

CONSIDERATIONS FOR U.S. APPROVAL TO SHIP SPENT FUEL WITH U.S.-ORIGIN URANIUM TO RUSSIA FOR STORAGE AND DISPOSAL

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ABSTRACT

This paper is divided into four parts. First are some remarks on the overall question of international cooperation in the storage and disposal of spent fuel and high-level waste. Second are some general requirements established by U.S. law and policy regarding any scheme for international storage and disposal of spent fuel containing U.S.-origin nuclear material. The following part deals with the specific requirements in this respect. Last are specific questions related to the opportunity created by the recent Russian legislation and numerous related proposals.

INTRODUCTION

Many steps have been taken over a period of years to work toward acceptable solutions for the safe disposal of spent fuel and radioactive waste, most recently, through the first meeting of the Parties to the Joint Convention on Spent Fuel and Radioactive Waste. The U.S. Government sees a continued high priority for these activities, as more countries make progress toward national geological disposal and enter active phases of decommissioning and dismantling.

I need hardly to point out to the assembly here that the subject is both national and global in character. For countries for which national disposal solutions are not feasible, developing and implementing multinational solutions is a possible alternative. However, it is important that the search for a multinational solution should not jeopardize any ongoing national programs.

In the United States, there are requirements established by U.S. law and policy regarding any scheme for international storage and disposal of spent fuel containing U.S.-origin nuclear materials. Specifically, questions arise in regard to the opportunity created by recent Russian legislation and numerous related proposals. These factors and more complicate the issue of international cooperation in the storage and disposal of spent fuel and high-level radioactive waste.

THE CURRENT SITUATION

Requirements of the Joint Convention

The ultimate responsibility for ensuring the safety of spent fuel and radioactive waste rests with the State. This is affirmed in the Preamble to the Joint Convention on the Safety of Spent Fuel Management and the Safety of Radioactive Waste Management. The Joint Convention also recognizes the principle that the responsibility for the safety of spent fuel and radioactive waste rests with the State that produced it. The Joint Convention entered into force on June 18, 2001. On September 29, 1997, the United States was the first signatory to the Convention. On April 9, 2003, it was the thirty-first member to ratify the Convention, becoming a full Contracting Party on July 14, 2003. The Convention now has 42 Signatories and 33 Contracting Parties. The Convention incorporates principles important to this panel's topic.

While giving primacy to the responsibility of the State that generates spent fuel and nuclear waste to dispose of it on its own territory, the Joint Convention recognizes that in certain circumstances safe and efficient management of spent fuel and radioactive waste might be fostered through agreements among

Contracting Parties to use facilities in one of them for the benefit of the other Parties, particularly where the waste originates from joint programs.

Each proposal for international spent fuel or high-level waste storage or disposal must be evaluated individually on its merits. The IAEA has developed a Code of Practice on the Transboundary Movement of Radioactive Waste. The most important provisions of the Code found their way into the Joint Convention. This Code and the Joint Convention provide some technical guidance for a State to use in determining whether or not to participate in an international repository or spent fuel or waste transfer. The overriding principle is that a sending State should ship waste or spent fuel only with the consent of the receiving State and only after satisfying itself that the receiving State has the administrative and technical capacity, as well as the regulatory structure, needed to manage the waste or spent fuel safely. Similarly, the receiving State should only consent to receiving the waste or spent fuel if it can satisfy itself that it can meet those requirements. This means that shipments of spent fuel and nuclear waste fall clearly under State jurisdiction and reflect a State's policy. While technical factors are important in evaluating a proposal, political factors always count in State decisions as well.

U.S. Waste Management Cooperation Program

In general, the United States favors the idea of States in a region getting together to solve their spent fuel and nuclear waste problems collectively. Conceptually, this is similar to the Waste Compact program in the United States in which several U.S. states join together in compacts to locate a low-level waste repository in one of them, rather than to locate separate repositories in each. Some progress is already underway in moving in this direction. One example is the recent agreement between Luxembourg and Belgium for Belgium to take Luxembourg's radioactive waste. Another example is the announcement by Slovenia, at the Joint Convention Meeting of the Parties, that it had taken the first steps in support of a regional approach by hosting a meeting to begin discussion among NIS nations.

