Bellona Working Paper

THE MOST EXPENSIVE PROGRAM: How to rescue Russia from its nuclear past

"Nuclear and Radiation Safety in 2008 and for the Period through 2015" (Federal Target Program for Nuclear and Radiation Safety for 2008 through 2015)

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List of abbreviations and acronyms

FTP Federal Target Program
LRW Liquid Radioactive Waste
NPP Nuclear Power Plant
NRS Nuclear and Radiation Safety
Rosatom Russian State Corporation for Atomic Energy (name retained as of end 2009 by Russia's top nuclear authority, former Ministry of Atomic Energy, also, formerly, Federal Agency for Atomic Energy)
RTG Radioisotope Thermoelectric Generator
SNF Spent Nuclear Fuel
SRW Solid Radioactive Waste
USARSCS Unified State Automated Radiological Situation Control System

Notes on the English version of this report

In accordance with what is common Russian practice, some of the names cited in the original report (including the list of sources used) are not given as full names, but rather as last names preceded by initials standing for the first name and the patronymic. With certain exceptions, they are rendered as such in the English translation as well, using standard transliteration rules.

Letter-digit combinations used for designating government documents, regulations, instructions and such have likewise been rendered into English using common transliteration rules.

Footnotes have been provided by the translator for clarifications on organizations, industry-related sites and facilities, as well as certain phenomena that are specific to the Russian nuclear industry and that the English-language reader may be less familiar with.

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Introduction

One of Rosatom's main principles of nuclear and radiation safety is separating its responsibility for the Soviet nuclear legacy from that of the state's.

(Decommissioning as a Priority Task for the NRS Complex, Ye. G. Kudryavtsev, I. I. Linge, presentation, June 2, 2009)

Background notes

The Federal Target Program "Nuclear and Radiation Safety in 2008 and for the Period through 2015" came into being at an exceptionally propitious time in world economy. The sheer stream of money that was pouring into the country, carrying with it enormous financial boons, seemed boundless, bottomless. Program developers had been set with a task to prepare for the government the most ambitious nuclear-related project in post-Soviet history. Admittedly, they almost succeeded in that, too. The result was a program that envisioned appropriating nearly RUR 150 billion in eight years – or an equivalent of $6.5 billion in exchange rates valid for that period. In effect, over $800 million in federal budget funds was to be earmarked each year to mitigate the consequences of the USSR's drive to advance its nuclear defense industry.

In expert estimates, comparable amounts – with all price adjustments taken into account – had been annually spent in the Soviet Union on nuclear technologies at the peak of industry development.

The main Appendix to the Federal Program, the one that contained item-by-item descriptions of expenditures suggested, was labeled "For Official Use Only" and, as such, was closed for public access. Because, as previous experience has proven, "classifying" financial documents is primarily done to facilitate unchecked spending of monetary funds, it was all too natural for the expert community to assume what begged no further clarifications: The funds were unlikely to make it to those sites on the ground that were actually doing the job ensuring nuclear and radiation safety of the Russian nuclear fuel cycle. The global economic crisis that hit soon after the Program was adopted, coupled with budget cuts that followed across the board in Russia, only served to exacerbate the experts' misgivings as to the feasibility of the Program's plans and the sincerity of its authors' intentions.

Yet, well into its second year, money is still flowing into the Program. One should note, however, that the results of the Program's first year in action have not been made available to the public. No information on the Program has appeared in the press. The official web site of the Program at http://www.fcp-radbez.ru/ offers nothing much beyond a number of highly generalized fact sheets stripped of any specific information on the works undertaken, costs derived, or results achieved. All of this impedes efforts to analyze the Program's progress and reinforces what doubts there may be as to how efficiently the financial resources are being put to use. It also challenges public control over the realization of a program that deals with an issue of great importance to society – enhancing nuclear and radiation safety in a country where the application of nuclear technologies and the spread of nuclear materials have been so pervasive.

The main goal of this report is to give a general review of the Program's expediency and the adequacy of funds to be allocated – a study that has to be done based on the information available. We will try to assess the likelihood that the Program will result in an improved state of nuclear and radiation safety in Russia. We will also attempt to examine to which extent the burden of responsibility for what is called collectively Russia's "nuclear legacy" (the term "historical radioactive waste" has been widely

associated with the issue) has been placed on federal and local budgets and which part of that responsibility has been recognized by Rosatom's commercial entities – enterprises which must pay out of their own profits for the decommissioning and disposal of radioactive waste generated as part of their operations.

Current situation and its challenges

The greatest predicament of the state of affairs with nuclear and radiation safety in Russia today is that any room for procrastination has by now been used up. Risks of serious incidents associated with the physical degradation of systems and elements they comprise, as well as the exhaustion of natural and engineered safety barriers created forty or more years ago, are growing drastically, which could lead to a significant rise in costs of works attempted to ensure environmental safety of such sites in the future (Malyshev et al., 2006).

A brief roster of problems accumulated – and as yet unattended to – in the sphere of nuclear and radiation safety in Russia to date includes:

- Lack of any strategic decisions on the part of the state regarding management of spent nuclear fuel and radioactive waste; absence of procedural or institutional instruments allowing for an economically efficient management of SNF and radioactive waste generated in the course of current economic activities;
- Deferred decommissioning of Rosatom's already shut-down sites of nuclear and radiation hazard (four NPP reactor blocks, ten industrial graphite-moderated reactors and over 110 other sites), as well as of around 50 shut-down sites under the purview of Rosprom[1], Rosmorrechflot[2], and other agencies. Maintaining safety of these sites in a shutdown mode incurs steadily increasing expenses.
- Temporary radioactive waste storage facilities, which are not designed to ensure guaranteed containment of radioactive waste and prevention of its contact with the surrounding environment for a period of at least several decades (over 1,170 of such storage facilities). Considerable upgrades are required on existing facilities, as well as the creation of new ones for complete containment of radioactive waste.
- Safety risks posed by enormous amounts of uncontained radioactive waste, such as at Techa Reservoir Cascade[3] and the catch basins and uranium tails[4] storage facilities of various nuclear fuel cycle enterprises. Managing these safety risks requires significant and continuous efforts and expenses.
- The over 18,500 tons of SNF accumulated in Russia. SNF and radioactive waste storage facilities are practically filled to capacity at NPPs operating reactors of the RBMK[5] and EGP-6[6] designs, which challenges further operation of these power plants.

[1] The Russian Federal Industry Agency. The agency has been defunct since May 2008, when its functions and responsibilities were delegated to the Ministry of Industry and Trade.
[2] The Russian Federal Agency for Sea and River Transport is part of the Russian Ministry of Transport and oversees the management of Russia's sea- and river-going fleet.
[3] The Techa Cascade is a waterworks complex managed by Mining and Chemical Combine Mayak, an SNF reprocessing plant located in Chelyabinsk Region in the Urals. The cascade is a – relatively – closed-loop system of four reservoirs that – along with Lake Karachai, also on Mayak's territory – have been for decades serving as a dumping spot for the radioactive waste generated by the plant. The town of Ozersk, where Mayak is situated, is infamous for being the most contaminated place on the planet. For more information, see, for instance, http://www.bellona.org/articles/articles_2007/Musymovo_resettle.
[4] Depleted uranium hexafluoride, also referred to as "hex" – is a by-product of uranium enrichment. In defiance of laws prohibiting the import of radioactive waste into the country, Russia has practiced, via contracts between Rosatom and various Western enrichment companies, importing uranium tails – to the tune of around 100,000 tons as of 2006 – seeing it as a source of valuable reprocessing material. Only a fraction of this waste has been reprocessed, however, with the remaining stockpiles stored in questionable conditions under the supervision of a number of chemical reprocessing enterprises across Russia. For more information, see Bellona coverage on the topic, for instance, at http://www.bellona.org/articles/articles_2008/tail_violations.
[5] Stands for "High Power Channel-type Reactor", a Soviet design of a graphite-moderated nuclear power reactor.

