

THE FUTURE OF THE US-RUSSIA PLUTONIUM MANAGEMENT DISPOSITION AGREEMENT

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ORIGIN, PURPOSE, AND PROBLEMS

- The initial Plutonium management and disposition agreement was concluded in 2000 and called for the United States and Russia to each dispose of 34 tons of excess weapons-grade plutonium
- Provided two benefits:
 - Serve as a symbol of irreversible disarmament at end of Cold War. Helped meet NPT Article VI commitments
 - Prevent Russian stockpiles from theft
- But for 14 years agreement largely has been held up by differing and sometimes shifting views on utility of plutonium as a fuel source and proliferation resistance of different plutonium grades:

DIFFERING VIEWS ON PLUTONIUM

- Russia
 - nuclear establishment invested in closed fuel cycle and operating without commercial constraints sees plutonium as a resource.
 - sees reactor-grade plutonium as of little risk for nuclear weapons; believes by irradiating weapons-plutonium substantially lowers risk
- United States
 - US reactors operate on an open fuel cycle; MOX fuel is regarded as a commercial loser—more expensive and riskier
 - US policy has generally opposed reprocessing since Ford and Carter administrations; plutonium is viewed as waste
 - US labs do not hold the same view as to the significance of the isotopic differences between reactor and weapon-grade plutonium



A LONG AND WINDING ROAD (1)

- If US carries out suggestions of DOE report, may need to have make revisions to agreement.
 - Not as significant as two earlier revisions
- 2000 Initial agreement
 - US
 - 75 % MOX
 - 25 % too impure for MOX-- Immobilization
 - Russia-
 - Mostly dispose of in LWRs
 - Preference was to dispose of in fast reactors

A LONG AND WINDING ROAD (2)

- 2002 Bush administration chose to eliminate two-track option
 - Chose MOX because “cheaper”
 - But meant had to deal with impure fuel—adding expense (among many other reasons)
 - Costs of plans to fabricate fuel rose
 - Russia did not want to stick to original plan to use MOX in LWRs without costs paid by others
 - Other countries didn’t want to pay full amount

A LONG AND WINDING ROAD (3)

- 2010 Russia and United States concluded a protocol to the PMDA
 - Russia allowed to use its former weapons plutonium to fuel 2 demonstration fast reactors: BN-600 and still-to-constructed BN-800
 - Russia can reprocess the product of this fast reactor irradiation after all 34 tons have been irradiated
 - Russia can discharge 30 percent of other spent fuel in BN-800
- US supposed to provide up to \$400 million “subject to budgetary review and availability of appropriated funds”
 - \$100 million of it reserved for verification
 - Some negotiations on “milestones” at which it would be disbursed
 - Until now, Russia has self-financed construction of MOX-fuel fabrication facility

A LONG AND WINDING ROAD (4): CURRENT SITUATION

- The PMDA and protocol have technically entered into force, not implemented
 - US and Russia and IAEA still need to conclude a “transparency” (verification) agreement
- US MOX plant more than ½ finished
- However, costs keep rising
 - PLANT
 - 2008- AREVA said \$4.8 billion with start date of 2016
 - 2012—AREVA said \$7.7 billion with start date of 2019
 - DOE believes cost will be “substantially higher” even after ending construction of new pit disassembly facility to provide feedstock
 - SUBSIDIES TO MOX CUSTOMERS— no one interested w/ current U market prices
- DOE has said it will take 18 months to make a decision
- SC lawmakers pushing for plan to go forward—
 - Both House and Senate authorization bills have funds for continued construction.

DOE'S 2014 REPORT (1): THE COSTS

- Five Options Examined and their total lifecycle costs and start date of disposition
 1. Current approach: irradiation of MOX in LWRs: \$25 billion, 2028
 2. Irradiation of MOX in Fast reactors: \$50 billion, 2033
 3. Immobilization: \$28.7 billion, 2039
 4. Downblending and Disposal: **\$8.78 billion, 2019**
 5. Deep Borehole Disposal: N/A (Experimental), 2047
 6. *Classified Analysis of transferring Pu overseas for fabrication into MOX*
 - *Country not specified (France? UK?)*

DOE'S 2014 REPORT (2): OTHER ISSUES

- Disposal options—where to dispose?
 - Problems with WIPP
 - MOX LWR spent fuel though also has issues
 - Proliferation resistance
 - Ideally seek to meet criteria for minimizing accessibility through 3 types of barriers- physical, chemical, and radiological
 - - first 3 options have all 3 characteristics.
 - Not clear with deep boreholes
 - not radiological barrier to “spent fuel standard” with downblending?
 - Availability of sufficient HLW for immobilization?
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DOE'S 2014 REPORT (3): NEED FOR RUSSIAN APPROVAL OF CHANGES

- All but status quo would require some Russian approval
 - Irradiation in fast reactors would require consensus in PMDA consultative committee
- Others would require written agreement per Article III of PMDA

RUSSIAN VIEWS (1)

- Even with Ukraine crisis, Russia has agreed to talk to US about changes to US disposition plan
- Some optimism among USG, Some Russian Experts Changes Can be Made
 - Russia has already invested a lot of money
 - Disposition agreement could be important channel to discuss other nonproliferation & other issues
 - Military has almost has almost no stake in agreement implementation
 - Previous experience: HEU Agreement implementation continued during Yugoslavia crisis.
 - Both have stake in showing progress to 2015 NPT RevCon

RUSSIAN VIEWS (2)

- Diakov and Rybanchenkov:
 - Situation changed since 2000 agreement
 - Material far more secure at Mayak
 - Irreversibility less important-
 - Post agt: US and Russia will have more material than need to sustain post-New START arsenal
- In return for changes on US side, Russia could seek to:
 - Repudiate the provision prohibiting spent fuel and blanket reprocessing until the full disposition of 34 tons of excess plutonium is over.
 - Include more civil material (It has 48 tons) in disposition.

THE GLOBAL CONTEXT

- Big decisions on reprocessing and fast reactors looming in many countries
 - Japan- Rokkasho RRP, MOX plant
 - UK-new MOX facility?
 - ROK-pyroprocessing and/or fast reactors?
 - India-reprocessing and fast reactor program?
 - France—a new reprocessing plant?
 - US PMDA decision needs to take into this global context:
 - Goal should be decreasing global stockpiles of separated plutonium
 - Leverage US decision to do so
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