Prospects for Russian Spent Fuel Import – Insights From the Harvard-Tokyo Study and Beyond

Matthew Bunn, Harvard University, presentation to
Institute for Nuclear Materials Management
Spent Fuel Management Seminar XIX
Washington DC, January 9-11, 2002
http://www.ksg.harvard.edu/bcsia/atom

The Harvard-Tokyo Study: *Interim Storage of Spent Nuclear Fuel*

- Review of technology, economics, current status
  - Focused primarily on dry cask storage
  - Mainly U.S. and Japan
- Legal, political, and institutional constraints
  - Overview of political history of issue in U.S. and Japan
  - Current public/institutional acceptance colored by past experience
- International spent fuel storage and disposal concepts
  - Detailed review of issues, pros and cons
  - Detailed review of specific proposals (including Russian)

The Harvard-Tokyo Study (cont.)

- Key Issues, Tensions, and Approaches
  - Wet vs. dry
  - At-reactor, centralized, multiple consolidated sites
  - Siting process: modification of “The Facility Siting Credo” specifically for interim SF storage

- Conclusions and Recommendations

Full report available at http://ksgnotes1.harvard.edu/BCSIA/Library.nsf/pubs/spentfuel

Or send e-mail requesting hard copy to:
Atom@harvard.edu

Harvard-Tokyo Study: Conclusions on International Spent Fuel Facilities

- Complex array of advantages and disadvantages – but *on balance*, "it would be highly desirable to establish one or several such facilities over the next two decades."
- Advanced countries with large and sophisticated nuclear programs, such as the United States and Japan, should plan on storing and disposing of their spent fuel domestically
- If managed appropriately, international sites could have important nonproliferation advantages
- Over the long term, one or more international disposal sites is essential – doesn't make sense to have a repository for every country with even a tiny research reactor

Potential Nonproliferation Advantages of International Sites

- Provides option to remove material from states of proliferation concern – several such operations already in 1990s, more likely to be needed
- If managed appropriately, increases transparency and confidence in management of the spent fuel
- Provides alternative to reprocessing (and resulting separation of unneeded weapons-usable plutonium) for utilities unable to establish additional domestic storage
- Potential revenue stream for funding urgent nonproliferation and arms reduction objectives – e.g., securing nuclear material, dismantling weapons, converting weapons complexes, reducing plutonium stocks

Harvard-Tokyo Study: Conclusions on Russian Spent Fuel Import

- A Russian spent fuel import operation could make a substantial contribution to international security and would deserve support *if:*
  - Effective arrangements (including independent regulation) were in place to ensure that it achieved high standards of safety and security
  - Negotiations over the project made it possible to resolve the proliferation risks posed by Russian nuclear cooperation with Iran, and a substantial portion of the revenues were used to fund urgent disarmament, nonproliferation, and cleanup projects
  - The project did not in any way contribute to separation of additional unneeded weapons-usable plutonium, or to Russia's nuclear weapons program; and
  - The project had gained the support of those most likely to be affected by it, through a democratic process giving them ample opportunity to ensure that their concerns were effectively addressed

Status of Russian Spent Fuel Import

- Authorizing legislation approved, signed into law
- Makes possible storage contracts, reprocessing contracts without return of waste (to better compete with Britain and France), leasing contracts
- Portion of revenue required to be spent on cleanup, related social and environmental projects
- Putin established special commission to oversee imports, management of funds – headed by Nobel prize-winning physicist, Zhores Alfyorov
- Environmental groups, 75-90% of Russian public still strongly opposed
- Nearly all of most likely customer fuel requires U.S. approval – formal U.S.-Russian negotiations not started

Criteria for U.S. Approval

- U.S. permission requires Sec. 123 Agreement for Cooperation under the Atomic Energy Act
- U.S. has refused to negotiate such a pact because of Iran issue (Russian-Indian nuclear cooperation now also a problem). U.S. approval will require deal to resolve these (and billions of dollars at stake may facilitate such a deal).
- Other criteria imposed by law:
  - Safety and security
  - No reprocessing w/o U.S. consent
  - No transfers of nuclear weapons-related or reprocessing tech.
  - No impacts “inimical to the common defense and security” (would revenue to Russian nuclear weapon program fall into this category?)

What kind of deal on Iran?