- Use of sources of ionizing radiation at more than 15,000 organizations of various forms of ownership and operating under the purview of a variety of state agencies. This increases significantly their vulnerability to terrorist attacks and stands contrary to the non-proliferation regime.
- Problems pertaining to remediation of areas affected by so-called "peaceful nuclear explosions" carried out for various applied purposes. No legislative, regulatory, or technological solutions have been provided to address these problems.
- Insufficient level of implementation of the requirements of nuclear and radiation safety conventions ratified by the Russian Federation (Malyshev et al., 2006).

In its reports and research papers, Bellona has consistently urged the public and those in charge of policy-making both in Russia and abroad to give the unaddressed issues of the Russian nuclear industry the attention they are due. In many cases, the pressing matters Bellona has focused the spotlight on do in fact find consideration on the part of decision-makers. This is why we deem it most important to remind Rosatom officials and anyone concerned with nuclear and radiation safety in Russia that the sacred cow of the Russian atomic industry – the so-called "reprocessing" of SNF and pursuing the closed nuclear fuel cycle – is a treacherous, dead-end enterprise. It is for many valid reasons that this practice is not found anywhere else in the world. Considering the dire situation at hand, we feel it is expedient that when implementing the Federal Target Program "Nuclear and Radiation Safety in 2008 and for the Period through 2015," relevant authorities concentrate their efforts on ensuring safety and security of the spent nuclear fuel and radioactive waste that Russia has stockpiled over the past decades. This calls for a more solid, better-defined concept of creating storage facilities, including on a regional level, for the long-term, well-monitored containment of spent nuclear fuel – something that will help achieve significant improvements in nuclear and radiation safety in Russia. It also requires renouncing all projects associated with SNF reprocessing currently envisioned by the Program.

[6] "Power Graphite-Moderated Steam Reactor," a model of a graphite-moderated boiling-water reactor for combined heat and power.

Chapter 1

1. CONTEMPORARY HISTORY OF NUCLEAR AND RADIATION SAFETY IN RUSSIA

1.1. Before 2000

In the years prior to 2000, the vast majority of measures aimed at enhancing nuclear and radiation safety at the enterprises of the Russian nuclear fuel cycle were of a declarative nature. What money was spent on these measures was mostly funds provided by sponsor states as part of international aid pledged to the goals of curtailing the threat of nuclear proliferation and eliminating the consequences of the nuclear arms race. The Russian Federation was ill-equipped to give nuclear and radiation safety projects sufficient financial support from its own budget.

1.2. Years 2000 to 2006

The first document that made financial provisions for nuclear and radiation safety assurance measures was the Federal Target Program "Nuclear and Radiation Safety in 2000 to 2006." A mandate to start designing the program was given in Instruction No. Pr-2214, of December 11, 1996, signed by former President Boris Yeltsin. More than three years later, on February 22, 2000, the government ratified the program with Decree No. 149. Later, a number of amendments were introduced into the Program by Government Decree No. 371 of June 10, 2005.

The Program envisioned "comprehensive solutions for the problem of ensuring nuclear and radiation safety in the country, aimed at reducing, until levels acceptable for society's well-being, the risk of radiation impact on humans and human habitat from sites of application of atomic energy and ionizing radiation sources, both man-made and natural."

This program set ambitious tasks before Russia, and clearing these objectives could have curbed significantly those radiation and environmental risks the country was dealing with, as well as improved dramatically the situation with nuclear and radiation safety. That, however, did not happen and many goals the government failed to accomplish at the time had to be left unfinished until another shot at them could be taken with the new program, the one developed for years 2008 through 2015.

Funds had started flowing into the original Program in 2001. Between 2001 and 2004, however, what money did come into the program did not cover more than 28 percent of the planned expenses. The funding allocated for nuclear and radiation safety assurance measures made up less than two percent of total funds that operating entities spent on these purposes out of their own budgets. With the expenses as they were, the program could have hardly impacted in any considerable way the level of safety of operations conducted at the time, nor could it have been enough to start working on solutions to the many problems of the nuclear legacy inherited from Soviet times (Malyshev et al., 2006).

Experts in the nuclear field point, however, to a number of positive achievements that the 2000-2006 NRS Program did bring about:

- Nuclear and radiation safety and security were maintained in the Russian Federation during the period that the 2000-2006 Program was being implemented;

- Acceptable operating limits were observed in the operation of reactors and other nuclear installations, as well as sources of radiation and storage facilities; normal safety levels were observed with regard to radiation exposure risks for personnel and the general population, as well as levels of acceptable radiation impact on the environment;
- Significant progress was made by the 2000-2006 Program with regard to assessing and analyzing nuclear and radiation safety issues, the results of which were fundamental to formulating "The main principles of state policy for the assurance of nuclear and radiation safety in the Russian Federation for the period until 2010 and beyond" – a strategy document signed by former President Vladimir Putin on December 4, 2003;
- The Program gave life to certain elements of a state-maintained system for radiation safety assurance, such as the radioactive materials and radioactive waste accounting system and the automated radiological monitoring and control system (Malyshev et al., 2006).

As such, the implementation of the NRS Program for 2000 to 2006 helped make some headway in approaching the general principles of ensuring nuclear and radiation safety in Russia. Yet, it did little to solve the many actual problems accumulated by decades of the nuclear arms race and failed to create conditions necessary to start tackling these problems efficiently in the future. Furthermore, as the Program was under way, the sheer number of these postponed problems continued to grow (Malyshev et al., 2006).

According to program description, the seven-year implementation of the Federal Target Program "Nuclear and Radiation Safety in 2000 to 2006" was to require a total of RUR 943 million in federal budget funds (RUR 1,496 million was actually allocated, including RUR 21 million in regional budget funds and around RUR 13 million in extra-budgetary money)[7]. Funding priority was given to research and development expenses – around RUR 650 million was planned to be spent on these purposes (RUR 942 million was, in fact, spent); capital expenditures and investment projects were to take another RUR 294 million (RUR 526 million was spent); and RUR 28 million was supposed to go into "other" expenses. It is hard to say with certainty how this money was actually spent as no project performance records or financial reports on the activities undertaken have been made available for public access.

Something apparently was being done to create the Unified State Automated Radiological Situation Control System (USARSCS). This system has been in the talks for many years now, but, judging by the various projections for its development, is yet to be built and become fully functional.

One of the promising results of the original Nuclear and Radiation Safety FTP, according to experts, was a policy document dubbed "The main principles of state policy for the assurance of nuclear and radiation safety in the Russian Federation for the period until 2010 and beyond," approved in December 2003. All programs related to the financing and operation of the Russian nuclear fuel cycle today are developed based on the principles of this document.

