsk-7, which is open to the US and IAEA experts. It is a huge facility that used to produce plutonium and manufacture HEU and plutonium weapon components and is now processing HEU under the terms of the HEU Purchase Agreement. After looking into facilities and challenges they face, the next chapter presents several recommendations for strengthening nuclear security measures targeting each facility based on their peculiarities and needs.

[35] The Global Partnership, Forth Annual Report, (2006) , http://www.fco.gov.uk/resources/en/pdf/global-partnership-06 (accessed 11.02.2009)

[36] *Communication received from the Russian Federation Concerning Its Policies Regarding the Management of Plutonium*, IAEA, Oct. 2008, INFCIRC/549/Add.9/10

Case Study (facilities, threats, responses, recommendations)

Mayak Production Association at Ozersk/Chelyabinsk-65 / the Fissile Material Storage Facility (FMSF) at Ozersk

Mayak Production Association is located in Ozersk/Chelyabinsk-65. It is the oldest Soviet-era nuclear material production facility. It has operated five tritium production reactors, several reprocessing plants, five plutonium production reactors, a plutonium metallurgy plant and supporting facilities. It is now the largest storage site for weapons-grade materials as well as for separated reactor-grade plutonium.

The facility does not produce weapons-grade fissile material any more: the plutonium production was shut down from 1987-1990. Although the information on major national storage sites in Russia is classified, there is evidence suggesting that Mayak is a major storage site for weapons-grade plutonium and highly-enriched uranium. Mayak remains a primary facility in Russia for large-scale manufacturing of plutonium and HEU components of nuclear weapons.

In 2003 the US helped Russia build a separate Fissile Material Storage Facility (FMSF) at Ozersk. After the facility was built, there was a dispute between Russia and the US on transparency measures which delayed the process of storage of fissile materials. In fact, the US and Russia continue to debate this issue: until the negotiations are complete, the US is not allowed on this site.[37]

The FMSF built in 2003 poses a large threat not only to the health of people working there and the environment, but also because of its "appeal" to terrorist organizations and hostile states. Mayak FMSF falls under Rosatom's (Russia's State Atomic Energy Corporation) jurisdiction. Whenever open sources try to raise the question of safety and security of this site, Rosatom gives the same-old argument and "strongly advises" journalists to only publish the information that is approved with Rosatom.

Several issues raise security concerns. First, why is such a large concentration of almost all plutonium and uranium stock, produced through the process of nuclear disarmament in Russia, stored on one site? Second, what exactly is the security system of the Fissile Material Storage Facility designed to protect against? Third, have all scenarios been taken into consideration when designing the security system?

The answer to the first question is mainly financial concerns – Mayak is the largest storage facility for fissile materials in the Soviet Union because Russia chose not to build other storage facilities and diversify locations where fissile materials are stored and avoid concentration in one place. In addition, the US assisted Russia in building FMSF in Mayak having its own strategic interests in the location of the facility (it is close to Europe, NIS and China as well as being the main link in the Russia's nuclear

[37] P. Podvig, *Consoludating Fissile Materials in Russia's Nuclear Complex*, International Panel on Fissile Materials, May 2009.

complex). A large concentration of weapons-grade plutonium and highly-enriched uranium in one storage unit goes against all international principals. In the US, for example, it is forbidden not only to concentrate such a large amount of radioactive material in one storage facility (it is spread in at least 10 different locations that are 1000 miles apart) but also have such a storage facility above the ground.

The second question is: What kind of threats does the security system of the Fissile Material Storage Facility in Mayak protect against? There are official Rosatom reports available in this regard, but they do not reflect present realities. Take two threats as an example: accidental or deliberate crash of an airplane on the facility and the launch of a missile or the explosion of a bomb. Rosatom reports indicate that the security system at the FMSF in Mayak provides protection against airplane crash with a mass of 20 tons and from the explosion of a bomb of up to 450 kg in caliber. But modern airplanes have a mass of 400 tons; 450 kg bombs are a legacy of World War II. The US could use enough GBU-28 to go through the roof of the FSMF and cause a nuclear explosion. The conclusion is obvious: the security system in place at the Fissile Material Storage Facility in Mayak is not adequate.