- One reactor at Bushehr is probably going to be completed – reactor vessel just being shipped, to open in 2003-2004
- Will the U.S. demand Russia stop even the first unit?
- If one unit goes forward, do further units matter?
- Would a deal on no reprocessing, enrichment, or other sensitive nuclear technology be enough?
- How would compliance with such a deal be verified?
- Currently, administration working on an overall approach to the Russia-Iran issue – of which this would be only one part

What kind of deal on safety?

- Russia has a poor past nuclear waste management record – massive contamination at many sites. Also accident-prone rail infrastructure, weak regulation
- Would U.S. insist on use of Western casks?
- Western safety standards, or Russian safety standards – and who verifies compliance?
- Would U.S. insist on set-aside of funds to ensure safe management of material over decades of contract?
- What about provisions for developing a repository for permanent disposal of the fuel after interim storage period?

What kind of deal on reprocessing?

- New Russian law allows import for reprocessing or temporary storage, not for permanent storage or disposal
- Under law, U.S. will need agreement on no reprocessing without U.S. consent (U.S. not likely to grant programmatic prior approval as with EURATOM and Japan)
- Will U.S. seek ban, or moratorium, on reprocessing of other fuel? (Clinton administration was negotiating 20-year moratorium, Russians seemed prepared to agree, Bush administration has not continued the effort.)

What kind of deal on the money?

- Russia will presumably want to be able to choose how to spend the revenue it earns – laws and decrees on how to control the funds already in place
- U.S. and Russian governments will have common interest in making sure the money is not lost to corruption
- U.S. will want to ensure money does NOT go to Russian nuclear weapons program, and will want to ensure some of the money DOES go to nonproliferation (e.g., securing and destroying nuclear warhead and material stockpiles).
- What mechanisms to control how the money is spent?
- One U.S. proposal – Non-Proliferation Trust (NPT) – envisions 100% of revenues being controlled by a U.S.-based private trust. Would the Russians buy it? Would the U.S. government buy it?

More Troubling Policy Issues

- Democracy: Should U.S. attempt to link approval to regional or national public support – expressed by referendum or otherwise – for the import?
- Russian credibility: Is a state still undergoing huge political, economic, and social transformations; with a record of waste mismanagement; with rampant corruption; with weak nuclear regulators; and with questionable long-term stability as a unified entity the best place to send spent fuel?
- Transparency and safeguards: Though U.S. law does not require them, will U.S. or customers demand safeguards?
- Ultimately, arrangements *could* conceivably be negotiated that would adequately resolve safety, control of funds issues (and if stability a problem, weapons first issue, not spent fuel) – but democracy issue remains difficult

Need for U.S. decisions -- soon

- U.S. government has not made decisions on its approach on these key issues – top policy-makers mainly focused on a broader approach to Russia-Iran cooperation
- The key question: how should the U.S. spend $10B-$20B worth of negotiating leverage?
- U.S. government usually doesn't make decisions until it has to – hence if Russia wants this done, it should propose a draft text of a 123 agreement for this purpose and ask for a date to begin negotiations
- If the U.S. government wants to achieve the potential nonproliferation benefits of such an agreement during this Presidential term, it needs to get its position in order and get going – this negotiation won't be quick

The need for an airtight agreement

- A U.S.-Russian 123 agreement will have a rough ride on Capitol Hill:
  - Anti-nuclear left will oppose
  - Supporters of Russian grass-roots democracy (left, right, and center) will oppose
  - Anti-Russian right will oppose
  - All will be looking for flaws, angles of attack, arguments to build opposition
- To succeed, agreement will need to have strong provisions on all the requirements covered by the Atomic Energy Act, and carry major national security benefits – probably needs BOTH the benefit of a deal on Iran AND the benefit of billions of dollars for cleanup and nonproliferation

Some Bottom Lines

- World community *should* be working to establish one or more international spent fuel storage or disposal sites
- Russian import proposal could make a major contribution to world security and deserve support *if* key criteria could be met – but whether an arrangement that meets them can be constructed and negotiated remains to be seen
- Troubling policy issues if a deal can be reached that meets the safety and security criteria, but not the democracy criterion
- The Bush administration needs to think through its approach to the negotiation over Russian import of U.S. obligated spent fuel, and soon – in what areas are our demands absolute, what compromises can we live with?

Acknowledgement

- Research for this presentation was performed with support of the U.S. Department of Energy (DOE) under Award No. DE-FG26-99FT40281. However, any opinions, finding, conclusions, or recommendations expressed herein are those of the author and do not necessarily reflect the views of DOE.