[7] Despite the stated lack of adequate financing, figures here show the funding allocated exceeded that which had been initially planned. Part of the discrepancy may stem from the fact that expenses were planned immediately after the infamous 1998 financial crisis, when the rouble tumbled some 70 percent against the dollar. What was seemingly compensated for by funding channeled into the Program after 2004, however, is still to be seen, overall, as underfinancing, when estimated in dollar terms (Vladislav Larin).

1.3. Year 2007

Following Presidential Instruction No. Pr-415, of March 16, 2006, and Government Instruction No. MF-P7-1136, of March 23, 2006, a document was developed under the title "List of Measures to Ensure Nuclear, Radiation, and Environmental Safety for 2007." That year, around RUR 2.5 billion in federal budget funds was allocated in accordance with this document for various purposes related to nuclear and radiation safety issues – an amount far exceeding any other previously earmarked for such activities. No report has been published on how exactly this money was spent, but spent it was.

It could be safely asserted that the money allocated was enough to develop the concept for the Federal Target Program "Nuclear and Radiation Safety in 2008 and for the Period through 2015" – the program this report examines in detail in the next chapters.

Information has also appeared that some of the money spent was used to finance a number of construction works at the site of a new dry storage facility for spent nuclear fuel at Zheleznogorsk Mining and Chemical Combine[8] in Krasnoyarsk Region in Central Siberia, but the exact scope of expenses incurred by these works is unknown.

[8] Officially, simply Mining and Chemical Combine or Krasnoyarsk Mining and Chemical Combine, a closed city formerly known as Krasnoyarsk-26. Prior to 1995, the enterprise specialized in weapons plutonium production. Main areas of operations include: storage and transportation of spent nuclear fuel, chemical reprocessing etc. For more information, see the enterprise's website at http://www.sibghk.ru (in Russian) or Bellona coverage at http://www.bellona.org/subjects/1140454732.79.

Chapter 2

2. Federal Target Program "Nuclear and Radiation Safety in 2008 and for the Period through 2015"

2.1. The target

It is the Program's concept, as devised by the authors, that it will attempt to find a comprehensive set of solutions for the problems posed by the need to ensure nuclear and radiation safety in the Russian Federation and associated with the following issues: management of spent nuclear fuel and radioactive waste; decommissioning sites of nuclear and radiation hazard; and improving those systems that are necessary to maintain nuclear and radiation safety.

This stated objective clearly shows that the new Program's concept has much in common with that of the old, supposedly "implemented" FTP, which was expected to tackle the issues in question in the years between 2000 and 2006.

The objective as it is formulated in the concept begs the conclusion that Rosatom anticipates if not working out a final solution for the problem of safe and "indefinite" storage of so-called "historical" radioactive waste, then, at least, creating conditions for the safe storage and reliable monitoring of, and sustained control over, nuclear and radioactive materials – irrespective of their nature or location.

This is an important statement since the sheer quantity of materials and sites targeted by the Program and the methods of storage or management represent a source of serious danger both from the point of view of safety, as a threat to population health and environmental well-being, and in terms of security, taking the risk of proliferation of fissile materials or of their falling into the wrong hands into account.

2.2. The goals

The following objectives are listed in NRS FTP for 2008 to 2015 as the main tasks set by the Program:

- providing practical solutions for problems associated with past operational activities, including:
    - decommissioning and liquidation of shut-down sites of nuclear and radiation hazard,
    - environmental remediation of territories affected by contamination with radioactive substances,
    - decommissioning of radiation installations that have outlived their design service periods and of exhausted sources of ionizing radiation;
- creating basic infrastructure sites for the management of spent nuclear fuel and radioactive waste, including construction and renovation of capacities intended for the storage, reprocessing, and transportation of spent nuclear fuel and radioactive waste;
- creating and improving systems designed to ensure and maintain control over nuclear and radiation safety both in the course of standard-mode operation and during accidents;
- enhancing measures of protection against radiation exposure for personnel, general population, and the environment, including measures to improve the medical and sanitary aspects of radiation safety assurance and creating up-to-date medical and hygiene technologies related to the field of radiation safety;

- providing support for the activities undertaken in the field of nuclear and radiation safety in such areas as research and development, organizational resources, and information and analysis.

Ever since 1992, items on the list above have been a commonplace mentioned in every program devised to enhance nuclear and radiation safety in the country. Those concrete measures and efforts that fall under the scope of the goals stated by the Program are something that has to be an ongoing activity running parallel to the implementation of another federal target program – "Development of the Atomic Energy Complex of the Russian Federation in 2008 through 2015."

At the same time, the nature and specific content of these goals remain hard to define and, furthermore, appear inconsistent. The general agenda includes, for instance, the intent to build infrastructure for the safe transportation and storage of spent nuclear fuel – which is a perfectly desirable goal from the point of view of nuclear and radiation safety assurance. However, mentioned in the very same sentence – specified, in fact, in the same comma-separated list – is the task of creating sites for SNF reprocessing. In other words, Rosatom experts contemplate continued reprocessing of spent nuclear fuel, which, in the opinion shared by independent experts and non-for-profit organizations working in the field, is exactly the source of generation and accumulation of new, additional stockpiles of fissile materials and radioactive waste.

By way of a sidenote:

Reprocessing of just one ton of spent nuclear fuel leads to the generation of an estimated 2,200 tons of radioactive waste with a combined radioactivity level of between 600,000 and 1 million curies, including:

- 45 cubic meters of high-level liquid radioactive waste – radioactivity levels of up to 10 curies per liter (450,000 curies);
- 150 cubic meters of medium-level liquid radioactive waste – radioactivity levels of up to 1 curie per liter (150,000 curies);
- 2,000 cubic meters of low-level liquid radioactive waste – radioactivity levels of below 10^{-5} curies per liter (20 curies);
- 1,000 kilograms of high-level solid radioactive waste;
- 3,000 kilograms of medium-level solid radioactive waste;
- 3,500 kilograms of low-level solid radioactive waste;
- 0.32 curies per year in gaseous radioactive waste (Larin, 2001; Kuznetsov, 2002).

No separate item, either in the Program's text or in its addenda, mentions the need to build additional infrastructure sites or facilities to store the radioactive waste generated during reprocessing of spent nuclear fuel.

One assumes from the above that the measures planned to create basic infrastructure sites to manage SNF and radioactive waste will be aimed at the construction and renovation of those capacities that will be used to store the newly generated waste – rather than the so-called "historical" waste. One of the fundamental goals of the Program may thus remain unaddressed.

Doubts arise, furthermore, with regard to what public control may be available over the implementation of FTP Nuclear and Radiation Safety 2008 to 2015. Experience gained over nearly a decade of attempts at cooperation with various agencies entrusted with providing research and development, information and analysis, and organizational support to the activities performed as part of nuclear and radiation assurance efforts in

Russia would testify to an almost impenetrable information lid kept over the nuclear industry, expert institutions, and administrative structures alike.