In 2001 the National Defense Council published "independent assessment" for the US nuclear planning process.[38] In chapter 4, detailed descriptions of major US attacks using land-based and sea-based strategic missiles on Russia's nuclear cities are given. Together with Sarov and Snezhinsk, two closed Russian nuclear cities that produce and develop nuclear weapons, Mayak's FMSF was the top priority target. Given the amount of fissile material stored at this site, the effects would be 6.5 times worse than the Chernobyl catastrophe: the territory that would be affected by radiation would be 20 million square km (the territory of the Russian Federation is 17 million square km). Depending on the direction and the speed of the wind, not only Russian but also the territories of Kazakhstan, Mongolia, China, Georgia and Ukraine would be affected by radiation. Rosatom is constantly publishing reports that no planes fly in this area without Russian government's approval. On Sept. 11 planes also flew with government's approval and it led to a catastrophe[39]

But even if we ignore the unlikely scenario of an "accidental" plane crash, it is important to notice here that compared to Moscow and regions close to it, territories south of Ural Mountains do not have any type of missile defense system (the air defense system that is in place is not up-to-date and does not reflect today's realities).[40]

If Rosatom was sure about the legitimacy of its security system at FSMF, at least some of its reports and briefings on these issues would have been open to the public, or at least to people who work at these facilities. They are not.

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[38] To view full report, see http://www.nrdc.org/nuclear/warplan/index.asp (accessed 09/21/09)

[39] A "conspiracy theory" in Russia argues that the US has built the Fissile Material Storage Facility to create a target in case there is a nuclear war with Russia: the US can now use FSMF in Mayak as a "bribe" in dealing with Russia by threatening to destroy it by launching a missile/plane.

[40] *Vedro s Plutoniem*, Russian site of nuclear disarmament, 2007, www.nuclearno.ru (accessed 09/23/09)

FMSF is unique: it does not have any technical, environmental, and military analogues. This "uniqueness" is not only described by the amount of fissile material stored there, but by the environmental and security threats and the level of "insecurity" from such threats.

Taking into consideration these threats, I recommend:

Locally:

1. Analyze the possibility of building an underground storage facility. Its underground nature will reduce the spread of radiation in case of an accident or an attack on the facility.
2. Build a "back-up" storage facility for short-term storage of fissile materials in case of emergency.

Regionally:

3. Build a modern missile defense system in the region and along Russia's borders with Kazakhstan, Mongolia, Georgia and China.

Internationally:

4. Involve all interested stakeholders that have an immediate interest in the security of FMSF in Mayak in information transparency measures, in building missile defense systems along their borders as well as putting radiation detectors along their borders with Russia in case of nuclear trafficking from this facility.

Novosibirsk Chemical Concentrates Plant[41]

Novosibirsk Chemical Concentrates Plant (*Novosibirskij Zavod Khimkonsentratov)* was established in 1949 to produce fuel elements for 13 plutonium production reactors located in Chelyabinsk-65, Tomsk-7 and Krasnoyarsk-26. It also used highly enriched uranium recovered from plutonium reactor fuel to make cores for tritium production reactors. It later used fuel pellets from Kazakhstan to produce fuel pins and assemblies for various reactors, but specialized in fuel for research reactors and VVER-1000s. Today the plant produces the fuel pellets for these assemblies.

Novosibirsk Chemical Concentrates Plant has won several international environmental and safety awards such as TUV-CERT Certificate of Management System and Environmental Protection in 2004. Also, together with the US Department of Energy a set of upgrades in the area of physical security of nuclear materials was completed in 2004: for every dollar Russian government spent on this project, the US spent $10 mil ($3 mil. from the Russian side vs. $7 mil. from the US). An upgraded security system can detect any sort of smuggling activity of nuclear materials and it gives the plant a defense capability against non-state actors seeking to steal nuclear material and/or sabotage of nuclear plants.

[41] Refer to the map on page 3

Nonetheless Novosibirsk Chemical Concentrates Plant, many unresolved issues that raise big concerns not only in the region but also on the global scale. First, since the U.S-Russian project on the plant's physical security was completed in 2004, the US has not been allowed on the facility mainly due to a change in the Russia's policies resulting from domestic politics and US – Russian tensions on major international issues such as Russia-Iran nuclear energy cooperation, Kosovo, the Russia-Georgia War, North Korea and others. Lab-to-lab cooperation between Russia and the US exists but it is neither a significant confidence-building measure nor does it allow the development of information transparency between the two countries, due to the fact that scientists cannot share "top-secret" information and sometimes cannot even discuss issues of concern. There are discussions of what sort of transparency will go along with disposition of excess plutonium, but they will not be resolved any time soon.

