United States Government Accountability Office

Report to the Committee on Armed Services, U.S. Senate

February 2020

NUCLEAR NONPROLIFERATION

Past U.S. Involvement Improved Russian Nuclear Material Security, but Little Is Known about Current Conditions

Accessible Version

GAO-20-392

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GAO Highlights

Highlights of GAO-20-392, a report to the Committee on Armed Services, U.S. Senate

Why GAO Did This Study

Russia possesses the world's largest stockpile of weapons-usable nuclear materials, largely left over from the Cold War. These nuclear materials could be used to build a nuclear weapon if acquired by a rogue state or terrorist group. Starting in 1993, and for the next 2 decades, DOE worked with Russia to improve security at dozens of sites that contained these nuclear materials. In 2014, following Russian aggression in Ukraine and U.S. diplomatic responses, Russia ended nearly all nuclear security cooperation with the United States.

The Senate report accompanying the Fiscal Year 2019 National Defense Authorization Act includes a provision for GAO to review NNSA's efforts to improve Russian nuclear material security. This report (1) examines the extent to which NNSA had completed its planned nuclear material security efforts when cooperation ended and what nuclear security concerns remained, (2) describes what is known about the current state of nuclear material security in Russia, and (3) describes stakeholder views on opportunities for future U.S.-Russian nuclear security cooperation.

To address all three objectives, GAO interviewed U.S. government officials, personnel from DOE's national laboratories, and nongovernmental experts. In this report, GAO refers to all of these groups as stakeholders. GAO also reviewed relevant U.S. government plans, policies, and program documentation. GAO requested the opportunity to interview Russian officials and representatives at nuclear material sites for this review, but the Russian government denied this request.

This is a public version of a classified report that GAO issued in December 2019. Information that DOE deemed classified or sensitive has been omitted.

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What GAO Found

Over more than 2 decades starting in the early 1990s, the Department of Energy (DOE) and its National Nuclear Security Administration (NNSA) completed many of their planned efforts to improve nuclear material security in Russia, according to DOE documentation, U.S. government officials, and nuclear security experts. These efforts, carried out primarily through NNSA's Material Protection, Control, and Accounting (MPC&A) program, included a range of projects to upgrade security at dozens of Russian nuclear material sites, such as the installation of modern perimeter fencing, surveillance cameras, and equipment to track and account for nuclear material. However, not all planned upgrades were completed before cooperation ended in late 2014. NNSA also completed many—but not all—of its planned efforts to help Russia support its national-level security infrastructure, such as by helping improve the security of Russian nuclear materials in transit. In addition, NNSA made some progress in improving each site's ability to sustain its security systems, such as by training Russian site personnel on modern MPC&A practices and procedures. NNSA documentation that GAO reviewed showed that by the time cooperation ended, Russian sites had generally improved their ability to sustain their MPC&A systems, but this documentation showed that concerns remained.

According to stakeholders, there is little specific information about the current state of security at Russian nuclear material sites because U.S. personnel no longer have access to sites to observe security systems and discuss MPC&A practices with Russian site personnel. However, stakeholders said there is some information on national-level efforts. Specifically, stakeholders said that Russia has improved regulations for some MPC&A practices, and there are signs that Russian sites receive funding for nuclear material security, though it is unlikely that Russian funding is sufficient to account for the loss of U.S. financial support. Regarding threats to Russia's nuclear material, nongovernmental experts GAO interviewed raised concerns about the risk of insider theft of Russian nuclear materials. Experts stated that it is likely that Russian sites have maintained nuclear material security systems to protect against threats from outsiders, but it is unlikely that sites are adequately protecting against the threat from insiders.

Stakeholders said that there may be opportunities for limited future cooperation between the two countries to help improve Russian nuclear material security. Such opportunities could include technical exchanges and training. These opportunities could provide the United States with better information about the risk posed by Russia's nuclear materials and could help address areas of concern, such as by training Russian personnel to help sites better address the insider threat. However, any potential cooperation faces considerable challenges, according to stakeholders, most notably the deterioration of political relations between the two countries. In addition, stakeholders said that cooperation is challenged by current U.S. law, which generally prohibits NNSA from funding nuclear security activities in Russia; by Russian antagonism toward U.S. proposals to improve nuclear material security internationally; and by Russian conditions for cooperation that the United States has not been willing to meet.

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Abbreviations

DOD	Department of Defense
DOE	Department of Energy
HEU	Highly enriched uranium
IAEA	International Atomic Energy Agency
MFA	Russian Ministry of Foreign Affairs
Minpromtorg	Russian Ministry of Industry and Trade
MOM	MPC&A operations monitoring
MPC&A	Material protection, control, and accounting
NDAA	National Defense Authorization Act
NGO	Nongovernmental organization
NNSA	National Nuclear Security Administration
Rosatom	Russian State Corporation for Atomic Energy
Rostekhnadzor	Russian Federal Service of Environmental, Technological, and Nuclear Supervision

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February 27, 2020

The Honorable James M. Inhofe
Chairman
The Honorable Jack Reed
Ranking Member
Committee on Armed Services
United States Senate

Following the collapse of the Soviet Union in the early 1990s, the United States was concerned that political and economic instability and a lack of government revenues threatened the security and control of Russia's nuclear warheads and weapons-usable nuclear materials, including highly enriched uranium (HEU) and plutonium.[1] The Department of Defense (DOD) and the Department of Energy (DOE) started programs to help the Russian government secure its massive stockpiles of warheads and nuclear materials; over the next 2 decades, DOE and its National Nuclear Security Administration (NNSA) led U.S. efforts to work with Russia on nuclear material security, spending more than $1 billion on projects in Russia to improve security at dozens of sites holding nuclear materials.[2] In December 2014, following the Russian invasion of Ukraine and ensuing U.S. sanctions, Russia announced that it was ending most U.S. nuclear security assistance in Russia, and cooperation with NNSA was dramatically curtailed.

Securing vulnerable nuclear materials around the world remains a top national security priority, and it is estimated that Russia holds the largest stockpile of nuclear materials in the world, at least 617,000 kilograms of

[1]Weapons-usable nuclear materials are materials that can be used to construct a nuclear device. These include HEU, uranium-233, and any plutonium containing less than 80 percent of the isotope plutonium-238.

[2]NNSA was created by the National Defense Authorization Act for Fiscal Year 2000, Pub. L. No. 106-65, 113 Stat. 512 (1999). It is a separately organized agency within DOE, with responsibility for the nation's nuclear weapons, nonproliferation, and naval reactors programs. Prior to the creation of NNSA, the DOE's Office of Nonproliferation and Arms Control led the department's cooperative nuclear security work with Russia.

HEU and 120,000 kilograms of plutonium, according to a 2013 study.[3] The December 2018 National Strategy for Countering Weapons of Mass Destruction Terrorism states that the United States will lead global efforts to close off terrorists' access to weapons of mass destruction and related materials, including weapons-usable nuclear materials.