2.3. Target indicators

Among the main indicators that will serve as a set of yardsticks to measure the Program's success, program authors specify the following:

1. construction and renovation of SNF and radioactive waste management infrastructure, including:
    - putting into commission SNF storage capacities;
    - putting into commission storage capacities for radioactive waste;
2. decommissioning nuclear and radiation-hazard sites and remediation of territories, including:
    - inventorying sites of nuclear and radiation hazard;
    - preparing sites of nuclear and radiation hazard for decommissioning;
    - liquidation of sites of nuclear and radiation hazard;
    - accommodation of spent nuclear fuel in long-term repositories;
    - combined radioactivity levels of radioactive waste that has been rendered environmentally safe;
    - remediation of contaminated territories;
3. establishing and further developing the USARSCS, or Unified State Automated Radiological Situation Control System, on the territory of the Russian Federation, including:
    - establishing and further developing departmental USARSCS subsystems subject to relevant agency oversight on the territory of the Russian Federation;
    - establishing and further developing regional USARSCS subsystems subject to regional jurisdictions on the territory of the Russian Federation;
4. degree to which the main task of the Program has been accomplished.

Worthy of special attention here is the fact that the authors scoop together in one broad category measures aimed at developing SNF and radioactive waste infrastructure and liquidating old radiation-hazard sites – something that requires significant investments – and comparatively low-cost tasks, such as, for instance, taking inventory of existing sites of nuclear and radiation hazard. The latter has, in fact, been done previously as part of efforts to mitigate the consequences of the nuclear arms race in Russia. Since the less expensive activities rank among the first on the expected performance indicator list, the likely result may be that these works will be the ones to receive priority attention in terms of financing, while any real efforts to create the infrastructure needed to safeguard Russia's SNF and radioactive waste, as well as to rehabilitate environmentally affected territories, will end up being put on the back burner.

A conclusion can be safely made here that the above performance indicators, as suggested by the Program's authors, will fail to reflect in any reliable measure those quantitative values that could help assess the degree of accomplishment of the goals set – or give an adequate sense of the real scope of measures planned and the results they are expected to yield.

2.4. Implementation stages and time frames

The Federal Target Program "Nuclear and Radiation Safety in 2008 and for the Period through 2015" is planned to run in two stages:

- Stage One: Years 2008 to 2010
- Stage Two: Years 2011 to 2015

As far as dividing the eight-year implementation period into smaller time frames is concerned, the idea per se seems reasonable enough. One will take into account, especially, the unavoidable adjustments in financing – namely, funding cuts that should be anticipated both as a consequence of the current economic downturn and because of the exorbitant financial expectations stated in the Program. One fact begs attention, however, that has to do with the lack of any clear information as to why the stages were determined the way they were by program developers.

Certain questions arise in this respect, such as:

- Why exactly was the overall term of duration divided into these particular stages, which are uneven time-wise and in terms of expected funding?
- What were the criteria used to group planned activities in one implementation period or another (in other words, why would one set of works be planned for Stage One – which, as the authors' intention shows, would indicate their priority – while other works would be filed under Stage Two)?;
- Why is it that the implementation of, and providing financial support for, the measures envisioned by the Program are not outlined on a regional level, but are, rather, tied to contractor organizations?

The Program's description does not offer answers to these questions. Rosatom officials and experts likewise decline to give any comments, citing the "restricted-access" nature of information that relates to the Program's financial details.

That the program authors fail to provide any substantive rationale for why the Program's stages were devised in this particular way calls into doubt the notion that the measures proposed have been well thought out, adjusted both budget-wise and in terms of time frames, and, by extension, that they will be fulfilled according to plan. The division of the Program's running time into the two stages, as suggested by the authors, appears poorly justified.

2.5. Financing

The scope of funding claimed by the Program is well commensurate with the influx of money that Russia was benefiting from at the time the Program was being contemplated – much as it is with the clout nuclear lobbyists enjoy in the country. In sum total, this funding comes at RUR 145.32 billion (or $6.32 billion in 2007 exchange rates). In particular, this amount comprises:

1. RUR 131.82 billion in federal budget funds ($5.73 billion in 2007 exchange rates), including specific expenditures on:
    - research and development: RUR 10.89 billion ($0.47 billion in 2007 exchange rates);
    - capital investments: RUR 87.99 billion ($3.83 billion in 2007 exchange rates);
    - other expenses: RUR 32.94 billion ($1.43 billion in 2007 exchange rates);
2. **RUR 12.20 billion** in extra-budgetary funds **($0.53 billion in 2007 exchange rates)**;
3. **RUR 1.30 billion** in funds supplied out of local budgets (i.e. budgets of the relevant constituent entities of the Russian Federation) **($0.06 billion in 2007 exchange rates).**

Looking over the scale of funding implied, one should keep in mind that as long back as in 2001, Rosatom's Department for SNF and Radioactive Waste Management and Decommissioning of Nuclear and Radiation-Hazard Sites – at the time, it was a structure within what was then called the Ministry of Atomic Energy – prepared a paper entitled "Urgent problems related to nuclear and radiation safety in the constituent entities of the Russian Federation and costs of measures required to solve them."[9] The estimate the paper provided at the time for the total amount of expenses needed to address Russia's most pressing nuclear and radiation safety problems stood at over RUR 168 billion (or $5.8 billion in 2001 exchange rates).

The ministry's assessment was the result of taking stock of a great number of measures required in all and every region across the country. The only expenses the estimate did not include were:

- decommissioning and interment of exhausted sources of ionizing radiation;
- decommissioning and safe disposal of RTGs[10];
- building regional storage facilities for the safe disposal of radioactive waste.

This document is interesting not only for the assessment it offers of the overall costs of the required efforts, but also because of the focused attention it gives the listed measures as it provides specific geographical and financial information for each. By contrast, the 2008-2015 Nuclear and Radiation Safety Program's treatment of these issues is much more modest and far less detailed.

The "Urgent problems related to nuclear and radiation safety" only lists those practical measures that are absolutely necessary to address the most acute issues. At the same time, the Nuclear and Radiation Safety Program currently in effect suggests to dedicate only part of the funds it asks for to such practical efforts – around 60 percent. The remaining 40 percent is planned to be divided between research and development and "other costs." This means that out of that scope of works that were determined in 2001 to be of critical importance, only half, at best, has a chance to be realized by 2015. One should keep in mind that in the time that will have passed between 2001 and 2015, the sheer number of vital issues that have yet to be addressed has grown and will be growing larger. By 2015, there will still remain a considerable amount of work to do that the 2001 paper referred to as measures of "top priority."

There are thus grounds for serious concern that not only will the promised funding not be coming in full, but that the money that will in fact be disbursed will not be spent on the sites that should rightly take their place at the top of the agenda. Doubts remain as well that the funds claimed by the 2008-2015 Nuclear and Radiation Safety Program will at all be capable of bringing about the radical change in the situation with nuclear and radiation safety in Russia that the country so badly needs.

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[9] For the full list of specific items and expense estimates contained in that paper, see Addendum 4.

[10] RTGs, or radioisotope thermoelectric generators, are sources of self-contained power for various independent types of equipment with a steady voltage of 7 to 30 volts and the power capacity of a few watts up to 80 watts. The core of an RTG is a thermal energy source based on the radionuclide strontium 90 – also known as radioisotope heat source 90, or RHS-90. RTGs are used in conjunction with various electrotechnical devices that accumulate and transform the electric energy produced by the generators. Russia has around a thousand RTGs, which were used as power sources for lighthouses and navigation beacons, but have long exhausted their designed service periods and need to be dismantled. Bellona has warned that radioactive incidents involving these RTGs are possible, both because of the decrepit state of the old lighthouses and a risk of premeditated theft of radioactive strontium 90 that is contained in them. For more information, see, for instance http://www.bellona.org/english_import_area/international/russia/navy/northern_fleet/incidents/37598.