Another problem that the plant faces concerns operational and technical support of a newly established security system: the system requires constant updates and maintance and Russia does not have well-trained specialists to do this work. A failure to keep a system up-to-date and well-maintained results in system errors.

All of the above problems lead to an increase in the amount of incidents related to nuclear trafficking and the nuclear black market: In August 2001, for example, a group of workers employed by the plant was arrested for stealing 500 kg of zirconium tubing. The worst part of this case is the fact that the workers took the zirconium through the main entrance of the plant. And although the plant's administration insisted that stockpiles at the plant will be inventoried to determine if prior diversions of the material took place, no further information was given regarding such a check-up. The plant is also quite likely the source of HEU seized in Georgia in 2003 and 2006 although the origin of the seized material has not been confirmed by Rosatom.

There have been several confirmed security violations on the facility in 2001, for example, all of them a result of a "personnel factor", lack of management, and low performance discipline. Nothing has been done to change these factors since 2001.

Recommendations:

Locally:

1. Set a long-term goal of eliminating HEU from the Novosibirsk fuel fabrication plant as the most of the demand for HEU fuel from weapons will stop in 2010 after a shutdown of the last plutonium production reactor.
2. Allow IAEA specialists in the facility to perform upgrades on the MPC&A security equipment.
3. Enforce regular reports from the plant's management regarding inventories, incidents, as well the security system.

Internationally:

4. Establish workshops and seminars through IAEA to train Russian specialists to maintain and upgrade newly established security systems.
5. Reestablish US-Russia project on physical security of the facility that ended in 2004 through regulations on nuclear information transparency acceptable to both sides.[42]

Siberian Chemical Combine at Seversk/Tomsk-7 (SKhK)

The Siberian Chemical Combine at Seversk/Tomsk-7 SKhK has been a major fissile material production site of the Soviet Union since 1949 and it remains the largest nuclear facility in the world. It is located in Tomsk region, southeastern part of the western Siberian lowlands. At first, it produced plutonium and manufactured HEU and plutonium weapons components for national defense purposes.[43] It is now storing weapons-grade plutonium and uranium as well as producing plutonium pits and HEU components for nuclear weapons (to be resumed by 2014). The facility is also storing a weapons-grade plutonium oxide under the US-Russia Agreement on cessation of production of plutonium for weapons. The facility was holding 10 tons of plutonium as of summer 2008. It now consists of eight plants, a research and construction center as well as several other facilities. The SKhK exports some of its products to the US, Canada, Great Britain, France, Italy, Netherlands, Austria, Switzerland, Sweden, Germany, Sweden, Japan, South Korea, and China.[44] The export of enriched uranium hexafluoride continues to be the basic source of income for the SKhK. The volume of all exports produced by the SKhK increased from 1993-2001 by a factor of 10. Two contracts signed in 2001 with the South Korean firm KNHP to supply uranium hexafluoride to nuclear power plants in South Korea contributed to this growth. The facility is internationally recognized for its innovations and product quality. It is important to note however that although the facility is somewhat integrated into the international nuclear framework, it remains a closed city due to its radiological status.

The Siberian Chemical Combine is a good example of U.S-Russia cooperation on HEU processing, under the HEU Purchase Agreement. Under this agreement, 500 tons of HEU from dismantled Russian nuclear weapons is to be blended into low enriched uranium (LEU) by 2013. Processed HEU is then sold to the US as fuel for commercial nuclear power plants. Roughly 30 tons a year is processed in Russia and delivered to the US under the HEU Purchase Agreement. It can be considered the most successful Russia-US effort in security and dismantlement of nuclear warheads as it "destroys hundreds of tons weapons-usable material that could otherwise pose risks of proliferation or arms-reduction reversal, provides employment to thousands of Russian nuclear workers, and provides hundreds of millions of dollars a year to the hard-pressed Russian nuclear