We have issued numerous reports on the security of nuclear materials in Russia and other countries. For example, in 2007 we reported that DOE and DOD had made progress improving security at Russia's nuclear sites, but that Russia's ability to sustain U.S. security upgrades was uncertain.[4] In a 2010 classified report, we reported that NNSA programs had made progress in securing nuclear materials in Russia, but that NNSA planned additional work, especially in mitigating the insider threat at major Russian nuclear material handling facilities.[5] We suggested that Congress consider extending NNSA's 2013 deadline for preparing Russia to assume responsibility for sustaining its nuclear security systems.[6]

The Senate Armed Services Committee Report accompanying S. 2987, a bill for the National Defense Authorization Act (NDAA) for fiscal year 2019, includes a provision for GAO to review NNSA's efforts to improve Russian nuclear material security.[7] This report (1) examines the extent to which NNSA's planned nuclear material security efforts in Russia were completed when cooperation ended and what nuclear security concerns

[3]Arms Control Association and Partnership for Global Security, *The Nuclear Security Summit: Progress Report* (Washington, D.C.: July 2013). Terrorists or countries seeking nuclear weapons could use as little as 25 kilograms of weapon-grade HEU or 8 kilograms of plutonium to construct a nuclear weapon.

[4]GAO, *Nuclear Nonproliferation: Progress Made in Improving Security at Russian Nuclear Sites, but the Long-term Sustainability of U.S.-Funded Security Upgrades is Uncertain,* GAO-07-404 (Washington, D.C.: Feb. 28, 2007).

[5]GAO, *Nuclear Nonproliferation: Comprehensive U.S. Planning and Better Foreign Cooperation Needed to Secure Vulnerable Nuclear Materials Worldwide*, GAO-10-941C (Washington, D.C.: Sept. 24, 2010). We also issued an unclassified version of this report. See GAO, *Nuclear Nonproliferation: Comprehensive U.S. Planning and Better Foreign Cooperation Needed to Secure Vulnerable Nuclear Materials Worldwide*, GAO-11-227 (Washington, D.C.: Dec. 15, 2010).

[6]Congress subsequently extended the deadline in the fiscal year 2011 National Defense Authorization Act, from January 1, 2013, to January 1, 2018.

[7]S. Rep. No. 115-262 (2018).

remained, (2) describes what is known about the current state of nuclear material security in Russia, and (3) describes stakeholder views on potential opportunities for future U.S.-Russian nuclear security cooperation. This report discusses the security at Russia's civilian and nuclear weapons complex sites that hold weapons-usable nuclear materials. It does not address the security of Russia's nuclear warheads or nuclear security at Russian Ministry of Defense locations. This report is a public version of a classified report we issued in December 2019.[8] The Department of Energy deemed some of the information in our December report to be classified, which must be protected from loss, compromise, or inadvertent disclosure. Therefore, this report omits classified information about the location and types of security projects completed in Russia, as well as information on perceived risks. Although the information provided in this report is more limited, the report addresses the same objectives as the classified report and uses the same methodology.

To address these objectives, we obtained and analyzed DOE and NNSA documents describing U.S. government efforts to support and sustain security at nuclear material sites in Russia. We also reviewed other relevant documents and plans from the U.S government as well as reports and articles from academia and nongovernmental organizations (NGO). In addition, we identified and interviewed relevant stakeholders, including U.S. government officials from NNSA, DOE, the State Department, and DOD; nongovernmental experts from academia and NGOs; and knowledgeable personnel at six U.S. national laboratories that supported U.S. nuclear security efforts in Russia, including personnel at Brookhaven National Laboratory, Lawrence Livermore National Laboratory, Los Alamos National Laboratory, Oak Ridge National Laboratory, Pacific Northwest National Laboratory, and Sandia National Laboratory. We refer to national laboratory personnel as project team members because they implemented nuclear security projects in Russia on NNSA's behalf. When we use the term "stakeholders," we are referring to individuals from more than one of these knowledge groups. For example, if DOE officials and experts provided a similar viewpoint, we attributed this viewpoint to "stakeholders." Additional details of our scope and methodology can be found in appendix I.

[8]GAO, *Nuclear Nonproliferation: Past U.S. Involvement Improved Russian Nuclear Material Security, but Little Is Known about Current Conditions,* GAO-20-78C (Washington, D.C.: Dec. 5, 2019).

The performance audit upon which this report is based was conducted from September 2018 to November 2019 in accordance with generally accepted government auditing standards. Those standards require that we plan and perform the audit to obtain sufficient, appropriate evidence to provide a reasonable basis for our findings and conclusions based on our audit objectives. We believe that the evidence obtained provides a reasonable basis for our findings and conclusions based on our audit objectives. We subsequently worked with DOE from December 2019 to January 2020 to prepare this unclassified version of the original classified report for public release. This public version was also prepared in accordance with these standards.

Background

In 1991, following the collapse of the Soviet Union, the U.S. government authorized the President to establish the Nunn-Lugar Cooperative Threat Reduction (CTR) program to provide nuclear security assistance to Russia and the former Soviet states. At the time, there were significant concerns about Russia's ability to maintain adequate security over its large numbers of nuclear weapons and vast quantities of weapons-usable nuclear materials. In 1995, DOE established the Material Protection, Control, and Accounting (MPC&A) program to equip Russia and other countries with modern nuclear material security systems and promote effective nuclear material security practices. The CTR umbrella agreement with Russia—which established an overall legal framework under which the United States would provide nuclear security assistance to Russia—expired in June 2013. Joint nuclear security activities in Russia, however, continued under a multilateral agreement and a related bilateral protocol.[9] In December 2014, in response to U.S. sanctions over Russian actions in Ukraine, the Russian government ended nearly all

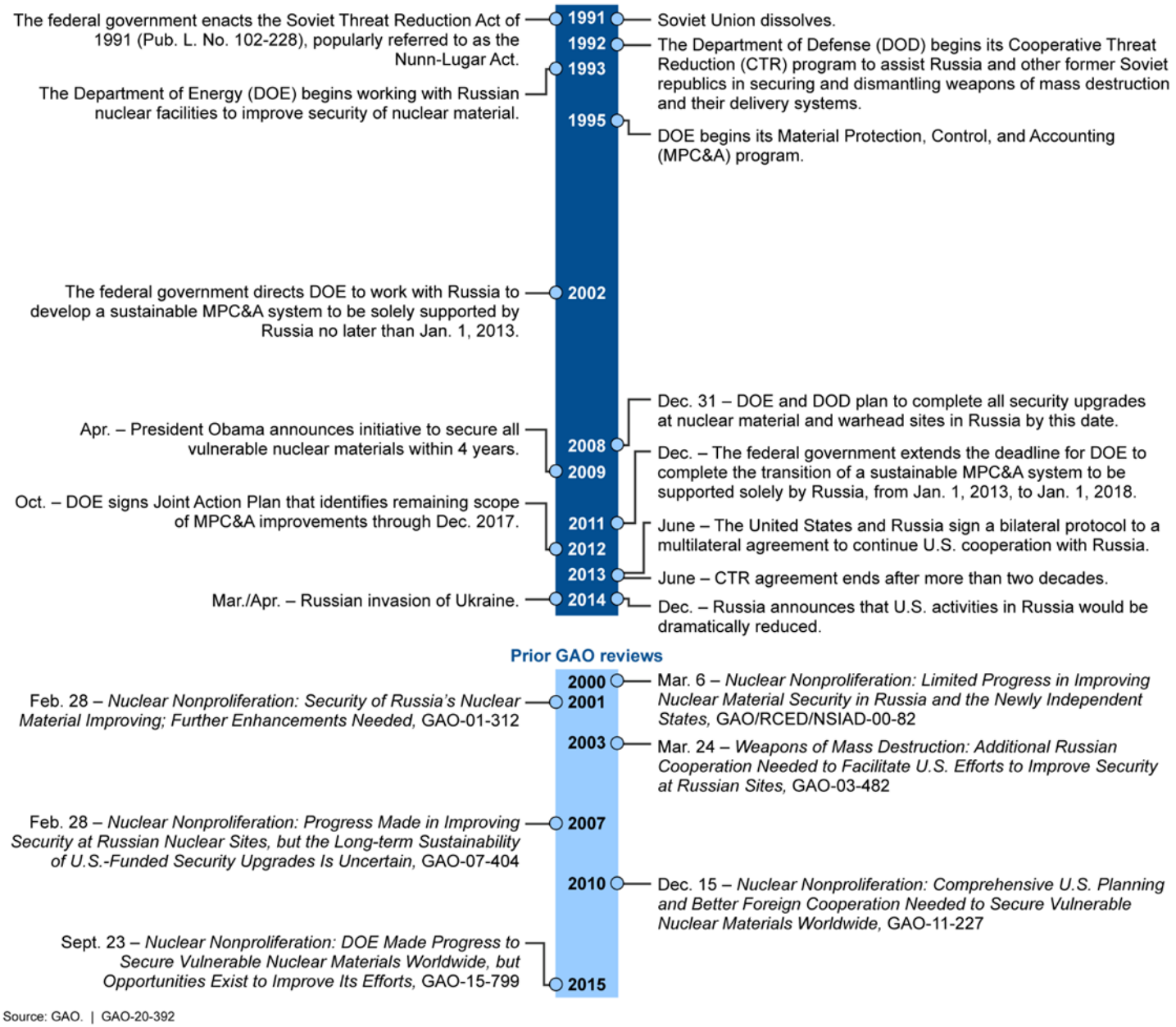
[9]*2003 Framework Agreement on a Multilateral Nuclear Environmental Programme in the Russian Federation (MNEPR); Protocol Between the Government of the United States of America and the Government of the Russian Federation to the Framework Agreement on A Multilateral Nuclear Environmental Programme in the Russian Federation of May 21, 2003.* According to NNSA officials, the CTR and MNEPR agreements were important to ensuring that U.S. personnel had the necessary immunities and legal protections to operate in Russia.