2.6. Anticipated results

This section of the Program is the most interesting one, since, though not excessively detailed, it still provides an idea of the extent of improvements that are hoped to be achieved. The results expected from the Program's seven-year operation can be divided into two groups – those that have precise quantitative indicators to measure the success of the works implied and those without such characteristics.

Results with precise quantitative and qualitative performance indicators:

- bringing into service a combined 44,000 tons' worth of SNF storage capacities;
- bringing into service a combined 165,000 cubic meters' worth of radioactive waste storage capacities;
- comprehensive examination of the technical and radiological condition of 270 sites of nuclear and radiation hazard;
- preparing for decommissioning 188 sites of nuclear and radiation hazard;
- liquidation of 42 shut-down sites of nuclear and radiation hazard;
- ensuring environmental safety of radioactive waste with a combined radioactivity level of up to $30 \cdot 10^{18}$ becquerels;
- environmental rehabilitation of 1,482,000 square meters of contaminated territories[11].

Results without precise quantitative and qualitative performance indicators:

- creating technologies and sites for the reprocessing of spent nuclear fuel and radioactive waste, including a pilot reprocessing center where such innovative technologies will be applied;
- offsetting both direct and indirect economic losses incurred by serious radiation accidents by preventing such accidents from happening;
- introducing technical upgrades at special-purpose first-response emergency units, including providing adequate medical equipment status and enhancing emergency preparedness;
- providing employment to the available high-skilled personnel (up to 10,000 people);
- compiling a database of initial data for the consequent development of locally based projects related to the environmental rehabilitation of the river Yenisei

As would be indicated by performance records of other Russian nuclear and radiation safety programs initiated in the past with federal budget funds to support them, the centerpiece of future project reports in this case is also likely to be those results that cannot be judged using precise quantitative or qualitative evaluations, as well as those measures that present a challenge in terms of financial assessment.

2.7. What will *not* be done

Despite the very impressive budget and the quite extensive implementation period set for the Nuclear and Radiation Safety Program, the majority of problems accumulated by the Russian nuclear fuel cycle to date has still fallen by the wayside of the Program's agenda and its financial ambitions.

As it stands, the Program finds no room for the creation of any sites of "terminal" storage of high-level radioactive waste or those stockpiles of spent nuclear fuel which,

[11] A list of exact locations is provided in Addendum 6.

due to their "defective"[12] status, cannot be reprocessed. This means that no ultimate disposal solution is planned for the high-level radioactive waste – which, as common sense would dictate, should include damaged SNF as well – at so-called "final disposal" sites. There are likewise no plans to develop a network of regional storage facilities for the accumulated medium- and low-level radioactive waste that is not subject to interment by Radon[13] and that is currently accommodated in temporary storage facilities. Nor does the Program envision the removal and burial at regional repository sites of the medium- and low-level radioactive waste that is currently stored at nuclear power plants and that is generated when reactor blocks are taken out of operation. Similarly, there are no plans that would see any NPP reactors go through the full decommissioning process, with the shut-down sites ultimately rendered safe enough to require no further oversight, nor any additional funding necessary for such oversight.

Experts believe that when taking inventory of the radiation-hazard sites as part of the Program's course, a number of "derelict" sites will be also discovered – sites that fall under no particular departmental jurisdiction. Additional financing is likely to be needed for any safeguarding efforts directed at such areas. As just some examples, industry insiders point to abandoned radioactive waste dumps that can be found in many Russian regions, sources of ionizing radiation that have long been lost track of, or nuclear materials piled up at shallow depths at the bottom of the Kara Sea. As far as the latter is concerned, searching for and safeguarding these nuclear dump sites will certainly become increasingly important in the future, as the Russian gas giant Gazprom sets out to develop gas fields on the shelf of the Kara Sea.

Finally, program authors have made no mention of any measures aimed at reprocessing nuclear and radioactive materials accumulated by the nuclear defense complex or at the remediation of sites under the purview of the Ministry of Defense.

Meanwhile, certain positive conclusions are to be drawn from the Program's expected outcome, such as the fact that no plans are suggested to create additional large-scale SNF reprocessing capacities. Likewise, the Program does not propose reprocessing the spent nuclear fuel accumulated at the storage facilities of Zheleznogorsk Mining and Chemical Combine. This means that at least this much radioactive waste will not be added to the already vast amounts of hazardous materials stockpiled in Russia so far.

[12] I.e. spent nuclear fuel that has sustained damage during storage or unloading and is thus resistant to standard reprocessing methods.

[13] With 16 branches spread across Russia's regions, State Unitary Enterprise Radon's facilities specialize in collection, storage, and disposal or radioactive waste from medical, technical, and scientific organizations.

Chapter 3

3. Program implementation in 2008 and 2009

3.1. A few words on access to program information

Lack of transparency surrounding the Program makes it extremely challenging to assess the efficiency of measures undertaken as part of the Program's agenda – or the expediency of financial disbursements its activities have been granted. Only some very general information has been made accessible with regard to the scope of financial resources planned to be appropriated for program implementation. No specific information can be found in open sources regarding the realization of particular projects, nor with respect to the money allocated and spent. Thus, only a handful of disparate numbers are available to review what efforts have so far been made in the Program, and just a few facts – obtained, at that, somewhat fortuitously, so that no guarantees as to their authenticity can be made.

Certain information regarding program implementation and financing in 2008 and 2009 has been posted on the Program's web site at www.fcp-radbez.ru. No public access exists for any other data. Even those organizations that are commissioned to execute the projects envisioned as part of the Program's goals in their respective regions have no information on the financing details, schedules, or expected results of these works.

According to federal budget estimations, RUR 47.5 billion will be appropriated for the Program in 2009 through 2011 (or $1.63 billion in exchange rates current as of the end of 2009). In yearly allocations, RUR 14.9 billion ($0.51 billion in late 2009 exchange rates) was planned to be disbursed from the budget in 2009; RUR 16 billion ($0,55 billion in late 2009 exchange rates) is envisioned for 2010; and another RUR 16.6 billion ($0.57 billion in late 2009 exchange rates) will be coming from state coffers in 2011. What works are supposed to have been fulfilled or will be fulfilled with this money, at which sites, and in which Russian regions – all of this remains unknown. The prevalent lack of concrete information points to a disappointing state of affairs when reflecting on the implied level of professional qualifications of government staff charged with relevant project planning.

3.2. Financing and program implementation in 2008

In 2008, total funds allocated for the Program came at RUR 11.41 billion ($0.45 billion in late 2008 exchange rates). According to data from the Accounts Chamber of the Russian Federation,[14] however, as of August 1, 2008, only 14.1 percent of the overall amount planned had actually been disbursed. This indicates that quite a hefty amount went to the Program at the end of 2008. Such financing practices usually mean that executing organizations do not find enough time to put the allocated money to use and it is claimed back by the state. No precise information is available with regard to how much money was actually spent by the Program in 2008, but according to statements made by Rosatom, all financial appropriations earmarked for the Program for 2008, were used in full.

