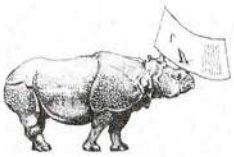
Routledge
Taylor & Francis Group



Dmitry Kovchegin

DEVELOPING NATIONAL REGULATIONS TO SUPPORT NUCLEAR SECURITY: LESSONS LEARNED FROM THE U.S. SUPPORT TO RUSSIA, UKRAINE, AND BELARUS

Development of national regulations supporting nuclear materials control and accounting and physical protection is an important part of the broader effort to ensure states' compliance with the requirements of United Nations Security Council Resolution 1540. This work is also promoted by the International Atomic Energy Agency, as well as within the framework of Nuclear Security Summits. Nuclear newcomers and states that have a less developed national nuclear security regulatory infrastructure often resort to foreign experience and/or international assistance to support development of their national regulations governing nuclear material control and accounting, and physical protection. While fundamental principles of nuclear security are universal, specific implementation that must be captured in national regulations and executed through national institutional infrastructure varies depending on the wide array of in-country environments.

Those involved in development of national regulations can learn several lessons from the experience of developing nuclear security regulations in Russia, Ukraine, and Belarus with U.S. support. First, the regulatory environment in each country is unique. Direct transfer of existing requirements and best practices from other countries (e.g. United States or Russia) or model requirements developed by the IAEA might lead to inability to achieve the desired nuclear security goals. Analysis of the local environment and practices and proper adjustment of model regulatory documents are critical. Second, actual regulation development constitutes formalization of accumulated best practices. Clear understanding of regulation content is critical before regulation development starts. Best practice exchanges involving both national authorities and nuclear facility operators play an important role in achieving this understanding. Third, it is impossible to regulate every aspect related to nuclear security. In general, a rather limited set of mandatory requirements supported by proper enforcement must be supplemented with sound management practices and an adequate nuclear security culture. The right balance would ensure that all critical requirements are met, yet give operators sufficient flexibility in their approach to compliance with mandatory requirements. This paper reviews experience in supporting development of nuclear regulations in Russia, Ukraine, and Belarus and outline strategies that can be used by states developing their national nuclear security regulations as well as states and organizations supporting them to enhance the regulatory development process.

INTRODUCTION

Regulations are key to reliable nuclear security. Regulations establish the goals for nuclear security activities, define the responsibilities of the entities and individuals involved, and provide guidance regarding implementation of the responsibilities. Regulations also capture existing best practices, ensure uniformity in their implementation, and provide criteria to evaluate performance and compliance.

ISSN 1993-4270 (print)/ISSN 2151-7495 (online) http://dx.doi.org/10.1080/19934270.2014.965967

Development of national regulations supporting nuclear materials control and accounting and physical protection is an important part of the broader effort to ensure states' compliance with requirements of United Nations Security Council Resolution 1540, as well as other international regimes applicable to nuclear security, including the Convention on Physical Protection of Nuclear Material and IAEA Safeguards. Development of nuclear security regulation is promoted by the International Atomic Energy Agency, within the framework of Nuclear Security Summits, as well as other multilateral or bilateral cooperative efforts.

Nuclear newcomers, states that have less developed national nuclear security regulatory infrastructure, or states that have limited resources often resort to foreign experience and/or international assistance to support development of their national regulations governing nuclear material control and accounting and physical protection. There are multiple examples of international assistance efforts aimed at developing nuclear security regulations:

- The IAEA issues multiple recommendations that provide advice on the development of nuclear regulatory infrastructure as a whole, as well as model content for domestic nuclear security regulations. The most notable example is INFCIRC/225/Rev 5, "Nuclear Security Recommendations on Physical Protection of Nuclear Material and Nuclear Facilities."
- As part of its International Physical Protection Advisory Services the IAEA reviews the national nuclear security regulations of the host country, provides recommendations on improving them, and provides additional follow-up assistance, if requested by the host country.
- Since the 1990s the United States and other international donors have provided significant support to the Former Soviet Union states—Russia, Ukraine, and Belarus in particular—in developing national nuclear security regulations. This support has included financial assistance to pay for the work of experts involved in development of regulations, as well as subject matter expertise on issues related to the scope of regulations under development.