nuclear security cooperation with the United States.[10] Until then, the United States had been gradually transitioning responsibility to Russia for supporting its nuclear material security systems, and it was anticipated that the U.S. MPC&A program would continue to help Russia sustain its nuclear material security systems until January 1, 2018.[11] See figure 1 for a timeline of major events during the period of cooperation.

[10]According to NNSA officials, certain site-level projects were allowed to continue until the contracts were completed, and some sites continued limited cooperation with DOE that did not involve financial assistance.

[11]The United States established other programs in Russia to support nonproliferation goals. For example, the Materials Consolidation and Conversion program supported the consolidation of nuclear materials to fewer, more secure locations, as well as the conversion of HEU to low enriched uranium.

Figure 1: Major Events in the History of U.S. Efforts to Secure Nuclear Material in Russia, and GAO Reviews



Source: GAO. | GAO-20-392

Note: GAO issued numerous other reports in the 1990s related to U.S. nuclear security efforts in Russia.

Starting with fiscal year 2015, and with each fiscal year since, language in annual appropriations laws and national defense authorization acts has largely prohibited NNSA from funding new efforts in Russia, including

nuclear material security assistance, unless the prohibition is waived by the Secretary of Energy under certain conditions.

Russian Nuclear Material Sites and Structure of Relevant Russian Governmental Organizations

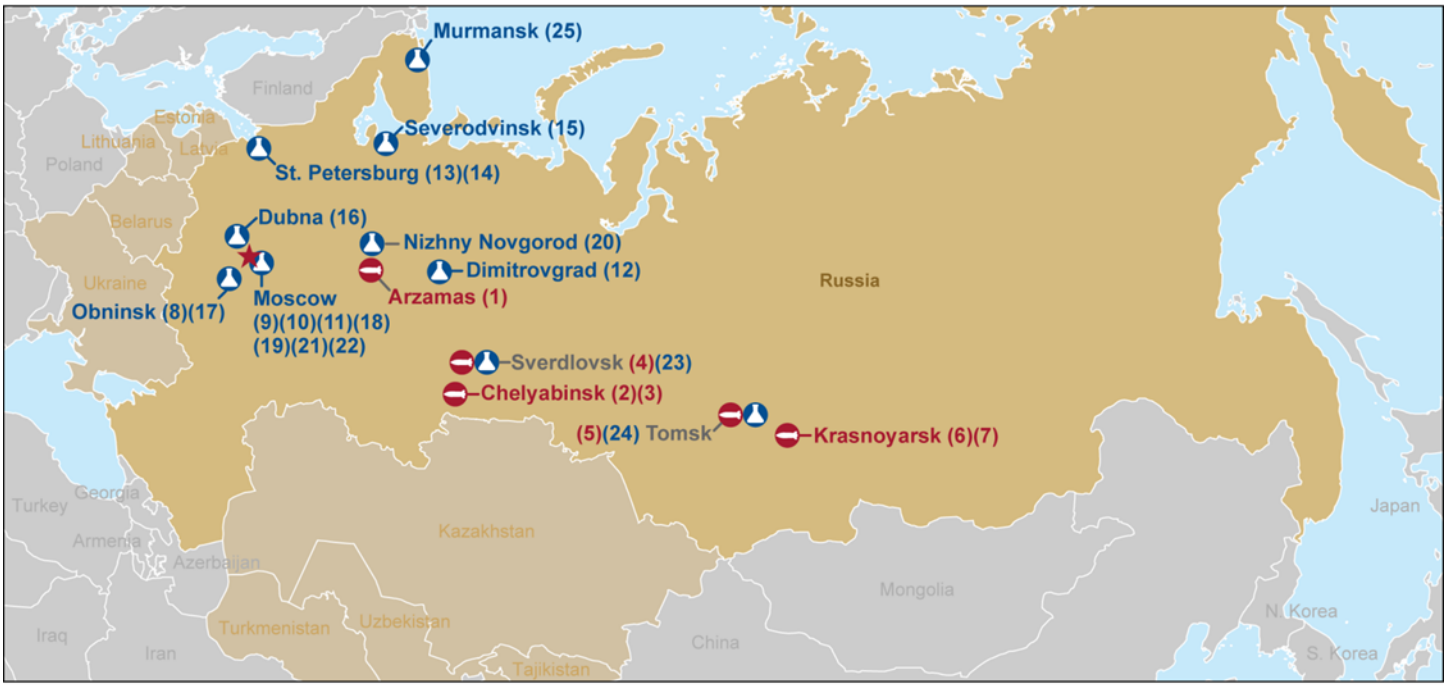
Russia's weapons-usable nuclear materials are stored and processed at more than two dozen sites overseen by a number of Russian entities, and the MPC&A program's focus was on 25 of these sites at the time of our last report in 2010.[12] The Russian State Corporation for Atomic Energy (Rosatom) is the Russian agency that manages much of Russia's nuclear security enterprise, including seven nuclear weapons complex sites located in closed cities. These sites store and process the nuclear materials used in Russia's nuclear weapons. Of the other 18 sites, many are overseen by Rosatom, but some are independent of Rosatom or managed by other Russian government entities. These sites often hold HEU and plutonium for research reactors or for other civilian purposes. See figure 2 for the location of the 25 Russian nuclear material sites. Other Russian government organizations with responsibilities in nuclear security include the following:

- **Russian Ministry of Foreign Affairs (MFA).** MFA is responsible for overseeing Russian policy and agreements for cooperation with the United States, including cooperation on nuclear security.
- **Russian Federal Service of Environmental, Technological, and Nuclear Supervision (Rostekhnadzor).** Rostekhnadzor is the regulator responsible for Russia's civilian nuclear facilities.