The United States has maintained a strong program of international cooperation in waste management technologies so that its trading partners can manage their own spent fuel and waste. For example, U.S. nuclear cooperation committee meetings with Taiwan and the Republic of Korea have been held for more than 15 and 25 years respectively, and spent fuel and radioactive waste management have been on the agendas of most of those meetings. Many States have gained an understanding of the Department of Energy's (DOE) repository science programs and site evaluation methodology from cooperation programs with the United States. But one thing States should not expect to see is the United States giving consideration to taking irradiated U.S.-origin fuel supplied for electricity generation back for storage and/or disposal, in Yucca Mountain or elsewhere. The Nuclear Non-Proliferation Act of 1978 makes any plan for the return of such fuel subject to stringent conditions, including submission to Congress, which has the option to reject it. Subsequently, Congress prohibited the Executive Branch from even spending money to formulate or review such a plan.

Despite the U.S. policy against taking back spent power reactor fuel, the United States has operated an international spent fuel disposal system of sorts, taking back spent U.S.-origin research reactor fuel for disposal. This is part of the effort to reduce worldwide use of high-enriched uranium, an effort that has been successful in encouraging the conversion of most research reactors to use of low enriched uranium fuels. The bulk of spent high-enriched uranium fuel will be repatriated before the U.S. program ends in 2009. The U.S. is also working with Russia and the IAEA on a similar program involving return to Russia of high-enriched uranium fuel from exported Soviet-era research reactors.

Acceptance of Shared Repositories

The major problem facing any international storage or acceptance of shared repositories disposal scheme is public acceptance. If it were an easy problem, there would be a regional spent-fuel repository by now, because the concept has been around for at least 25 years. However, it seems inevitable that at least in some areas of the world, regional storage sites or repositories will be built. There are presently 34 countries plus Taiwan that will have to dispose of spent fuel and/or high-level waste from reprocessing. It is hard to imagine 35 separate deep geologic repositories, or an indefinite continuation of the present condition where almost every nuclear reactor in the world constitutes a spent-fuel storage facility. It is particularly hard to imagine these outcomes in regions of closely grouped States, each with spent fuel from only a few nuclear plants. These States might conclude that their environs would be better served by one storage site and/or repository than by several.

GENERAL FACTORS AFFECTING U.S. POLICY

Over the last few years there have been numerous proposals for international spent fuel storage or disposal. The focus of this panel is the possibilities presented by the new Russian legislation on the receipt of foreign spent fuel for interim storage or reprocessing. Before addressing that issue, a few remarks about general factors are in order.

An Agreement for Cooperation Required

Source and special nuclear material are exported from the United States pursuant to an agreement for cooperation negotiated according to the requirements of Section 123 of the Atomic Energy Act, as amended. These requirements apply to not just the exported material but also to special nuclear material produced through its use or the use of certain U.S.-exported nuclear facilities and technology. This material is referred to here as U.S.-origin nuclear material. The requirements include:

1. A provision of a peaceful use/no explosive use guarantee;
2. For non-nuclear-weapon States, application of full-scope safeguards;
3. Maintenance of adequate physical protection;
4. A U.S. consent right over reprocessing or enrichment of the nuclear material, and alteration in form or content of any irradiated fuel containing the material;
5. A U.S. right to require return of the material to the United States under certain conditions;
6. A U.S. approval right over any storage facility for separated plutonium, or high enriched uranium; and
7. A U.S. consent over retransfer to another country.

An agreement for cooperation is negotiated by the Secretary of State with the technical assistance and concurrence of the Secretary of Energy and in consultation with the Nuclear Regulatory Commission. The agreement is submitted by the Secretaries of State and Energy to the President, who transmits it to Congress where it must lie for a period of 90 days of continuous session, after which it can enter into force unless disapproved by both Houses of Congress. While the President may waive one or more of the above requirements for an agreement, any such agreement then requires an affirmative vote of Congress.

No President has ever waived any of the required provisions. The United States currently has Nuclear Cooperation Agreements with EURATOM, the IAEA, Taiwan, and 22 countries.

