Russia, U.S. Sign Plutonium Disposition Pact

Russia and the United States last month signed an agreement clearing the way for Russia to turn dozens of tons of weapons-grade plutonium into reactor fuel.

Secretary of State Hillary Rodham Clinton and Russian Foreign Minister Sergey Lavrov signed the accord in Washington April 13, during the nuclear security summit convened by President Barack Obama.

The new agreement is a protocol to a 2000 pact, known as the Plutonium Management and Disposition Agreement (PMDA), that commits each side to the disposition of at least 34 metric tons of surplus weapons plutonium. The combined 68 metric tons of plutonium is “enough material for approximately 17,000 nuclear weapons,” the Department of State said in a document released in conjunction with the signing.

Under the earlier version of the plan, Russia would have turned the plutonium into mixed-oxide (MOX) fuel—so called because it is a mix of plutonium and uranium oxides—for use in Russian light-water reactors (LWRs). That effort stalled over programmatic, financial, and legal differences.

A main issue, as the State Department document put it, was that “the Russian program set forth in 2000 proved incompatible with Russia’s nuclear energy strategy and was, thus, not financially viable.”

U.S. officials and others have long said that Russia never fully supported the plan for LWR disposition, preferring instead to use fast-neutron reactors. Russia and the United States eventually began renegotiating that aspect of the agreement and in November 2007 issued a joint statement outlining a plan for use of fast-neutron reactors by Russia. They said they planned to negotiate a protocol to change the PMDA accordingly. (See ACT, December 2007.)

The Obama administration’s fiscal year 2011 budget request, which was released Feb. 1, said the two sides had “completed negotiations” on the protocol and expected to sign the new document “in early 2010.” (See ACT, March 2010.)

The administration requested $113 million for fissile material disposition in Russia. In an April 21 interview, a U.S. official said “Congress made clear” that it wanted the protocol signed before it approved the funding request.

The switch to fast-neutron reactors has drawn criticism from some nonproliferation specialists because such reactors, unlike LWRs, can produce more plutonium than they consume. The protocol includes “certain nonproliferation conditions,” as the State Department described them, that are designed to minimize the potential nonproliferation drawbacks of using fast-neutron reactors.

Another significant change from the original PMDA is that the protocol caps total U.S. funding for the effort at the $400 million amount that the United States previously pledged. As the protocol notes, the funding is subject to U.S. congressional appropriations decisions.

In his remarks at the signing ceremony, Lavrov said the Russian government would spend about...
$2.5 billion on the effort.

Under the original plan, the United States had spearheaded a multinational effort to fund the Russian disposition effort. According to the protocol, Russia and the United States will “seek other donor funding that would be used to reduce Russian outlays,” but implementation of the program “will not be dependent” on contributions beyond the U.S. pledge.

**Spending, Nonproliferation Rules**

The protocol specifies that “up to $300 million” of the $400 million can be spent on “development and construction activities.” That money can be spent “beginning as early as 2010 and continuing thereafter,” the document says. “Not less than $100 million” is to be spent after disposition actually begins; expenditures are to be “based on a fixed rate per metric ton” of disposition, according to the protocol.

That funding is intended to serve as an “incentive,” the U.S. official said. The two sides have not yet determined the payment rate, he said.

Under the protocol, the $300 million sum can be used for a wide variety of activities, including those “associated with the development, construction, and modification of facilities for fabricating MOX fuel and long-term storage of spent plutonium fuel” and “development of a system for monitoring and inspections.”

The funding also can be used for certain types of work on the two fast-neutron reactors in which Russia would irradiate the MOX fuel—the BN-600, which is currently operating at the Beloyarsk site, and the larger BN-800, which is under construction at the same site. The protocol specifies that none of the U.S. funding shall be used for the construction of the BN-800, but the money can be used for “BN-800 core design.”

U.S. negotiators made clear to their Russian counterparts that the U.S. government was “not in a position of helping [the Russians] build their own reactors,” but it would help them redesign the BN-800 core so that it has a breeding ratio of less than one, the U.S. official said.

A breeding ratio of less than one means that the reactor is operating as a plutonium “burner,” consuming more plutonium than it produces, rather than as a breeder.

The protocol continues the restriction from the original PMDA that spent fuel containing the weapons plutonium cannot be reprocessed until after the disposition mission is completed. However, unlike the original PMDA, the protocol does provide for some reprocessing of other materials that may be irradiated in reactors used for disposition.