The U.S. regulatory development support to Russia, Ukraine, and Belarus has resulted in the enactment of several dozen regulations ranging from high-level requirements captured in laws, government decrees, federal norms, and rules through detailed technical guidelines providing implementation recommendations to nuclear security personnel at nuclear sites. Due to its scope, the U.S. regulatory development cooperation with Russia, Ukraine, and Belarus presents valuable experience and can provide multiple lessons to those beginning development of national nuclear security regulations.

REGULATORY ENVIRONMENT IN RUSSIA, UKRAINE, AND BELARUS

While fundamental principles of nuclear security are universal, specific implementation that must be captured in national regulations and executed through national institutional infrastructure varies depending on the wide array of in-country environments. For the purpose of this paper, it is important to understand regulatory environment in Russia, Ukraine, and Belarus that impacts development of nuclear security regulations. While all three countries have the legacy of the Soviet Union, they have their own specifics that explain differences in regulations development.

RUSSIA

Russia has inherited a vast nuclear industry from the Soviet Union. It includes:

- a nuclear weapons complex;
- a full range of nuclear fuel cycle enterprises from uranium mining through spent fuel reprocessing and disposition;
- several dozen nuclear power reactors;
- multiple nuclear research facilities;
- a nuclear-powered fleet, including icebreakers, nuclear powered civilian and navy surface ships, and nuclear submarines;

- intensive transportation of nuclear materials;
- a significant cadre of nuclear industry personnel with skills and experience comparable to those of other leading nuclear nations;
- supporting organizations, including R&D institutes, equipment manufacturing and construction enterprises, and others.

The inventory of nuclear materials in Russia includes several hundred tons of highly enriched uranium and weapons grade plutonium. From the standpoint of the regulatory system, it is worthwhile noting the following specifics:

- Russia inherited a significant regulatory basis from the Soviet Union. This regulatory basis does not always support nuclear security best practices. Changing available regulations requires significant time and effort. Changing implementation practices and providing operators with the capability to comply with new regulations require even greater time, effort, and resources.
- The availability of civilian and defense nuclear complexes results in two separate regulatory systems, including two independent nuclear regulatory bodies. There are regulations that apply to both civilian and defense nuclear industry applications and regulations that apply to only the civilian or defense part. Overall, civilian nuclear applications are better covered with necessary regulations, including nuclear security, than defense applications. For example, there is still no federal law governing the use of nuclear energy for defense purposes.
- Russia has a poor tradition of independent regulation. Independent nuclear regulatory body in Russia was created only in 1991. Rather than having strong federal legislation supported with regulations issued by an independent regulatory body, Russia has significant regulatory development authorities inherited by or delegated to agencies managing the use of nuclear applications, i.e. separation of regulator and operator is not always sufficient and may lead to a conflict of interest. The situation has gradually been changing since the early 1990s, but significant work is still to be done.
- Russian regulations are very prescription based rather than performance based. Under a performance-based system, security critical mandatory requirements would be established in federal legislation or by an independent regulator. Operators will then be given flexibility to choose their own way of ensuring compliance with mandatory regulations, while the regulator can issue voluntary recommendations supporting implementation. In the prescriptive-based system existing in Russia, mandatory requirements are often very detailed and prescribe even minor implementation details. Again, some changes have occurred in this area as well, but the situation is often complicated by the fact that operators are used to very detailed mandatory guidance and not prepared to bear significant responsibility for developing their own approach to ensure compliance.
- There are multiple agencies with functions related to nuclear security. This leads to the need to ensure interagency coordination in nuclear security activities.

As a nuclear weapon state Russia is exempt from multiple nuclear security related international obligations, such as IAEA safeguards, that impose certain requirements on and drive certain developments in national regulations.