It is possible that the money mentioned above was allocated in addition to the RUR 20 billion that (according to official sources) is spent annually to support ongoing

[14] The Accounts Chamber of the Russian Federation was established in 1994 by the upper and lower houses of the Russian parliament, the Federation Council and the State Duma, respectively, to exercise control over fulfillment of the federal budget. As such, it is an independent instrument of state financial control, answerable to the parliament, but not subject to formal jurisdiction of any of the power branches.

safety measures undertaken as part of normal operations at Russian nuclear- and radiation-hazard sites (including sites operated by the nuclear defense industry). This RUR 20 billion in annual safety funds is generally referred to as money that nuclear fuel cycle enterprises spend "out of their own budgets." That very wording, when applied to the situation in question, makes for a rather hazy definition, since Rosatom enterprises receive the bulk of their operating funds from the federal budget and only a fraction of their money is what they actually earn on their own. At any rate, if one were to make a broad assessment with the information at hand, budget expenses claimed by nuclear and radiation safety efforts in Russia in 2008 would come to around RUR 30 billion – an unlikely amount, still, given the economic crisis that was just then gaining pace.

Out of the RUR 11.41 billion allocated in 2008, RUR 8.42 billion was taken up by capital investments (construction costs); research and development accounted for another RUR 1.56 billion; and RUR 1.43 billion was disbursed for other costs. Of the total expense amount, RUR 9.99 billion came from the federal budget, including: RUR 7.78 billion in capital investments; RUR 1.13 billion in research and development costs; and RUR 1.02 billion in other costs.

In 2008, 181 state contracts were signed to a total amount of RUR 9.12 billion. Of those, 118 contracts envisioned works with duration periods of over one year (total value of these is estimated at RUR 8.51 billion).

All information regarding open tenders for government contracts for the implementation of certain projects under the Program's umbrella (those falling under the category of "other expenses") can be found at the Program's web site at www.fcp-radbez.ru. Information on the actual works performed is not, however, published in full.

In 2008, funds allocated for the Program were spent in the following way:

- rendered environmentally safe were $2.5 \cdot 10^{19}$ becquerels' worth of radioactive waste, including:
  - deep interment of liquid radioactive waste, $3.7 \cdot 10^{17}$ becquerels in total (Siberian Chemical Combine[15] and NIIAR[16]);
  - vitrification for long-term storage of high-level radioactive waste, $2.5 \cdot 10^{19}$ Becquerels in total, 725 tons in vitrified form (Production Enterprise Mayak[17]);
- remediation works were performed on 19,750 square meters of contaminated territories (construction of a solid radioactive waste cementation and storage facility, environmental conservation of Lake Karachai[18] at Mayak);
- proposals were worked out as part of research and development activities with regard to general guidelines for the operation of information systems related to the decommissioning of sites of nuclear legacy (including their 3D models).

The implementation of the Program was proceeding at a time of reorganization of federal executive bodies, which, in this case, were also those government entities that were contracting out the projects under development. Many enterprises executing these projects were also undergoing various changes in their legal organization form, i.e. type of business ownership structure. Drawing on the results of the first year of the Program's

[15] A multi-purpose integrated processing enterprise based in Tomsk, Southwest Siberia. Main operations include production of uranium hexafluoride and uranium enrichment. For more information, see http://www.atomsib.ru/ (in Russian).
[16] Russian acronym standing for State Scientific Center "Research Institute of Atomic Reactors" (English name provided by company website). For more information, please see http://www.niiar.ru/?q=en/about.
[17] See Footnote 3.
[18] See Footnote 3.

run, Rosatom proposed amendments to the 2008-2015 Nuclear and Radiation Safety Program that were approved by the government in its Decree No. 997, of December 24, 2008, entitled "On introducing amendments to the Federal Target Program 'Nuclear and Radiation Safety in 2008 and for the Period through 2015'" (see http://www.fcp-radbez.ru/index.php?option=com_content&task=view&id=401&Itemid=396). In part, those amendments stemmed from the fact that many Rosatom enterprises – such as Atomflot[19] – changed their departmental jurisdiction and legal business form.

From what data has been made available on program implementation, a conclusion can be made that the Program was focused on mostly the same efforts that had been taking place before it was launched. Lack of detailed information impedes any reliable comparison of what was done in 2008 with what had been done in the previous years. We know, however, that, much as in the past years, works undertaken under the Program's aegis took place chiefly at Rosatom's most problem-ridden enterprise, reprocessing plant Mayak.

3.3. Financing and program implementation in 2009

In 2009, RUR 15.78 billion was earmarked for the Program (or $0.54 billion in exchange rates current as of late 2009). Capital investment costs came to RUR 9.32 billion ($0.32 billion in late 2009 exchange rates); RUR 1.55 billion was to be spent on research and development ($0.05 billion in late 2009 exchange rates); and RUR 4.90 billion was allocated for other expenses ($0.17 billion in late 2009 exchange rates).

The share of federal budget money in total appropriations was RUR 12.26 billion, including RUR 8.08 billion in capital investments, RUR 1.02 billion in research and development, and RUR 3.17 billion in other expenses.

In 2009, 212 government contracts were concluded to a total sum of RUR 7.92 billion, including 140 contracts for projects with duration periods of over one year (a total of RUR 5.31 billion).

As seen from these figures, most of the funds disbursed have been used for capital investments – construction of such sites as the dry storage facility for spent nuclear fuel generated by RBMK-1000 and VVER-1000[20] reactors (in official documents, the site is designated as Spent Fuel Storage Facility 2), renovation of the wet storage facility for spent nuclear fuel generated by VVER-1000 reactors at RT-2 SNF reprocessing facility (Building 1), and creation of a pilot up-to-date SNF reprocessing centre. All of these are projects under development at Zheleznogorsk Mining and Chemical Combine.

At the time that this report was being written, in September and November 2009, the following information was available at the Program's website on projects implemented in 2009:

- inventories were taken at 16 sites of nuclear and radiation hazard, including NIIAR, FEI[21], VNIIKhT[22], Kurchatov Institute[23];

[19] Murmansk-based nuclear icebreaker operator Atomflot was in 2008 severed from its parent company, the Murmansk Shipping Company, and put under Rosatom's control.
[20] A pressurized water reactor (PWR) model.
[21] Russian acronym standing for State Scientific Center Alexander Leipunsky Institute for Energy Physics, based in Obninsk, near Moscow. One of the first created to develop Soviet nuclear reactors. For more information, see http://www.ippe.obninsk.ru/on%20us/briefly.php (in Russian).
[22] Acronym standing for All-Russian Research Institute of Chemical Technology (English name provided by the organization's website). For more information, see http://www.vniiht.ru/en/.
[23] Russian Scientific Research Centre Igor Kurchatov Institute, Moscow. For more information, see http://www.kiae.ru/ (in Russian).

- placed in long-term storage were 88 tons of spent nuclear fuel (Zheleznogorsk Mining and Chemical Combine);
- environmental remediation works were performed on 43,900 square meters of contaminated territories (http://www.fcp-radbez.ru/index.php?option=com_content&task=view&id=401&Itemid=396).

3.4. Short-term prospects

As described above, the bulk of the expense section of the 2008-2015 Nuclear and Radiation Safety Program was developed prior to the crisis that hit Russia in late 2008 and early 2009. Enormous funds were claimed by the Program – compared, especially, to the previous expense budgets earmarked for the purposes of enhancing nuclear and radiation safety in the country. When, in late 2008, the first year of the Program's slated implementation period was coming to a close and the first signs appeared that the global economic recession was starting to take its toll, the impending prospect of budget cuts became apparent – which was to bring about inevitable changes in the Program's agenda, as well. Since the Program's budget required a stamp of government approval, any modifications in its plans also have to be vetted by the government. Because of all the complicated red tape normally involved in such approval procedures, any changes introduced come with a significant time lag, never catching up with the real operating needs.