  Russian Ministry of Industry and Trade (Minpromtorg). Minpromtorg coordinates nuclear material security activities and develops nuclear material security regulations for Russian naval shipbuilding sites, including Sevmash Shipyard, the primary builder of nuclear submarines for the Russian Navy.

[12]The 25 represent nuclear material sites where NNSA was supporting nuclear security efforts when GAO reported on this issue in 2010. However, some other nuclear material facilities were not included in the MPC&A program. For example, as we reported in 2010, the Russian government refused to include in the scope of cooperation with NNSA major facilities in three closed nuclear cities that produced nuclear weapons material. In addition, prior to our 2010 report, DOE and NNSA had completed nuclear security efforts at other nuclear material sites.

Figure 2: Locations of Russian Nuclear Material Sites



Sites in the Rosatom weapons complex

1. All-Russian Scientific Research Institute of Experimental Physics
2. All-Russian Scientific Research Institute of Technical Physics
3. Mayak Production Association
4. Ural Electrochemical Integrated Plant
5. Siberian Group of Chemical Enterprises
6. Mining and Chemical Combine
7. Electrochemical Plant

Russian civilian sites

8. Institute of Physics and Power Engineering
9. All-Russia Research Institute of Inorganic Materials
10. Elektrostal Machine Building Plant
11. Luch Federal State Unitarian Enterprise Scientific Production Association
12. State Scientific Center Research Institute of Atomic Reactors
13. Khlopin Radium Institute
14. Petersburg Nuclear Physics Institute
15. Sevmash Shipyard
16. Joint Institute of Nuclear Research
17. Karpov Institute of Physical Chemistry
18. Institute of Theoretical and Experimental Physics
19. Moscow Engineering and Physics Institute
20. Experimental Machine Building Design Bureau
21. Research Institute for Scientific Instruments
22. Kurchatov Institute
23. Institute of Nuclear Materials
24. Institute of Physics and Technology
25. Atomflot Port

Source: GAO analysis of a National Nuclear Security Administration document. | GAO-20-392

- **Russian Ministry of Defense.** DOD and NNSA supported Russian efforts to secure Russian Ministry of Defense nuclear warheads and strategic rocket sites. That work is outside the scope of this report.

NNSA's Material Protection Control and Accounting (MPC&A) Program

The MPC&A program was the primary NNSA program that worked with Russia to help improve Russia's ability to secure its nuclear materials and its nuclear warheads. To secure Russia's nuclear materials, the program consisted of three main efforts:

- **Site-level projects.** NNSA managed MPC&A projects at the 25 Russian nuclear material sites to upgrade security systems at those sites. Teams of specialists from across DOE's national laboratories, referred to as U.S. project teams, identified and carried out MPC&A upgrades on behalf of NNSA. MPC&A includes the following types of security systems, among other things:
  - physical protection systems, such as fences around buildings containing nuclear materials and metal doors protecting rooms where nuclear materials are stored;
  - material control systems, such as seals attached to nuclear material containers to indicate whether material has been stolen from the containers, and badge systems that allow only authorized personnel into areas containing nuclear material; and
  - material accounting systems, such as nuclear measurement equipment and computerized databases to inventory the amount and type of nuclear material contained in specific buildings and to track their location. Material control and material accounting are collectively known as material control and accounting.
- **National-level projects.** NNSA managed cross-cutting projects to enhance Russia's national-level infrastructure to sustain MPC&A systems for nuclear materials, including enhancing Russian nuclear security culture, developing Russian regulations for MPC&A operations, and strengthening Russian inspection and oversight capabilities.
- **Sustainability support for individual sites.** NNSA also fostered development of MPC&A sustainability practices and procedures at the Russian nuclear material sites based on seven sustainability elements, such as the presence at the site of an effective MPC&A management structure that plans, implements, tests, and evaluates the site's MPC&A systems.

NNSA Completed Many of Its Planned Nuclear Security Efforts in Russia, and Had Concerns about the Sustainability of These Efforts When Cooperation Ended

Based on our review of available NNSA documentation and interviews with project team personnel, we found that NNSA had completed many—but not all—site-level MPC&A projects at the 25 Russian nuclear material sites when cooperation ended in 2014. NNSA also made progress on 11 cross-cutting projects that were intended to improve Russia's national-level nuclear material security infrastructure. In addition, NNSA made progress on supporting the ability of the 25 Russian sites to sustain nuclear material security efforts. However, at the time cooperation ended, NNSA still had a number of concerns about both the sustainability of nuclear security efforts at the 25 sites and the state of Russia's national-level nuclear material security infrastructure.

NNSA Completed Many but Not All Site-Level Projects at the 25 Russian Nuclear Material Sites

Based on our review of available NNSA documentation and interviews with stakeholders, we determined that NNSA completed many MPC&A projects at the 25 Russian nuclear material sites, and stakeholders said that these upgrades significantly improved the state of nuclear material security at the sites. In particular, they told us that during the early years of the MPC&A program, the program completed upgrades focused primarily on the most significant security gaps, and in later years the program became more focused on transitioning the responsibility for sustaining nuclear security efforts to Russia. However, not all work was completed before cooperation ended, and project team members told us that the extent of completion varied by site. For example, project team members estimated that 90 percent of MPC&A projects were completed at one site, but that projects at other sites had lower levels of project completion.

NNSA was unable to provide a complete set of documents detailing all projects completed and not completed across the 25 sites because several projects were consolidated into continuing programs and have not yet been closed out. In addition, the available site documentation did not always include detailed information on all projects completed or not

completed. As a result we could not quantify how much planned work was completed and not completed when cooperation ended across all 25 sites. However, based on our review of available NNSA documents, we were able to identify many completed projects that included specific types of physical protection measures, material access controls, and material accounting upgrades.

Project team members we interviewed and documentation we reviewed also indicated that some projects were not completed when cooperation ended. NNSA documentation identifies a variety of uncompleted projects at specific sites, such as not constructing or upgrading perimeter fencing, not replacing aging physical protection equipment, and not upgrading entry control points with vehicle radiation monitors. For example, at one site there were several kilometers of modernized perimeter fencing, guard towers, and sensors that had not been completely installed by the time cooperation ended, according to NNSA documents and project team members. Project team members told us that the site had plans to complete these projects. However, because Russia ended cooperation, the project team was unable to verify that the equipment was installed or operating appropriately. Similarly, project team members told us about two major efforts at another site that were terminated by Russia when cooperation ended: a $1 million project to relocate the guard force building to reduce the reaction time for protective forces and a $300,000 project to update software for the central alarm station and other security systems. According to project team members, the contracts were agreed to and associated costs obligated by NNSA, but Russia ended cooperation before signing the agreements.[13]

In addition, in our 2010 classified report, we found that NNSA faced challenges in implementing MPC&A upgrades against insider and outsider threats at some Russian nuclear material facilities to reduce the risk of material theft. At the time of the 2010 report, NNSA had proposed MPC&A upgrades at certain Russian sites to address these concerns, and GAO found that progress in implementing upgrades at some locations and in some MPC&A technical areas had been limited. For our classified report issued in December 2019, we asked NNSA for an update on the status of these upgrades; in response to our request, NNSA

[13]According to NNSA officials, after the end of cooperation, funds previously obligated for the MPC&A program were used to close out MPC&A projects in Russia or reprogrammed within NNSA to support other nuclear security efforts.

officials told us that due to a lack of cooperation, they had not received additional information from Russian counterparts to determine the status of these upgrades.