[42] President Obama and President Medvedev are both committed to nonproliferation and this might create a rare window of opportunity to renegotiate projects on nuclear security such as the one performed at Novosibirsk Chemical Concentrates Plant until 2001.
[43] In 1953, the facility produced its first enriched uranium – 235.
[44] Some of the products offered by the facility for export: U-235 (5 percent), U-235 (20 percent), uranium enrichment services among others, http://www.seversknet.ru/organizations/chk/ (accessed 12.10.09)

complex all at very modest costs to the US taxpayer."[45] This agreement also encourages information transparency among two countries: the US observes many steps undertaken by Russia, and Russians are allowed to do the same on US facilities. US Department of Energy teams have regular visits to SKhK to monitor ongoing MPC&A improvements. Under the same program, physical protection enhancement activities are carried out at the facility.

The Siberian Chemical Combine has also joined the Nuclear Material Protection, Control, and Accounting Program (Laboratory-to-Laboratory MPC&A Program) in 1995. Based on this agreement, it started cooperation on portal monitors which later expanded to include equipping the entire plant with new portal monitors, particularly pedestrian radiation monitors, metal detectors as well as handheld radiation monitors. Although the MPC&A equipment was first delivered in 1996, until now there are scheduled visits to confirm that all this equipment has been installed as agreed.

The combine's administration is also taking nuclear security measures seriously and is putting a lot of effort into improving them. In March 2002, the Siberian Regional Center for Civil Defense, Emergencies and Disaster Control held a command-and-staff training exercise in Tomsk and Seversk to improve emergency response to possible accidents resulting from terrorist acts against nuclear facilities. The exercise scenario included a deliberate plane crash into the SKhK.

However, even with all the accomplishments, major issues that undermine not only the security the security of a region, but global security as a whole remain. First, although HEU Purchase Agreement has stimulated some information transparency, there is very little information available about plutonium from the plutonium production reactors at Seversk. Second, although the production of plutonium and manufacture of HEU and plutonium weapons components has reportedly been phased out, there is still a vast amount of nuclear material that requires much more security measures than are in place.

Recommendations:

1. Provide financial and operations support to the Siberian Regional Center for Civil Defense, Emergency and Disaster Control in their efforts to improve emergency response to possible accidents resulting from terrorist acts against nuclear facilities in SKhK.
2. Provide technical support to SKhK's management to properly install MPC&A equipment delivered in 1996 as well as establish control for proper usage of such equipment.
3. Negotiate a deal with Russian' officials on information transparency measures related to plutonium production reactors at Seversk.

[45] M. Bunn, *Reducing Excess Stockpiles, US-Russian HEU Purchase Agreement (2003)*, Nuclear Threat Initiative (NTI) Research Library, http://www.nti.org/e_research/cnwm/reducing/heudeal.asp (accessed 10.07.09)

21 Steps to Better Nuclear Security in Asian Russia

In 2009, Presidents Obama and Medvedev in various speeches emphasized the importance of nuclear disarmament not only to both countries but also to global security. These comments were met with the support and approval of a majority of world's population. The speeches stimulated a global debate and awareness of the importance of nonproliferation measures, including nuclear security measures. Obama has even been given Nobel Peace Prize for his emphasis on nonproliferation issues. Unfortunately however, there is only so much presidents can do. What is needed to start an effective process of global nuclear disarmament is a detailed agenda for each particular country regarding disarmament - a component that unfortunately countries with nuclear arsenals seem to be unable to agree upon. Without this, all the "nonproliferation and disarmament" speeches are just words.

This chapter presents 21 practical steps that address the problem of nuclear safety and security for the Russian Far East region which is essential to the non-proliferation measures in the region.