U.S. Consent Rights Apply

There are nearly 33,000 metric tons of spent fuel outside the United States that contain U.S.-origin nuclear material and which are, consequently, subject to U.S. consent rights. Among countries included in this estimate are the European Union member states, Brazil, the Czech Republic, India, Japan, the Republic of Korea, Mexico, Switzerland and Yugoslavia, as well as Taiwan. The most frequently mentioned customers for any international repository are Taiwan and Korea, as both have large quantities of spent fuel they would like to dispose of and the money necessary to make a repository proposal attractive to a potential host. All the spent fuel on Taiwan and much of the spent fuel in Korea are subject to U.S. consent rights, making the exercise of these consent rights by the United States an important consideration in any proposal for international storage or disposal of spent fuel. It is worth noting that the high-level nuclear waste that comes from the processing of spent fuel over which U.S. consent rights existed would generally not be subject to the same consent rights.

Under Section 131 of the Atomic Energy Act of 1954, as amended, U.S. consent rights over the retransfer of spent nuclear fuel are exercised according to legally established procedures and standards by the Secretary of Energy on a case-by-case basis through a process called a Subsequent Arrangement. In addition to obtaining the consent of the Secretary of State and consulting with the Department of Defense and the Nuclear Regulatory Commission, the Secretary of Energy must make a written determination that the Subsequent Arrangement will not be inimical to the common defense and security. A notice of the proposed Subsequent Arrangement and this determination must be published in the Federal Register for 15 days before the Arrangement can take effect. If the retransfer of spent fuel is for the purpose of reprocessing, the Subsequent Arrangement must also lie before Congress for 15 days. Section 127 of the Atomic Energy Act requires that retransfers of U.S.-origin nuclear material can only be approved to recipient States that agree to the U.S. export control requirements.

POLICY FACTORS IMPORTANT

Disposal, Not Reprocessing

It is the policy of the Bush Administration that the United States will continue to discourage the accumulation of separated Plutonium worldwide. This policy and the requirements of the Subsequent Arrangement process mean that before approving new arrangements for the retransfer of any spent fuel containing U.S.-origin nuclear material, the United States would almost certainly need to be assured that the spent fuel was destined for eventual disposal and not for reprocessing. A permanent repository need not be available at the time of the export, and long-term storage could be part of any scheme. But the scheme should also involve specific plans for, and the commitment of sufficient resources to, development of a geologic repository. The United States would expect to use its consent rights to enforce the disposal, vice reprocessing, of transferred spent fuel.

Facilities must be Safe and Environmentally Sound

In addition to gaining assurances about the ultimate disposition of the spent fuel, the United States would also need to be assured that the interim storage facilities and the final repository facilities were safe and environmentally sound. The technology for storage of spent fuel is well established, as demonstrated for example at a large number of U.S. nuclear power plants as well as away from reactor storage facilities in

Canada, Russia and Sweden. The U.S. Nuclear Regulatory Commission has concluded that spent reactor fuel could be stored safely for at least 100 years, and commercial suppliers of the necessary technology are available.

Secretary of Energy Abraham's recommendation for Yucca Mountain as a scientifically sound site for the disposal of nuclear wastes and the subsequent notification by the President to Congress that he considers the Yucca Mountain site to be qualified for a construction permit are evidence of a large body of work on geologic containment of nuclear waste. The opening of the Waste Isolation Pilot Plant in New Mexico in 2000 marked the world's first geologic repository, and a giant step forward. Sweden and Finland are also well along the way toward the development of a geologic repository. The United States shared its experience with both WIPP and Yucca Mountain at the Joint Convention's first meeting of the Parties. The United States is also making a broad range of efforts to share its experience with cooperating partners. We would be likely to participate in the scientific evaluation of any facility storing and disposing of spent fuel containing U.S.-origin nuclear material to ensure it is constructed on an environmentally sound basis. While the events of 9/11 certainly raise concerns about the security from terrorism of nuclear fuel, Secretary Abraham has pointed out the benefits of safely locking away nuclear fuel forever rather than storing it at a large number of different sites.