NNSA Made Substantial Progress on Its Projects to Support Russia's National-Level Nuclear Material Security Infrastructure, but Some Work Was Not Completed When Cooperation Ended

In addition to site-level MPC&A security projects, NNSA managed 11 cross-cutting projects to support Russia's national-level nuclear material security infrastructure, such as projects to enhance Russian nuclear security culture, develop Russian regulations for MPC&A operations, and strengthen Russian MPC&A inspection and oversight capabilities.[14] We found that—at the time cooperation ended in 2014—NNSA had made substantial progress on its cross-cutting projects. NNSA reported that work was fully completed or mostly completed on at least 10 of the 11 cross-cutting projects by the time cooperation ended. However, NNSA could not provide complete documentation detailing the level of progress for some of these projects. See table 1 below for a description of these project areas.

Table 1: The National Nuclear Security Administration's (NNSA) 11 Cross-Cutting Projects to Support National-Level Russian Nuclear Material Security

Project area	Goal
Regulations development	Provide a civilian regulatory structure in Russia for an integrated Material Protection, Control, and Accounting (MPC&A) program
Inspections	Enhance Russian MPC&A inspections by establishing an infrastructure with sufficient resources to enforce MPC&A regulations though federal and industry oversight
Material control and accountability measurements	Assist Russia in improving the security of weapon-usable material at high risk of theft or diversion, through development and support of a sustainable and effective measurement-based material control and accounting program
Rosatom training and technical support infrastructure project	Develop cost-effective, self-sustaining, and accessible training and technical support for upgraded MPC&A systems in Russia
MPC&A Education	Educate the next generation of Russian safeguards and security specialists to secure special nuclear materials

[14]In 2010, we reported on the progress NNSA had made with Russian agencies and organizations on enhancing national-level MPC&A infrastructure on these 11 projects and we found that more work needed to be done in several of these projects. GAO-11-227.

Project area	Goal
MPC&A Operations Monitoring (MOM)	Install MOM systems at non-Rosatom nuclear sites in Russia with completed MPC&A upgrades to provide increased confidence that the upgrades continue to operate effectively
Transportation security	Work with Rosatom to improve the security of Russian nuclear materials in transit
Protective force	Ensure that a sufficient number of organized, equipped, and trained protective force personnel are present to provide balanced protection against all design basis threats to Russian special nuclear material
Federal information systems	Operate and upgrade a Russian system designed to systematically collect, process, and analyze site reports on quantities of nuclear materials and inventory changes
Certification and taxation	Improve Russia's ability to certify MPC&A system-related equipment and software effectively and in a timely manner
Nuclear security culture	Develop Russian regulatory requirements, evaluation criteria and methodologies, and training programs to enhance nuclear security culture at the site level, including creating a nuclear security culture enhancement program at each site

Source: GAO presentation of NNSA information. | GAO-20-392

We found that NNSA had planned to do more work on some national-level projects, but that the end of cooperation in 2014 resulted in some planned work not being completed. For example, in the case of regulations development, project team members told us that the project teams had planned to develop numerous regulations with Rosatom, but these were not completed because of the end of cooperation.

NNSA Made Some Progress on Improving Sites' Abilities to Sustain Security Efforts, but NNSA Had Remaining Concerns about Sustainability When Cooperation Ended

As part of its plan to shift to Russia the responsibility for nuclear material security efforts, NNSA supported the adoption of MPC&A sustainability practices and procedures at the individual Russian nuclear material sites based on seven "sustainability elements." NNSA identified these elements, such as performance testing of systems to evaluate MPC&A effectiveness, as being fundamental to the long-term sustainability of a modern nuclear material security system. See table 2 below for more information about the seven sustainability elements.

Table 2: Seven Elements of Material Protection, Control, and Accounting (MPC&A) Sustainability and Selected Indicators, 2013 Sustainability and Transition Guidelines

Element	Description	Selected indicators
Site MPC&A organization	MPC&A organizations at the site level plan, coordinate, implement, test, and evaluate MPC&A operations and have clearly defined roles and responsibilities to carry out all of their duties.	• Site has an established and documented MPC&A organization with clear roles and responsibilities. • Site has developed MPC&A plans of its own. • Site has a mechanism to coordinate activities between organizations at the site and with other agencies.
Site-level MPC&A documentation	MPC&A personnel follow existing regulatory requirements for using systems, equipment, and technologies to ensure security of nuclear materials at the sites and during transportation. The development of regulatory requirements takes into account data from vulnerability assessments and is customized to technical processes for handling nuclear materials.	• Site has written procedures for all key MPC&A activities. • Site procedures conform to Russian regulations. • Site has a process for evaluation of procedures.
Training	MPC&A training programs ensure that site personnel have the requisite knowledge, skills, and abilities to perform necessary MPC&A operations.	• Site has established and resourced on-site training. • Site training plan defines scope and schedule of training for effective MPC&A operations.
Operational cost analysis	Site understands all the costs involved in operating its MPC&A program.	• Site has identified life-cycle costs, capital replacement costs, and other costs for MPC&A equipment. • Site has developed and documented procedures to determine costs and to plan for expenditures.
Equipment maintenance, repair, and calibration	Timely preventive maintenance, repair, and calibration of equipment provide for the efficient operation of all system components.	• Site has evaluated MPC&A system maintenance requirements. • Site has developed a master list of MPC&A equipment installed and maintenance or replacement, or both, requirements. • Site has spare-parts supply and equipment warranties or replacement service contracts.
Performance testing	Performance testing ensures that key MPC&A activities are performed in accordance with site operating procedures, that critical systems are operating as intended, and site procedures are in accordance with Russian regulations.	• Site has internal review program to evaluate MPC&A performance. • Site is identifying and correcting MPC&A deficiencies • Site tracks number and type of MPC&A incidents.
MPC&A system configuration management	To sustain effective operation of MPC&A systems, it is necessary to document all elements of the MPC&A systems, and review, authorize and coordinate changes to these systems' configurations.	• Changes to MPC&A system configuration are reviewed by appropriate staff to verify system effectiveness is not degraded. • Changes in configuration are communicated to and understood by site staff.

Source: GAO analysis of 2013 National Nuclear Security Administration Sustainability and Transition Guidelines. | GAO-20-392

To determine a site's ability to sustain its security systems, project teams periodically assessed each site based on the seven elements, and rated sites in each element on a scale from low to high. In our 2010 classified report, we reported the results of these sustainability assessments across

the 25 Russian nuclear material sites and found that the MPC&A program had made limited progress and faced challenges in developing effective practices and procedures consistent with the seven elements of sustainability. For our classified report issued in December 2019, we reviewed and reported on the most recent sustainability assessments, largely conducted between 2012 and 2014.[15]

We compared the ratings from the most recently completed site sustainability assessments for the same 25 sites to the ratings we reported in 2010. We found that sustainability ratings generally improved, but low scores persisted at many sites and in some sustainability areas.[16] For example, we found that the number of high ratings increased over this period by about half, and the number of low ratings decreased by about half. We believe this indicates general progress in improving sustainability across the sites. Of the seven sustainability elements, the MPC&A organization sustainability element was the element most frequently rated as "high" in the most recent assessment, and it showed the most improvement across the 25 sites. This indicates that the ability of Russian site organizations to plan and coordinate MPC&A operations had improved.