It says that “uranium assemblies that have been irradiated in the BN-600” can be reprocessed “if this does not result in the accumulation of new separated weapon-grade plutonium by itself or in combination with other materials.” The U.S. official said the provision was important to the Russians. The BN-600 will be operating with a partial MOX core, with only about one-quarter to one-third of the assemblies being MOX and the rest being uranium assemblies, he said. The Russians want to continue their current practice of reprocessing the uranium assemblies, he said, although the goal is to extract uranium rather than plutonium. The plutonium in this case is merely “an unfortunate byproduct,” the official said.

Under another new provision, “up to thirty (30) percent of the assemblies with fuel containing plutonium prior to irradiation that have been irradiated in the BN-800” can be reprocessed if the reprocessing is “for purposes of implementing research and development programs for technologies for closing the nuclear fuel cycle” in Russia and the United States. However, the protocol specifies that the exception applies only if “such assemblies do not contain disposition plutonium and such reprocessing does not result in the accumulation of new separated weapon-grade plutonium by itself or in combination with other materials.”

The U.S. official emphasized that it was not clear how vigorously Russia would pursue that option.
The 30 percent figure is an “upper limit for sure,” he said.

**Reduced Disposition Rate**

Under the protocol, each side “shall take all reasonable steps” to be able “to achieve a disposition rate of no less than 1.3 metric tons per year of disposition plutonium within as short a time as possible.” That figure represents a drop from the target disposition rate of 2 metric tons per year in the 2000 PMDA. The rate had to be reduced because the combined disposition capacity of the BN-600 and BN-800 is lower than that of the several LWRs that were to be used under the earlier agreement, the U.S. official said.

In the U.S. disposition program, the Department of Energy and its National Nuclear Security Administration (NNSA) have had difficulty securing agreements with U.S. utilities to take the MOX fuel that is to be fabricated at a plant now being built by an NNSA contractor at the Energy Department’s Savannah River Site in South Carolina. However, that was not a factor in the reduced goal for the disposition rate, the official said.

An NNSA press release at the time of the November 2007 preliminary agreement said the Russian reactors could dispose of “approximately 1.5 metric tons of Russian weapon plutonium per year.” That figure, the U.S. official said, was the “very best ballpark guesstimate,” and the new, slightly lower figure represents “technical refinements.”

The protocol adds that if ongoing work on a different kind of reactor, a gas-cooled high-temperature reactor, is successful, there could be “additional possibilities for increasing the disposition rate in the Russian Federation in 2019-2021.” Russia and the United States are cooperating on the development of that reactor.

According to the protocol, disposition in the BN-600 and the BN-800 “is targeted to begin in 2018.” The 2007 NNSA press release had said disposition in the BN-600 would begin in the “2012 timeframe” and in the BN-800 “soon thereafter.”

The U.S. official said the protocol uses the 2018 date “for symmetry reasons” because that is when U.S. reactors are supposed to start irradiating MOX fuel made from U.S. weapons plutonium, but an earlier start for the Russians is “not precluded.”

Once disposition starts, it probably will take 20 to 25 years to handle the 34 metric tons, the U.S. official said.

**Verification Issues**

With regard to monitoring and inspections, the protocol says that Russia and the United States “shall begin consultations with the International Atomic Energy Agency (IAEA) at an early date and undertake all other necessary steps to conclude appropriate agreements with the IAEA to allow it to implement verification measures with respect to each Party’s disposition program.”

In the April 21 interview, the U.S. official said those consultations had not yet started. He said he expected they would begin in “the May-June time frame,” adding that there had been “major progress” on monitoring and inspections during a March 12 meeting of the co-chairmen of the PMDA’s Joint Consultative Commission. According to the State Department’s April 13 document, the co-chairmen at that meeting “approved a number of key elements clarifying how monitoring and inspections will be developed and carried out.”

The U.S. official said he would expect those verification provisions to be “nailed down” before the United States expended new monies, but not necessarily before the protocol’s entry into force.

The target date for completing the verification provisions is “as early as possible next year” while entry into force is expected later this year, he said. The agreement will come into force when the two sides exchange diplomatic notes after each side has completed its “national procedures,” the protocol says.
Because it is an executive agreement, the protocol does not require congressional approval, although the administration must provide a formal notification to Congress, the U.S. official said. The Russians, however, have to submit the protocol to the Duma, he said.

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