Locally and Regionally:

1. Establish IAEA training programs for the technical security systems (MPC&A) to Russian Far East plant managers and specialists.
2. Establish a 50 year plan of maintaining and upgrading MPC&A equipment focusing on Russian capabilities and scientists.
3. Minimize material transfers between nuclear facilities in the Russian Far East by reducing the weapon assembly and disassembly which requires circulation of weapon material from one site to another.
4. Establish the prototype of the DOE Nuclear Emergency Search Team (NEST) along the borders of Russia with China, Mongolia, Eastern European, and Central Asian states.
5. Establish an international institution that will control the safeguarding and security of nuclear facilities in the Russian Far East. There are about 100 facilities in the Former Soviet Union (FSU), most of which are in Russia, that produce and store nuclear arms and conduct research. These facilities are owned and managed by different governmental authorities and institutions such as the Russian Ministry of Defense, the Russian Navy, the Ministry of Atomic Energy (MinAtom), Kurchatov Institute and some others. The variety of owners and managers creates a decentralized and non-transparent system that has proved to be ineffective.
6. Establish a Center for Management and Control of Nuclear Facilities. This center would ideally be an international institution where members of the UN Security Council would send their experts and observes to help Russia safeguard and secure its nuclear facilities, offer expertise, and establish a transparent system of information sharing.

7. Convert civilian research reactors and isotope production facilities from the use of HEU fuel that can be used for WMD to LEU fuel.
8. Establish annual IAEA workshops in the region on physical protection of nuclear material and nuclear facilities. A prototype of such workshops has recently been established by the National Nuclear Security Administration (NNSA) as a part of a series held between the US and Russia pursuant to the goals of the Joint Statement on Nuclear Security by President Obama and President Medvedev in July 2009. Such workshops involve other countries such as Great Britain and France. "This workshop is an example of the high level of cooperation between our nations as we work together to prevent the spread of nuclear weapons and to keep these weapons out of the hands of terrorists," said Brad Peterson, NNSA's Chief of Defense Nuclear Security.[46] Countries exchange best practices in mitigating the insider threat, vulnerability analysis tools, testing, and physical protection. But NNSA international workshops usually take place in Paris, Geneva, or other Western European states, which limits the access of such for Russian Far East nuclear experts and plant managers. Therefore, the same approach should be adapted on the regional level. The IAEA should move its workshops closer to facilities such as the Mayak Fissile Material Storage facility and the Siberian Chemical Combine. This will first be a step toward building trust and transparency among facilities and countries, creating an opportunity for larger participation on the Russian part, as well providing training "on the ground with real problems."
9. Make nuclear facilities in the Russian Far East more accessible to attract foreign private investors, while respecting Russia's national security interests. The most effective way to do that is to promote Western NGOs investment in Russia's nuclear security measures without governmental involvement to avoid political concerns.

Regionally and Internationally:

10. Transition from a US-Russian cooperative program to a Russian-directed and Russian-funded fully indigenized program that will ensure the security of 600 tons of weapon-usable nuclear material at a level of international acceptability. Overcoming these obstacles requires an increased political commitment at a number of levels of the Russian government to modern material protection, control, and accounting systems (MPC&A).
11. Establish a 10-year indigenization fund of about $500 million provided by Russia and its G-8 partners as a new mechanism for gradually shifting the financial burden of MPC&A to the Russian government. Some of the money can come from $1.6 billion that President Obama requested after the 2010 Nuclear Security Summit as US assistance to countries like

[46] *Nuclear Security Focus of U.S, Russia and the U.K.,* National Nuclear Security Administration, DOE (2009), http://nnsa.energy.gov/2657.htm (accessed 10.16.09)

Russia and Pakistan in their efforts to secure vulnerable materials and facilities.