Transport Must be Safe

Prior to providing consent for retransfer, the United States would further have to be assured that the material would be handled safely in transit. Sea transport of radioactive materials is routinely carried out with an exceptionally high degree of safety and security, in compliance with stringent IAEA and International Maritime Organization standards. Nevertheless, such shipments are highly controversial, and some coastal and small island states are increasingly vocal in calling for greater regulation or an outright ban. Attempts to ship through international choke-points, like the Panama Canal, the Straits of Malacca, or the Bosphorus and the Dardanelles could risk attempts to pose unilateral restrictions or even attempts at interception by protestors. Large-scale movement of nuclear material from a port to a repository, via road or rail, might prove to be a challenge for many nation's infrastructures, and, as has been seen in Germany, can be another focal point for protest. However, the technology for the transport casks is well established, and any foreseeable incidents are likely to be more a matter of inconvenience than a safety risk.

Assurance of Needed Resources

The requirements for safety and security already identified will need to be implemented over a long period of time. Before granting its consent to a retransfer, the United States would want to be sure that institutional mechanisms, whether private or governmental, were in place to ensure that the safety and security requirements continue to be met over a very long period of time. In particular, these mechanisms include those for ensuring that the large amount of money that would change hands, much of it up front, was properly managed and accounted for and remained available to manage the spent fuel for the life of the disposition program. The obligations being undertaken may be longer than what a commercial entity might be able to guarantee.

RUSSIAN REPOSITORY OPPORTUNITIES

As to the specific topic of many of these panel presentations, the United States is interested in the possibility of safe and secure storage in Russia of spent reactor fuel containing U.S.-origin nuclear material. Among the specific technical issues raised above, the U.S. Department of Energy has already begun a cooperative program in geologic repository science with Russia. This would be an excellent basis for ultimate cooperation in evaluation of a potential repository location.

Transport Issues

Western ports in Russia might be problematic as receiving stations for foreign spent fuel as they require access through politically sensitive sea-lanes and choke points. If spent fuel were shipped to a Pacific port, there could be concerns about the ability of the old TransSiberian rail lines to sustain traffic in heavy rail mounted casks. However, a new rail line could easily be designed for such traffic.

Disposition Issue

Ultimate disposition of the fuel provides greater difficulties. While the U.S. requires a clear path to disposal, Russian legislation requires that spent fuel can be accepted only for interim storage or reprocessing and not for disposal. While interim storage, particularly if it is a long interim, would ease political problems arising from the exhaustion of on-site storage capacity that could prematurely shut down reactors, the disposal of spent fuel would still require the construction of an expensive geologic repository, reducing the value of such interim storage.

IAEA Safeguards

Another issue might be a potential requirement for IAEA safeguards on some of the spent fuel transferred to Russia. There is no requirement in U.S. law for safeguards on exports or retransfers of source or special nuclear material to Russia, since it is a nuclear weapon state. Furthermore, the United States believes that the discretionary application of safeguards to spent fuel in Russia should be a low priority for the IAEA, particularly given the already inadequate resources available to meet safeguards obligations in non-nuclear-weapon States. The United States also doubts that the IAEA wants to spend its resources in this way. However, some non-nuclear-weapon States might wish such safeguards applied to fuel they export and want it written in their own transfer agreement. The wording of the safeguards agreement applied in Taiwan may require safeguards on any spent fuel transferred from there.

Iran

Finally, while the concept of spent fuel storage in Russia has promise, it will not be possible for the United States to support practical steps in this direction until the problem of Russian cooperation with Iran is resolved. The United States does not authorize retransfer of nuclear material to countries to which it could not transfer nuclear material directly. Therefore, the United States and Russia must have an agreement for cooperation in force before any spent fuel with U.S.-origin nuclear material may be shipped to Russia. No such agreement is in force. The transmittal report to Congress for a proposed agreement for cooperation must include an assessment of the proliferation record of the other party. We would only be in a position to negotiate such an agreement once Russia addressed our concerns regarding Russia-Iran nuclear, missile, and advanced conventional weapons cooperation. The Bush Administration has firmly linked storage of spent fuel containing U.S.-origin nuclear material in Russia to an end to Russian missile, sensitive nuclear, and advanced conventional arms transfers to Iran. This condition, founded in law as well as policy, has not been met.