UKRAINE

The Ukrainian nuclear industry is not as comprehensive as its Russian counterpart. Nevertheless, Ukraine has 15 operational nuclear power reactors, most of them commissioned when Ukraine was part of the Soviet Union, several nuclear research facilities, and significant supporting infrastructure. Until recently, Ukraine had a stock of highly enriched uranium that was removed from the country as part of the joint U.S.–Russian effort. Ukraine also has qualified personnel capable of supporting nuclear industry operation, including nuclear security.

While Ukraine also had inherited Soviet regulatory structures, due to the relatively smaller nuclear industry and absence of a defense component, it has greater flexibility in adjusting its regulations and implementation practices compared with Russia. Changes were also driven by the fact that Ukraine joined the Nonproliferation Treaty as a non-nuclear weapon state and

therefore has to accept IAEA safeguards and implement regulatory changes supporting compliance with safeguards obligations. Interagency coordination in Ukraine is also easier as the number of agencies involved is smaller than in Russia.

BELARUS

There is only one nuclear facility that was built during the Soviet time—a research nuclear reactor that uses highly enriched uranium (HEU). An effort was made to remove HEU from Belarus but this has not been successful so far due to disagreements between the United States and Belarus. Another nuclear facility—a nuclear power plant—is now under construction with Russian support. Commissioning of the first reactor is expected in 2018 and the second in 2020. An independent nuclear regulatory body exists in Belarus as a department within the Ministry of Emergency Situation, which also has multiple other functions not related to nuclear safety and security regulation. Until recently, this regulatory body was understaffed, with only one staff member having physical protection and nuclear materials control and accounting as part of his daily responsibilities. Construction of the nuclear power plant resulted in positive development, including an increase in regulatory staffing, but significant effort still needs to be made to provide appropriate support.

Adequate nuclear security regulations had been almost non-existent in Belarus until the U.S. regulatory development support began. This support resulted in the development of several fundamental regulations governing physical protection and nuclear materials control and accounting. Belarus is also a non-nuclear weapon party to the Non-Proliferation Treaty and has a safeguards agreement with the IAEA that is supported by several national regulations.

LESSONS LEARNED FROM REGULATORY DEVELOPMENT COOPERATION IN RUSSIA, UKRAINE, AND BELARUS

While there are still some gaps in regulatory coverage of nuclear security in Russia, Ukraine, and especially Belarus, the cooperation has been mostly successful and has resulted in the development of much needed regulations. This cooperation had to overcome multiple obstacles and provide valuable lessons to those beginning development of their national nuclear security regulations.

UNDERSTANDING THE REGULATORY AND OPERATIONAL ENVIRONMENT

While fundamental principles of nuclear security are universal, specific implementation that must be captured in national regulations and executed through a national institutional infrastructure varies depending on the wide array of in-country environments. The regulatory and operational environment in each country is unique. Direct transfer of existing requirements and best practices from other countries (e.g. the United States or Russia) or model requirements developed by IAEA might lead to inability to enact the necessary regulations and achieve desired nuclear security goals. Analysis of the local environment and practices and proper adjustment of model regulatory documents are critical.

The U.S. regulatory development support in Russia failed to achieve an appropriate enactment rate of the developed regulations. Multiple regulations were developed, but not properly enacted to become mandatory for operators. Changes were made to cooperation implementation to take into account specifics available in Russia which led to the enactment of all but a few regulations that were developed within cooperation.[1]

The following are examples of regulatory and operational environment factors that significantly impacted implementation of regulatory cooperation in Russia:

- The Law on Technical Regulation that was enacted in late 2002 significantly changed requirements to the procedure of establishing mandatory requirements in multiple areas, including physical protection and nuclear materials accounting and control. Implementation of cooperation was adjusted and significant attention is given to the regulatory authority of the organization developing specific regulation and regulation content to ensure compliance with the requirements of the Law on Technical

Regulation. This situation was complicated by the fact that multiple substantive amendments were introduced to the Law after its enactment.