It has by now become obvious that the Program's budget will have to be reduced, but there have as yet been no official decisions in this regard. At the same time, information has surfaced that the changes planned in the Program will have to do with an anticipated RUR 1 billion cut in funding earmarked for 2009, followed by another RUR 2 billion cut in 2010 and yet another, of up to RUR 5 billion, in 2015. According to this change, any funding saved will be used if the Program's run is extended to 2016.

Apart from the purely fiscal problem, there is also one involving the issue of actually using the funds disbursed. Any funds that have not been spent by the Program must be returned to the budget, which means that the Program loses irretrievably some of the funding it receives from the state. This happens for a variety of reasons, of which the principal one is that there are not enough production capacities to carry out some of the projects envisioned in the capital construction section. The future dry storage facility project at Zheleznogorsk Mining and Chemical Combine is one good example.

3.5. Dry storage facility at Zheleznogorsk and its problems

As was stated previously, first among the main target indicators that will serve to measure the efficiency of the Program's implementation course are the construction and modernization of infrastructure sites related to SNF and radioactive waste management. These include launching new capacities to handle spent nuclear fuel intended for storage. New SNF storage areas have been planned as part of the Program's realization to a combined capacity of 44,000 tons.

"Dry Storage Facility for Irradiated Nuclear Fuel Generated by RBMK-1000- and VVER-1000-type Reactors" – such is the full official name of the future dry storage facility under development at Zheleznogorsk chemical reprocessing plant. Construction on the 38,000-ton storage site began in 2004. Since then and until January 1, 2008, funding for the project was provided by Rosatom and Rosenergoatom[24]. The exact scope

[24] Rosenergoatom concern is the operator company of Russia's ten nuclear power plants and is in charge of overseeing both energy production and nuclear and radiation safety at these sites. For more information, see http://www.rosenergoatom.ru/eng/index.wbp.

of works already performed is unknown, but judging from the condition the project is currently in, not much has so far been done.

Since January 1, 2008, the official date when funding started trickling into the 2008-2015 Nuclear and Radiation Safety Program, the federal budget has been the source of money for the project – although, again, Rosatom is the entity that distributes the funds through its own budget. The storage facility's total budget was set at over RUR 30.7 billion (around $1 billion in late 2009 exchange rates) (Nuclear and Radiation Safety, 2008; Petrov, 2008). There is information stating that in 2009, Rosatom already disbursed RUR 2.947 billion for the project as part of the Program's operations, and another RUR 758 million is planned to be fed into the Zheleznogorsk facility before the end of the year. This means that around RUR 3.7 billion ($125 million in current exchange rates) will have to have been spent in the course of the year – only 12 percent of the overall funding planned (Delay fixed, 2009).

There is yet no clarity as to the facility's completion deadline. Official sources choose to remain discreet on the subject. A wide variety of possible time frames is suggested in news sources in the press and on the Internet. According to the best-case scenario, the first line of the SNF storage facility should be put into commission in August 2010 (Delay fixed, 2009). The most pessimistic prognosis puts the approximate launch date sometime in 2015 (First line, 2009).

Should everything go according to current plans, the dry storage facility will start filling its capacities with SNF by 2010. This is cause for concern for the expert community, since ongoing construction works hardly make for good conditions to ensure nuclear and radiation safety, as well as physical security, of the SNF in storage.

It could be assumed with a high degree of certainty, however, that the launch date for the SNF storage facility will be pushed back. This, in turn, disturbs many among the personnel of those nuclear industry sites where SNF stockpiles have been growing steadily and where management has been hoping to lessen the load on the on-site storage areas by shipping at least some of the spent fuel to Zheleznogorsk. Nuclear power plants are among the first to be affected by the delays. For instance, Leningrad NPP[25] has been working for some time on its own plans to build a new, separate facility to store spent nuclear fuel generated by its reactors.

One noteworthy problem with the dry storage facility construction project is a financial dispute that erupted between the project owner, Rosatom, acting as the ordering party on behalf of the state, and the contractor, a state-owned company whose full title is Federal State Unitary Enterprise "Department for Special-Purpose Construction on Territory No. 9 under the Federal Agency for Special-Purpose Construction" (or Spetsstroi). The conflict led to a decision, on April 1, 2008, on the part of the developer company, to cease all works at the site, which, as it turns out, has been financed as part of the terms of a state defense contract (Petrov, 2008). Funds that are allocated under the aegis of a defense contract usually fall under a completely different budget category. There does not seem to be a clear-cut connection between the channels by which funding is fed into the storage facility project and the 2008-2015 Nuclear and Radiation Safety Program.

The gist of the dispute[26], which finally resulted in that Rosatom had to find another developer for the project, is quite telling. In the first half of 2008, when Russia's top

[25] Located near St. Petersburg, Leningrad NPP operates four RBMK-1000 reactors. A second line of construction – LNPP-2 – is currently in development. Issues related to safe SNF storage remain one of LNPP's most acute problems. For more information, see http://www.bellona.org/reports/Leningrad_NPP.
[26] See also http://www.bellona.org/articles/articles_2008/Zhelenogorsk_storage.

officials were far from even suspecting a coming recession, costs of construction materials and those involved in attracting and paying for the work force were growing fast. During the first months of that year, builders continued working at the site even though no contract had yet been signed with Rosatom. It is possible that Rosatom brass were still waiting for construction material prices to go down – and the project was big enough to suggest formidable construction costs – and were thus dragging their feet about signing a contract, which would certainly include a clause on the expected scope of funding. At any rate, Spetsstroi insisted that the contract had not been signed before the works started due to errors made by Rosatom in assessing the project's costs. According to the contractor, the ordering party underestimated the costs of construction works by 30 percent, with the result that signing an onerous deal like that would have put the construction company and its 3,000-strong workforce on the brink of bankruptcy. As one argument, Spetsstroi cited a statement made by chief of Atomenergoprom's Capital Investment Programs Management Department[27], Gennady Sakharov, who spoke of the serious errors made when estimating the funds that would be needed for the implementation of the Program at a visiting session of the Council for Investment Program Planning and Capital Investment Economic Efficiency Monitoring (Petrov, 2008). Fearing that they would be unable to work within the budget Rosatom was pushing for, the developer company demanded that the nuclear authority come up with a contract that would see a 30-percent increase in financing. Rosatom did not agree to this and on August 26, 2008, it announced an open tender for the construction project. Two organizations participated in the bidding – an Atomenergoprom-affiliated company Atomstroi[28] and a hydropower construction firm Bureyagesstroi[29]. The latter had just completed the Burei Hydroelectric Power Plant. Bureyagesstroi's terms proved the most attractive as they were charging the least, so the project was awarded to that company. The dry storage facility jobs thus went past construction firms that specialize in building nuclear sites.

This is just one telling example of the challenges that a sweeping endeavor like the federal Nuclear and Radiation Safety Program could face. What we are dealing with is not a lifeless set of instructions printed on paper, but an unpredictable, changeable reality, and any change or unforeseen disruption could threaten to undermine one or other of its projects, if not the program as a whole.