12. Strengthen and expand PSI activities in Russia on the regional level by strengthening local legal authorities. Although Russia joined PSI in May 2004, and has been ever committed to reducing the risk of unconventional weapons proliferation, the geo-political structure of the country does not allow PSI activities to function on their full capacity. The Russian Far East is distant from Moscow and has "autonomy"[47] in the decision-making process. Therefore in order for the PSI activities to be effective in the regions of the Russian Far East they need to be "tailored" to political, cultural, and economic features of the region. First, the NGO structure is poorly developed. Therefore, the PSI activities should be conducted through governmental organizations with a possible control from a group of international observers. Because unconventional weapons proliferation is a high concern for Russia, Moscow won't resist letting international observers evaluate its commitment to PSI activities. In fact, due to the global economic crises and the reduction in oil prices, Russia does not have a good financial base to support PSI activities and therefore will welcome help. Second, because of the distance from Moscow, Russian Far East is "on its own": the more effective way to conduct PSI activities is to get Beijing involved as it shares a large border with the regions, has security interests in the issues of nuclear trafficking, and arguably has more authority over decision-making processes. In addition, by getting Beijing involved in joint PSI activities on the China-Russia border and the territories of the Russian Far East, it will lead to confidence and trust-building among the two countries which will resolve the growing tensions on the Russian-Chinese border. Third, due to corruption in the region, funds for PSI activities should be carefully monitored. There should be a physical evaluation of funds spent by either international groups of observers or Moscow's experts.
13. Strengthen Russia's operational and political capabilities to deter, detect, defeat, and respond to different kinds of terrorist activity through multilateral collaboration such as ASEAN+Russia Forum.
14. Establish the prototype of DOE Nuclear Emergency Search Team (NEST) along the borders of Russia with China, Mongolia, Eastern European, and Central Asian states.
15. Promotion of Academic Programs and Staff Training programs on nuclear safety and security (perhaps through the IAEA)
16. "Update" Clinton proposal for an Expanded Threat Reduction Initiative (ETRI) and increase the funding. This should be seen as one of the most effective investments in US national security. President Clinton proposed the ETRI in January 1999, which significantly increased funding for

[47] "Autonomy" has not been officially granted to the Russian Far East regions by Moscow, but historically it has been established as a result of distance from the center.

cooperation with Russia, Ukraine, and other NIS to prevent proliferation of weapons of mass destruction and the materials to make them focus mainly on nuclear security (deactivating and dismantling former Soviet strategic weapons and ensuring the security of Russian nuclear materials). There is concern over cuts in the US budget regarding this initiative which proved to be one of the most effective and well-recognized tools in dealing with nuclear security in NIS. In addition, although the US administration has been urging other nations to increase NIS security assistance, not much has been done.

17. Indirectly involve Central Asian states and China through the Shanghai Cooperation Organization in cooperation with Russia on safeguarding nuclear materials and efforts on tracking nuclear trafficking (it will be more effective than western based governments and organizations to assist Russia with this effort).

18. Establish a campaign "Nuclear Black Market as a Global Challenge." This campaign should argue that Russia is not the only country with a problem with black market. The problem of a nuclear black market is a global challenge. Smuggled weapon can come from any part of the world. There is also a rise in demand for illegal nuclear weapons: not only states but also nonstate actors, motivated by religious, ideological, economic and/or political views, are actively seeking to buy nuclear weapons and/or materials. This campaign will first address Russian sensitivity over the idea that the world "blames" it for the problem of a nuclear black market, which will then lead to better international cooperation on nuclear security. Second, the campaign will raise public awareness of the scope of the problem and the importance of it. A specific "Action Plan" should be developed regarding steps to take if somebody sees a suspicious activity or has information regarding nuclear contraband as well as a "Reward Fund."

19. Encourage private sector involvement on a science-to-science basis. A science-to-science approach is the most effective in building trust and understanding among nuclear "elites" of different countries. Unfortunately, politics frequently gets between scientists which makes it harder to them to cooperate. Therefore, the more science-to-science programs are established with as little governmental involvement as possible, the more effective it is for information transparency and trust-building measures.

20. Educate private sector companies about corruption in Russia and how to deal with it. Establish workshops among private companies with experience in working with Russia's nuclear complex and "new-comers" to share experience, and "lessons learned" activities as well as overcome the myth of "Russian corruption" and face the reality of the problem.

21. Launch media campaigns to promote awareness of nuclear safety and security particularly around nuclear facilities. The focus of such campaigns should be on local issues not broad, general problems of the

nuclear complex. Also, the problem of "cultural dynamics" should be addressed in such public campaigns by showing which accidents and catastrophes could have been avoided by not relying on the cultural phenomena "*Avos*" (described in Chapter 3), by following rules and regulations as well as individual awareness and responsibility.

Conclusion

The threat posed by unregulated and unsecured nuclear facilities in the Russian Far East is real. The region's unstable and often corrupt political structure, Russia's limited information transparency and limited access to foreign aid and assistance, as well as rising Islamic extremism within the country and along its borders increase the vulnerability of already unsecure nuclear materials and facilities. Terrorist groups will not wait until international community decides to act. Unfortunately, there is a global tendency that unless something horrible happens, we do not believe that the threat is real.

About the Author

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