We also found in our review of these assessments that NNSA had continuing concerns when cooperation ended about both the sustainability of MPC&A upgrades at individual Russian sites and the state of the national-level nuclear material security infrastructure in Russia. In their final reports after cooperation ended, U.S. project teams documented ongoing concerns with the sustainability of MPC&A upgrades at Russian nuclear material sites. We reviewed the concerns in the 25 final site summary documents and interviewed project team members who provided additional examples of these concerns. Based on our documentation review and interviews with project team members, we

[15]According to NNSA sustainability guidelines issued in 2013, project teams were to rate the degree to which Russian sites or organizations met the principles of each sustainability element using a scale of low, medium, high, or unknown.

[16]NNSA periodically updated the sustainability guidelines and the elements that project teams used to assess site sustainability. NNSA updated the sustainability guidelines in 2013—after our 2010 classified report—and modified some of the descriptions of the seven elements. Therefore some of the descriptions of the sustainability elements used to assess sites in the 2014 assessments may differ slightly from the elements we reported in 2010. According to NNSA officials, the seven elements were similar enough across this period that our comparison of ratings is valid.

identified the six most common areas of concerns, including: (1) the responsiveness of protective forces, (2) performance testing the effectiveness of MPC&A systems, (3) sustainment funding, (4) physical protection systems, (5) nuclear security culture, and (6) access and cooperation at Russian sites.

Stakeholders we interviewed highlighted a number of national-level concerns in other areas, such as the state of security equipment. Project team members were concerned that some of the equipment provided in the early years of cooperation had become outdated or obsolete by the time cooperation ended, such as surveillance cameras and monitoring equipment, and would need to be replaced.

Little Information Is Available on Security at Russian Sites, but Nongovernmental Experts Raised Concerns about Insider Theft Risks

There is little specific information available about the current state of security at Russian nuclear material sites, though anecdotal evidence suggests that nuclear material security regulations have improved and that Russia funds some nuclear security efforts. We interviewed DOE officials and national laboratory personnel about security risks and threats to Russian nuclear material security. The details of these conversations are classified. However, according to nongovernmental experts we interviewed, the theft of nuclear materials by insiders is currently considered the greatest threat to Russia's nuclear materials.

Little Specific Information Is Available about Nuclear Security at Russian Sites, but Some Information Exists on National-Level Regulatory Efforts and Security Funding

According to stakeholders, little information is available about site-level security currently at the 25 sites holding Russian nuclear material, including the status of U.S. upgrades funded through the MPC&A program. Stakeholders told us that this is primarily because U.S. personnel no longer have access to the sites to observe security improvements and discuss MPC&A practices with Russian site personnel.

According to DOE officials, the ability of U.S. project teams and other personnel to visit Russian nuclear material sites helped provide

transparency into the state of Russian security at these facilities, such as the status of radiation portal monitors at entry points within nuclear material storage buildings. Since the end of cooperation, few U.S. personnel have visited Russia's nuclear material sites, greatly limiting transparency into the status of U.S. security investments and Russian security practices.

According to NNSA officials and U.S. project team personnel, NNSA documentation—such as the U.S. project team closeout documents that are referred to above—are based on observations primarily from 2014 or earlier. This documentation provides the most recent direct assessments of security at the site level. These officials stated that while such reports are useful for identifying the state of Russian nuclear material site security at the time cooperation ended, they likely do not provide an accurate picture of the nuclear material security at the 25 sites currently.

Regarding national-level efforts in Russia to support nuclear security in the country, stakeholders we interviewed said that information exists in two main areas: development of nuclear security regulations and nuclear security funding.

- **Development of nuclear security regulations.** According to stakeholders, Russia has improved its nuclear security regulations in recent years, including since cooperation ended in 2014. Although U.S. efforts to help Rosatom develop modern MPC&A regulations ended in 2014, NNSA has continued work with Rostekhnadzor to improve Russian nuclear material security regulations through a national-level MPC&A sustainability project.[17] Stakeholders said that this project has resulted in Russian nuclear security regulatory improvements. For example, this project provided technical support on 11 regulations, including regulations to improve vulnerability

[17]While most MPC&A projects closed following Russia's ending of cooperation in December 2014, NNSA continued a few national- and site-level activities that operated under existing contracts, according to NNSA officials. These few remaining activities—including some regulatory assistance activities in Russia—fall within the Russian Bilateral Engagement project at NNSA. According to NNSA officials, while most assistance to Russia was prohibited by congressional action, NNSA determined that best practices and technical exchanges with Russian entities—such as those within the Russian Bilateral Engagement Project—were not assistance to Russia, as these involved cost-sharing and the mutually beneficial exchange of ideas on national and global security matters.

assessments of nuclear sites and nuclear materials in transit. However, stakeholders also noted some limitations. For example, they stated that compliance with regulations at nuclear material sites is mostly unknown. Similarly, the effectiveness of enforcement in cases of noncompliance is unknown, though fines are thought to be negligible.

- **Nuclear security funding.** Information on nuclear security funding is limited, according to stakeholders. Some stakeholders we interviewed stated that, based on their experiences and conversations with Russian officials, they believed that Russia was generally providing sufficient funding for nuclear material security at sites.[18] However, others doubted that Russia was providing sufficient resources to replace the funding lost when the U.S. MPC&A program ended. Stakeholders generally agreed that funding for nuclear security likely varies by site. A few stakeholders expressed concern that security at nuclear material sites could be one of the first areas cut during an economic downturn, as nuclear security is not seen to be as significant a priority for site managers as other operations and revenue-generating activities at the sites.

Nongovernmental Experts Raised Concerns about Insider Theft Risks to Russian Nuclear Materials

We interviewed DOE officials and national laboratory personnel about security risks and threats to Russian nuclear material security. The details of these conversations are classified. However, according to nongovernmental experts we interviewed, the theft of nuclear materials by insiders is currently considered the greatest threat to Russia's nuclear materials.

According to nongovernmental experts we interviewed, Russia's nuclear security culture generally does not prioritize protection against the threat of nuclear material theft by insiders, a threat that modern nuclear security systems are designed and maintained to prevent. For example, experts said that Russian nuclear material site managers were more likely to

[18]According to one nongovernmental expert, funding for nuclear security can come from multiple sources in Russia, including the Russian federal budget, Rosatom, and revenue generated by the nuclear material sites themselves. According to this expert, sites in Russia that generated their own income—such as through the sale of medical isotopes produced at a site—were better able to provide for nuclear security funding.

devote resources—such as training, manpower, and funding— to measures that protect facilities from outsider threats, and less likely to devote resources to measures that protect facilities against insider threats. Experts told us that while the MPC&A program advanced Russian appreciation of the insider threat during the period of cooperation, they were concerned that—without U.S. influence and training—protection against insider threats would still be insufficient and likely ignored unless the Russian government required such protection, which was not the case when cooperation ended. As a result, according to experts, Russian sites are likely not currently supporting MPC&A systems adequately to counter insider threats.

One nongovernmental expert noted that Russian security services have assumed greater control and tightened security in the closed cities that contain the vast majority of Russia's nuclear materials, and that this may have reduced the near-term threat from insiders. However, according to this expert, over time this reliance on the security services could create vulnerabilities. For example, some Russian sites may rely too heavily on the physical security elements of nuclear security systems—such as guard forces—to protect nuclear materials and may become complacent in modernizing other elements, such as material control and accounting practices to deter and prevent insider theft risks, or measures that can protect against other emerging, nontraditional threats such as drone or cyber risks.