- The regulatory authorities of Rostechnadzor—Russia's nuclear regulatory body participating in cooperation—were changed several times. At some point Rostechnadzor was placed under the Ministry of Natural Resources and Environment and its authority to enact federal norms and rules—the highest level of mandatory nuclear regulation—was transferred to the Ministry as well. This affected cooperation, as Rostechnadzor was still in charge of developing regulations, but had to submit them to the Ministry for enactment. Later the situation was reversed and the Rostechnadzor authority was restored.
- Enactment of high-level Russian regulations requires reconciliation with multiple agencies, including those that are not directly related to nuclear security and not involved in cooperation. Reconciliation of two high-level documents in the area of PP and MC&A—"Rules of Physical Protection of Nuclear Materials, Nuclear Facilities, and Nuclear Material Storage Sites" approved by the Government Decree and Federal Norms and Rules "Basic Rules of Accounting and Control of Nuclear Materials"—took more than a year after the final drafts were developed.
- Armed guards at most nuclear sites in Russia, Ukraine, and Belarus are provided by Internal Troops of the Ministries of Internal Affairs (MVD IT) of the respective countries, not by private pro-force contractors as in the United States. MVD IT is independent from the operator and managed by a separate government agency. As an essentially military organization, MVD IT has a different mode of operation, approaches, organization of its activity, and personnel training. Requirements for the physical protection of nuclear sites must be reconciled with the MVD at the level of regulations applicable to all sites and with the specific MVD IT unit related to the organization of protection at a specific nuclear site.

DEVELOP CAPABILITIES BEFORE ESTABLISHING REGULATORY REQUIREMENTS

Operators need to be capable of complying with established requirements. If requirement is established without operators being capable of such compliance, then either the requirement would not work in the case of loose enforcement or operators would have to stop their activity due to inability to comply with an established mandatory requirement. Necessary capabilities may include additional personnel or new skills for available personnel, resources to modify facilities and upgrade equipment, and time to adjust operations to new requirements.

In a natural way, if something new is introduced, it passes through stages from innovation to best practice and the widely acceptable practice captured in a voluntary standard, and finally the mandatory requirement captured in regulation. When regulation establishing a mandatory requirement is developed with foreign support, it is often the case that the donor has significant experience in implementing this requirement, while the recipient has insufficient capability to ensure compliance.

In this case, it is important to accompany development of regulation with development of appropriate compliance capabilities. Examples from the regulatory cooperation with Russia, Ukraine, and Belarus listed below support this point:

- Russia's Basic Rules of Accounting and Control of Nuclear Materials were first introduced in the late 1990s and then revised twice, in 2006 and 2012. Each following revision saw an increased strength of requirements. This was due to the fact that Russia's nuclear facilities capabilities of complying with new requirements grew over time. The work on developing this regulation was complemented by activities aimed at developing capabilities to comply with it, including personnel training, equipment supplies, site upgrades, measurement methodologies development, and so on. On the other hand, certain requirements were not introduced in the latest revision and were postponed for future consideration due to the inability of a large share of Russian nuclear sites to comply with them. We can observe a similar pattern with other regulations as well.
- Training on vulnerability analysis delivered to Belorussian nuclear security personnel proceeded to the development of Belarus national regulation on vulnerability analysis.

A clear understanding of regulation content is critical before regulation development starts. Best practice exchanges and training activities involving both national authorities and nuclear facility operators play an important role in achieving this understanding and should become a key part of international nuclear security assistance. In their own turn, national stakeholders should consider development of capabilities to comply with nuclear security requirements as their highest priority.

DO NOT OVERREGULATE

As discussed above, different countries have different regulatory cultures. Some countries issue very detailed regulations that prescribe even minor details for implementing regulated activities. Other countries establish more general mandatory requirements covering safety and security-related issues, while allowing operators significant flexibility in ensuring compliance. In any case, it is impossible to regulate every aspect related to nuclear security.

