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?
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