[27] As a self-described state vertically integrated company, currently in the process of working out its corporate structure, Atomenergoprom is part of the state corporation Rosatom and is to unite 89 enterprises of the Russian civil nuclear industry. Created in 2007 by a presidential decree, the new holding promises by end 2009 to have brought together all branches of the nuclear fuel cycle – from the supply and enrichment of uranium to nuclear power plants construction and production of nuclear energy. Prior to the consolidation, all state enterprises are to be reincorporated into joint stock companies. For more information, see http://www.atomenergoprom.ru/en/.

[28] Investment and Construction Concern Atomstroi is a construction and assembly company created in 2001. Main operations include building new NPP units and nuclear industry sites, as well as nuclear construction research and development. For more information, see http://www.atomrus.ru/ (in Russian).

[29] A hydroelectric power plant construction company based in Amur Region in Russia's Far East. For more information, see http://www.bgess.ru/en/.

Conclusion

It is without doubt that the very contemplation of a generously funded federal effort to ensure nuclear and radiation safety in the country is a laudable move and one that would be greatly appreciated by the public. There are, at the same time, certain factors – both of subjective nature and those the Program has no bearing on – that would call into question the successful implementation of this new and ambitious enterprise, important as it surely is since it is aimed at safeguarding Russia's nuclear and radioactive materials and rehabilitating the numerous areas that have been affected by radioactive contamination in the course of the many decades of nuclear industry operations.

First and foremost, the Program's agenda is at odds with its own stated goals. As is stipulated in the Program's description, its objective is "finding a comprehensive set of solutions for the problems of nuclear and radiation safety assurance in the Russian Federation associated with the management of spent nuclear fuel and radioactive waste, decommissioning sites of nuclear and radiation hazard, and improving those systems that are necessary to maintain nuclear and radiation safety…"

Taking these goals as a starting point, one is perplexed as to why the Program includes projects such as the construction of a pilot reprocessing center at Zheleznogorsk Mining and Chemical Combine, as well as other measures implying further development of the concept of a closed nuclear cycle and reprocessing of spent nuclear fuel. Anything that has to do with SNF reprocessing means effectively accumulating nuclear and radiation safety problems, rather than solving them. In sum total, around RUR 13 billion of the Program's funds is planned to be spent on projects related to SNF reprocessing. Furthermore, these projects are stipulated as first-priority measures and, as such, will not be expected to be dropped from the Program.

Secondly, the traditional shield of secrecy surrounding issues of nuclear and radiation hazards in Russia is still in effect and is quite manifest, too, where this program is concerned. This is partly due to how closely interwoven the various fields of application of atomic energy still are that service the defense industry and the sector of commercial nuclear production. It is evident, however, that another reason exists as well for such a lack of transparency – and it is rooted in the attempts to conceal from public view the specific budgets envisioned for particular program items. A program closed to public access is a program impervious to what oversight society may try to exercise over the government's most important efforts in the field of nuclear and radiation safety and environmental remediation of affected territories. In the end, this may have a negative impact on the efficiency of the Program's implementation.

Thirdly, the Program does little to attract the participation of local administrations of various levels, even though part of its funding depends on disbursements from regional budgets. As has become evident from Bellona's conversations with local administration officials, authorities in Russia's regions tend to disengage from any involvement simply on the merit that the Program is a federal one – even though it would stand to reason that rehabilitating contaminated territories and protecting the population from nuclear and radiation hazards would be in these regions' own interest.

The Nuclear and Radiation Safety Program is a complex organism, an intricate mesh of contractors and subcontractors, projects, measures and deadlines, and a complicated financing structure. Any minor modification in its parameters sets into motion a chain of endless government approval procedures. This greatly encumbers the Program's implementation, with a risk of grinding it to a complete halt.

Furthermore, the Program's success is hindered by what experts in recent years have assessed as a drastic drop in competency levels among officials charged with decision-making in the field of nuclear and radiation safety in Russia. At fault here are natural causes: The aging and retirement from active working life of those who sustained the ranks of nuclear expertise at the time the industry was experiencing a phase of vigorous expansion. The professional qualifications of top- and mid-level management called to steer the nuclear industry of today are too weak to allow for an efficient distribution of available resources in accordance with the Program's real needs.

One of the talking points that have recently generated a host of discussions is the issue of reorganizing state corporations[30]. That the Russian atomic authority functions as a state corporation is indeed something that begs a number of valid questions, but if a decision is made to change Rosatom's legal and organizational structure, that will undoubtedly cause additional impediments to the implementation of the Nuclear and Radiation Safety Program.

Additional concern arises over the state of the Russian industry, which is ill-equipped to supply all the materials and machinery necessary to realize the goals declared by the Program. This will cause inevitable delays in the real implementation time frames, compared to the desired deadlines – however generous the leeway allowed by the vague language of official program documents.

Certainly, the current economic and financial crisis will, too, take its toll on the Program's progress. It is clear that any expectations to attract additional funding in the near future will be without merit. Funding for the Program has already started to shrink in 2009, which is why all projects under the Program's umbrella have been rearranged in accordance with their perceived importance: First-priority ones are projects that are exempt from funding cuts, second-priority ones may be subject to cutbacks, and the rest will be financed on leftovers. Needless to say, the public has had no say in which measures should be given which priority – and that, in turn, precludes any hope that the distribution of allocated funds will be in accordance with the principles or criteria supported by the public.

One other unfortunate fact is that the Program also fails to seek financing for the development of regulatory norms related to nuclear and radiation safety at various levels, including, first and foremost, those that would legislate the management of spent nuclear fuel. Lack of regulatory acts in this field stems from the policies adopted by the Ministry of Finance, which does not provide funding to these activities as part of the federal budget. It is unclear, on the other hand, why, given the significance of this issue, no attempts have been made by Rosatom to attract other sources of funding to develop regulations that govern management of spent nuclear fuel, and particularly, a federal law "On SNF Management."[31]

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[30] Hardly any experts agree on the precise definition of what a state corporation is in modern Russia. The reformation of Rosatom as a state corporation occurred in 2008, very much in a behind-closed-doors manner, as a method of exercising control over large state-owned organizations and financial structures that received under their purview assets owned by the state in the field – Rosatom assets – and quite considerable financial resources. State corporations have recently come under heavy criticism over a perceived lack of transparency in financial management and for using their legal status to elude public oversight. In his November 2009 State of the Nation address to the Federal Assembly, President Dmitry Medvedev said state corporations have no future in Russia's economy and will be gradually phased out. Indeed, they seem to have done exactly what they were meant to do – spend money allocated from the budget – and have thus outlived their usefulness (Vladislav Larin).

[31] Russia still has no proper legislative regulations in the sphere of management of spent nuclear fuel and radioactive waste. Attempts to create a comprehensive legislative document to govern these issues have been made since the early 1990s, but so far to no avail.

One still hopes, though, that the Program will not share the fate of previous – failed – initiatives undertaken by the Russian government in the crucial field of ensuring nuclear and radiation safety in the Russian Federation. Even though the funding earmarked for the 2008-2015 Program will clearly be inadequate to the vast scope of problems besetting Russia's progress in this regard, many of these can still be tackled if only the money available is managed efficiently and with good judgment. Bellona will keep a close watch over the Federal Target Program's implementation – the public needs to be assured that such a program will, in fact, lead to a reduction, rather than further amassment, of nuclear and radiation risks in Russia.

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