According to nongovernmental experts, other factors in the country may also exacerbate the risk of theft posed by both outsiders and insiders to Russia's nuclear materials. For example, experts said the existence of massive amounts of weapons-usable nuclear materials at many dispersed sites across Russia is the primary factor that makes Russia's nuclear materials a greater threat than the nuclear materials held in most other countries. In addition, according to experts, persistent corruption and existing terrorist groups near some of the closed cities are other contributing factors that could further increase the risk of theft.

According to Stakeholders, Opportunities May Exist for Cooperation to Improve Russian

Nuclear Material Security, but Such Cooperation Would Face Challenges

According to stakeholders, there could be opportunities to help Russia improve aspects of its nuclear security system that NNSA and others identified as continuing risks. However, stakeholders noted that any future cooperation would likely be limited in scope and would face considerable political challenges.

Future Cooperation Would Likely Be Limited but Could Still Help Address Remaining Nuclear Material Security Risks in Russia

According to stakeholders we interviewed, there could be opportunities for future U.S.-Russia cooperation to address some of the continuing nuclear security risks in Russia. However, stakeholders said that any future cooperation would likely differ dramatically from the donor-recipient model of the past MPC&A program. The Russian government would likely expect to be treated as an equal and would not want to be seen as a recipient of U.S. funds for infrastructure improvements. Therefore, the scope of future cooperation would likely be a limited partnership, would primarily involve training and information sharing rather than directly supporting security upgrades at Russian sites, and would require fewer U.S. resources than the past MPC&A program did.

Stakeholders told us that engagement and cooperation are important because of the size of the Russian nuclear complex, the large amounts of Russian nuclear material, and the continuing security concerns in certain areas. Stakeholders told us they believed there would be security benefits to the United States in resuming nuclear security cooperation with Russia in some form. Stakeholders generally identified increased transparency and advancing security best practices as the two main benefits to nuclear security cooperation.

Stakeholders we spoke to identified examples of opportunities for cooperation that could support U.S. interests by providing information on the security of Russia’s nuclear materials and by helping Russia improve nuclear material security practices and procedures. These include the following:

- **Exchange of best practices.** Stakeholders noted that the United States and Russia could share MPC&A best practices in conferences and workshops. Best practices could cover areas such as performance testing of MPC&A systems, insider threat protection, and material control and accounting. Some stakeholders said that Russian expertise, such as in nuclear forensics, could increase U.S. knowledge and potentially improve U.S. practices in certain areas.[19]
- **Technical exchanges.** Stakeholders told us that there could be benefits to both the United States and Russia from reciprocal technical exchanges or meetings of nuclear security experts to review specific, technical MPC&A practices that each country employs. National laboratory personnel noted that past exchanges under the MPC&A program allowed Russian personnel to view MPC&A systems at U.S. facilities, which helped Russian personnel understand the features of modern MPC&A systems, such as insider threat prevention measures. U.S. personnel participated in reciprocal visits to view security measures at sites in Russia, which helped them understand Russian security practices. Stakeholders told us that such technical exchanges could help U.S. personnel better understand the state of Russian nuclear security funding and current Russian practices.
- **Training.** Experts and national laboratory personnel noted that training Russian personnel on technical matters—such as how to conduct comprehensive vulnerability assessments—could improve Russian security practices.
- **Conversations on legal agreements.** Some stakeholders said that initiating conversations with Russia on the status of existing but suspended legal agreements could provide an opening for other forms of cooperation. For example, a few stakeholders mentioned an existing—but suspended—research and development agreement from 2013 under which future nuclear security cooperation might be

[19]Nuclear forensics involves the investigation of nuclear material to find evidence of its source, trafficking, signature, and use.

pursued if both parties were interested in reactivating the agreement.[20]

- **Cooperation within multilateral organizations.** Some stakeholders noted that existing multilateral organizations, such as the International Atomic Energy Agency (IAEA) and the Global Initiative to Combat Nuclear Terrorism, could provide venues for the United States to pursue cooperative opportunities with Russia.[21] For example, Russia and the United States could cooperate on developing recommendations to the IAEA on physical protection measures for nuclear material, which could then be shared with IAEA member states.
- **Other opportunities.** The Nuclear Threat Initiative, a U.S. nongovernmental organization (NGO), and the Center for Energy and Security Studies, a Russian NGO, coauthored a report that identified 51 mutually beneficial opportunities to cooperate in nuclear security, nuclear safety, nuclear energy, nuclear science, and nuclear environmental remediation.[22] For example, the report identifies an opportunity for Russian and U.S. experts to establish a joint research and development program to improve nuclear security technologies to address emerging threats to nuclear material storage sites, such as drones.

Russia would likely insist that it and the United States be seen as equal partners under any future arrangement or program for cooperation on nuclear security, according to stakeholders. However, U.S. project team personnel told us that Russian nuclear material sites often lack the financial resources to pay travel costs for Russian personnel or to cover

[20]United States and Russia, *Agreement between the Government of the United States of America and the Government of the Russian Federation on Cooperation in Nuclear- and Energy-Related Scientific Research and Development* (Vienna, Austria: Sept. 16, 2013).

[21]The IAEA is an independent international organization based in Vienna, Austria, that is affiliated with the United Nations and has the dual mission of promoting the peaceful uses of nuclear energy and verifying that nuclear technologies and materials intended for peaceful purposes are not diverted to weapons development efforts. The Global Initiative to Combat Nuclear Terrorism is a voluntary international partnership of 88 partner nations and six international organizations that are committed to strengthening global capacity to prevent, detect, and respond to nuclear terrorism. The initiative is jointly chaired by the United States and Russia.

[22]Nuclear Threat Initiative and the Center for Energy and Security Studies, *Pathways to Cooperation: A Menu of Potential U.S.-Russian Cooperative Projects in the Nuclear Sphere* (February 2017).

costs for venues or workshops necessary for training or the exchange of best practices. Therefore, the level of funding to support any potential future cooperation might be disproportionate between the United States and Russia. Because we were unable to obtain views from Russian officials and Russian nuclear material site representatives, we were unable to establish the extent to which Russia would be willing to pursue any form of nuclear material security cooperation with the United States, regardless of funding sources and requirements.

Potential Cooperation Faces Significant Challenges

Stakeholders we interviewed were generally pessimistic about cooperation under the current political and diplomatic climate, and they noted that the deterioration of political relations is the most significant challenge to any future cooperation. Stakeholders identified other specific challenges, including the following:

- **Funding prohibition.** Some stakeholders said that provisions in recent appropriations acts and National Defense Authorization Acts (NDAA) prohibiting NNSA from funding nuclear security activities in Russia have been obstacles to cooperating on nuclear security matters. In a report submitted to Congress in May 2019, NNSA stated that "the lack of ability to sign new contracts or engage on a modest scale denies NNSA the insights necessary to directly monitor nuclear material security in Russia and the sustainment of past security improvements."[23] According to U.S. officials and U.S. project team personnel, the prohibition largely prevents U.S. personnel from sharing best practices with and training Russian counterparts, and the existence of the prohibition discourages U.S. and Russian personnel from interacting and maintaining relationships. Although the acts allow the Secretary of Energy to waive the prohibition under certain conditions, no secretary has done so since a prohibition was first included in the fiscal year 2015 appropriations act. In addition, according to NNSA officials we interviewed, the language describing waiver requirements in NDAAs has become more restrictive in recent years. Initially, the Secretary of Energy could waive the prohibition on the basis of a notification to certain congressional committees that the waiver was in the national security interest of the United States, an

[23]National Nuclear Security Administration, Report to Congress, *Sustainment of NNSA-Funded Security Improvements in Russia* (Washington, D.C.: May 2019).

accompanying justification, and the passage of 15 days. Starting with the fiscal year 2017 NDAA, however, a waiver can only be issued if it is necessary to address an urgent nuclear-related threat in Russia, and any such waiver requires concurrence from the Secretary of Defense and the Secretary of State.