In Russia a relatively limited set of documents establishing mandatory requirements for physical protection and nuclear materials control and accounting has been developed. The majority of documents constitute so-called "methodological recommendations" or "safety guidelines."

These are non-mandatory documents outlining one of the ways to ensure compliance with mandatory requirements. When the agency that issued these non-mandatory document inspects compliance with mandatory requirements it considers them as a preferable method of compliance, meaning that a site that uses this method is automatically considered to be in compliance. This does not mean that the site is not allowed to choose its own method. However, it needs to provide justification supporting the fact that an alternative approach also ensures compliance with mandatory requirements. Within this framework, most of the smaller sites in Russia use approaches established in methodological recommendations. Larger sites that have sufficient capability often choose their own approach and justify it to the controlling authority.

On the other hand, in countries that are new to modern nuclear security practices the level of nuclear security culture might be low and mandatory requirements would be the only way to ensure achievement of nuclear security goals.

In general, a rather limited set of mandatory requirements supported by proper enforcement must be supplemented with sound management practices and an adequate nuclear security culture to ensure achievement of nuclear security goals.

CONCLUSIONS

Experience of regulatory development cooperation in Russia, Ukraine, and Belarus provides multiple valuable lessons to those beginning development of their national nuclear security regulations and the international parties supporting them. This paper has reviewed the experience of cooperation and identified lessons learned.

- First, the regulatory environment in each country is unique. Direct transfer of existing requirements and best practices from other countries (e.g. the United States or Russia) or model requirements developed by the IAEA might lead to inability to achieve the desired nuclear security goals. Analysis of the local environment and practices and proper adjustment of model regulatory documents are critical.
- Second, actual regulation development constitutes formalization of accumulated best practices. Clear understanding of regulation content is critical before regulation development starts. Best practice exchanges involving both national authorities and nuclear facility operators play an important role in achieving this understanding.
- Third, it is impossible to regulate every aspect related to nuclear security. In general, a rather limited set of mandatory requirements supported by proper enforcement must be supplemented with sound management practices and adequate nuclear security culture. The right balance would ensure that all critical requirements are met, yet would give operators sufficient flexibility in their approach to compliance with mandatory requirements.

The following recommendations to those starting development of national nuclear security regulations either independently using international recommendations, such as IAEA's recommendations on physical protection, or with foreign assistance can be made based on identified lessons:

- ❑ Analyze the regulatory environment and identify stakeholders and procedures critical for successful development of a regulation. Based on the results of analysis, develop a road map for regulation development and follow it during development of regulations. In addition to nuclear security experts involve local legal experts from the early stages.
- ❑ When transferring nuclear security best practices, do not insist on copying them. Instead, capture the nuclear security goals to be achieved, analyze the local practices contributing to the achievement of these goals, and adjust best practices to ensure buy-in of the local stakeholders and personnel.
- ❑ Ensure that national stakeholders have sufficient capabilities to comply with newly established regulatory requirements. If capabilities are not sufficient, start the capabilities development effort before or at least no later than actual regulation development. Capability development may include personnel training, best practices exchange, equipment supplies, site upgrades, etc.
- ❑ Do not try to regulate everything up to the minor implementation details. Proceed from a performance-based approach to ensure a balanced mix of nuclear security critical mandatory requirements, supporting implementation guidelines, sound management practices, and a nuclear security culture.

NOTE

[1] Gregory Davis, Lawrence Livermore National Laboratory, Lorilee Brownell, DOE, M. Cunningham, Pacific Northwest National Laboratory, J. Tuttle, Pacific Northwest National Laboratory, T. Wright, Pacific Northwest National Laboratory, P. O'Brien, Gregg Services, "Creating a Comprehensive, Efficient, and Sustainable Nuclear Regulatory Structure: A Process Report from the U.S. Department of Energy's Material Protection, Control and Accounting Program," paper presented to the INMM Annual Meeting, 2006.