- **Russian conditions on cooperation.** Stakeholders we interviewed said that Russia has set conditions on any future nuclear security cooperation. For example, they said that Russia has indicated that it is unwilling to discuss nuclear security cooperation with the United States unless the United States is willing to discuss related areas, such as nuclear energy, nuclear safety, and nuclear science. According to stakeholders, in the past the United States has been unwilling to discuss these other areas as a condition for cooperating on nuclear security.
- **Russian antagonism to U.S. security efforts.** Stakeholders noted antagonism at some levels of the Russian government toward U.S. nuclear security efforts. For example, although Russia participates in nuclear security efforts at the IAEA, some stakeholders noted that Russia regularly obstructs U.S. initiatives and recommendations in that organization.

As noted above, stakeholders view the general deterioration of political relations between the United States and Russia as the greatest challenge to cooperation, and it is not clear whether Russia is prepared to reengage with the United States on these or other options for rekindling U.S.-Russian nuclear security cooperation. We reached out to the Russian government to request meetings with Russian government officials and representatives of nuclear material sites who could provide Russian perspectives on efforts to secure Russia's nuclear materials, the status of past U.S. nuclear material security investments, and potential opportunities for cooperation. The Russian government declined our requests to meet with these officials and site representatives. Therefore, without Russian perspectives on the likelihood of possible future cooperation, we were unable to determine whether changes to U.S. policy, such as lifting the funding prohibition, would have any meaningful effect on the status of nuclear security cooperation between the United States and Russia.

Agency Comments

We provided a draft of the classified version of this report to NNSA for review and comment. NNSA had no comments on the report.

We are sending copies of this product to the Senate Armed Services Committee, the NNSA Administrator, and the Secretaries of Defense and State. In addition, the report is available at no charge on the GAO website at http://www.gao.gov.

If you or your staff have any questions about this report, please contact me at (202) 512-3841 or trimbled@gao.gov. Contact points for our Offices of Congressional Relations and Public Affairs may be found on the last page of this report. GAO staff who made major contributions to this report are listed in appendix II.

David C. Trimble
Director, Natural Resources and Environment

Appendix I: Objectives, Scope, and Methodology

This report (1) examines the extent to which the National Nuclear Security Administration's (NNSA) planned nuclear material security efforts in Russia were completed when cooperation ended and what nuclear security concerns remained, (2) describes what is known about the current state of nuclear material security in Russia, and (3) describes stakeholder views on potential opportunities for future U.S.-Russian nuclear security cooperation.

For all three objectives, we identified and interviewed relevant stakeholders, including U.S. government officials from NNSA, the Department of Energy (DOE), the State Department, and the Department of Defense; experts on Russian nuclear security from academia and nongovernmental organizations (NGO); and knowledgeable personnel at six U.S. national laboratories that supported U.S. nuclear security efforts in Russia, including personnel at Brookhaven National Laboratory, Lawrence Livermore National Laboratory, Los Alamos National Laboratory, Oak Ridge National Laboratory, Pacific Northwest National Laboratory, and Sandia National Laboratory. We identified the stakeholders by contacting government agencies and NGOs with nuclear security expertise and asking them to identify other knowledgeable stakeholders. We reached out to these other knowledgeable stakeholders and interviewed those who responded and were willing to speak with us. To identify nongovernmental experts, we compiled a list of individuals who stakeholders identified as having expertise in the area of nuclear security in Russia. We also worked with a staff librarian to conduct an independent search of published literature to identify nongovernmental experts who had authored multiple publications related to Russian nuclear security. In addition, to ascertain whether an individual should be considered a nongovernmental expert, we considered other information, such as invitations to speak at nuclear security panels, being an editor of nuclear security related journals, and relevant positions in academic and other nongovernmental institutions. We interviewed six nongovernmental experts who fit these criteria.

To examine the extent to which NNSA's planned nuclear material security efforts in Russia were completed when cooperation ended and what

nuclear security concerns remained, we reviewed documents prepared by NNSA and the national laboratories for each of the 25 nuclear material sites in Russia where the United States worked previously with Russia to improve security. To identify NNSA sustainability programs at a national level, we reviewed GAO reports and NNSA project documentation. We also reviewed NNSA guidelines that detailed how project teams were to support and assess the ability of Russian sites to sustain their material protection, control, and accounting (MPC&A) systems. We reviewed the NNSA documents that assessed site sustainability and analyzed how site sustainability had changed at sites by the end of cooperation. These documents included project team assessments for each of the 25 sites in seven different sustainability elements. In these assessments, project teams provided ratings from low to high on the extent to which sites were prepared to sustain these areas. We also reviewed NNSA documents and identified concerns that site teams documented about site sustainability. We then analyzed the concerns from the 25 sites and grouped similar concerns into categories. We developed these categories based on the similarity of the concerns, definitions of key nuclear security areas in NNSA documents, and professional judgement. We then identified the six concerns that appeared most frequently, which accounted for about 70 percent of all concerns.

To describe what is known about the current state of nuclear security in Russia—in addition to interviews with our stakeholder group—we reviewed U.S. government and open-source documents. Specifically, we reviewed reports from the International Panel on Fissile Materials, the Nuclear Threat Institute, the National Academies of Science, and a national laboratory; articles on Russian nuclear security; and periodic reports on Russian nuclear security published by an expert independent consultant. In addition to general internet searches for published documents relating to Russian nuclear security and the MPC&A program, we conducted literature searches of published materials with assistance from a staff librarian; we excluded from our literature review any search results that were published prior to 2014 or were not related to nuclear material security in Russia. In addition to unclassified interviews with U.S. government officials on Russian nuclear material security, we received classified briefings from DOE. We requested threat and risk information relating to Russian nuclear material security from the Central Intelligence Agency, but we were not provided this information.

To describe stakeholder views on potential opportunities for future U.S.-Russia nuclear security cooperation, we interviewed those in our stakeholder group identified above. We also reviewed administration

plans and reports, including the National Security Strategy, the National Strategy for Countering Weapons of Mass Destruction Terrorism, and NNSA's May 2019 Report to Congress describing NNSA's funding of nuclear security improvements in Russia. To inform our understanding of the prohibition on NNSA's expenditures on nuclear security in Russia, we reviewed laws since fiscal year 2015 that restricted relevant NNSA funding in some way. In addition, to obtain Russian perspectives on nuclear material security and past U.S. efforts, we requested—through the State Department and the U.S. Embassy in Moscow—interviews with Russian officials at relevant Russian agencies and representatives at five Russian nuclear material sites. However, the Russian government declined our request to meet with these officials and representatives.

Appendix II: GAO Contact and Staff Acknowledgments

GAO Contact

David Trimble, (202) 512-3841 or trimbled@gao.gov

Staff Acknowledgments

In addition to the contact named above, William Hoehn (Assistant Director), Dave Messman (Analyst in Charge), and Dan Will made key contributions to this report. Antoinette Capaccio, Ellen Fried, Greg Marchand, Dan Royer, and Sara Sullivan also contributed to this report.

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