Before the
UNITED STATES NUCLEAR REGULATORY COMMISSION
Washington, D.C. 20555

In the Matter of	)	
	)	
DOE/NNSA	)	Docket No. 11006188
	)	
(Export of 93.20% Enriched Uranium)	)	License No. XSNM 03758
	)	

PETITION OF ALAN J. KUPERMAN
FOR LEAVE TO INTERVENE
AND REQUEST FOR HEARING

Pursuant to Section 189a. of the Atomic Energy Act of 1954, as amended, 42 U.S.C. § 2239(a), and Section 304(b) of the Nuclear Non-Proliferation Act of 1978, 42 U.S.C. § 2155a. (the "NNPA"), and the applicable rules and regulations of the United States Nuclear Regulatory Commission (the "Commission"), including 10 C.F.R. Part 110, Subparts H and I, Alan J. Kuperman ("Petitioner") hereby respectfully petitions the Commission for leave to intervene as a party in connection with the application of DOE/NNSA ("Applicant"), published in the Federal Register on February 18, 2015 (80 Fed. Reg. 8712), for a license to export 144.0 kilograms (kg) of 93.20% enriched uranium to fabricate

fuel at AREVA CERCA in France for ultimate use in the Belgian Nuclear Research Center's BR-2 reactor.

In addition, Petitioner requests that the Commission order a full and open public hearing at which interested parties may present oral and written testimony concerning the factual and legal issues relevant to the Commission's determinations with respect to the pending license application. Such a hearing would be in the public interest and assist the Commission in making its statutory determinations under the Atomic Energy Act, as provided for by Section 304(b) of the NNPA, 42 U.S.C. § 2155a., and 10 C.F.R. § 110.84.

I. Petitioner's Interests.

Petitioner is Associate Professor at the University of Texas at Austin, where he is also Coordinator of the Nuclear Proliferation Prevention Project (www.NPPP.org). The NPPP's stated mission is to engage in "research, debate, and public education to ensure that civilian applications of nuclear technology do not foster the spread of nuclear weapons to states or terrorist groups." Petitioner has worked professionally since 1987 on nuclear nonproliferation policy in general, and more specifically on minimizing commerce in nuclear weapons-usable, highly enriched uranium ("HEU"). He is editor and an author of Nuclear Terrorism and Global Security: The Challenge of Phasing out Highly Enriched Uranium (Routledge, 2013, 2014), which documents past, present, and future efforts to minimize export and use of HEU for non-weapons purposes. In 2001, Petitioner authored a petition for leave to intervene by the Nuclear Control Institute, regarding an export license application (XSNM-03192) for highly enriched uranium for use as fuel at the BR-2 reactor in Belgium, after which the applicant suspended its application.[1]

In 1992, Petitioner, while working as a staffer in the U.S. Congress, drafted the provision of the U.S. Energy Policy Act of 1992 (the "Schumer Amendment") that sharply restricts exports of bomb-grade uranium. Petitioner previously has made invited presentations regarding export and use of HEU for non-weapons purposes to the International Atomic Energy Agency, the U.S. Nuclear Regulatory Commission, the U.S. Congress, the Department of Energy, and the National Academy of Sciences.

Petitioner has important institutional interests which would be directly affected by the outcome of this proceeding. As noted above, Petitioner is actively involved in public information and education programs concerning arms control, the spread of nuclear weapons, and the risks of proliferation and nuclear terrorism in general and the use of HEU in particular. Its interest and ability to carry out these functions would be significantly and adversely impaired by the absence of a full, open and independent review by the Commission of the issues raised under the Atomic Energy Act and the NNPA by the pending license application.

Petitioner has no other means to protect its interests in this proceeding, and those interests are not now represented by the existing parties. This Petition, moreover, is not interposed for delay or to broaden the proper scope of the

proceeding. It is timely filed, within 30 days of the publication of notice of the license application in the Federal Register, as required by 10 C.F.R. § 110.82(c)(1). Finally, Petitioner's contentions raise important questions concerning the appropriateness of continued commerce in and use of HEU, which is directly useable in nuclear weapons, and Petitioner submits that its participation will assist the Commission in developing a sound record.

II. Background.

A. HEU and its Risks.

For many years, HEU has been used in the civil sector, including to fuel research and test reactors around the world. However, its risks have likewise long been recognized. There have therefore been substantial efforts to curtail its use by substituting low-enriched uranium ("LEU"), which is not weapons-usable but is capable of providing the same civilian benefits without significant economic penalty.

The nuclear proliferation and nuclear terrorism risks associated with the circulation of HEU in commerce are self-evident. HEU was the material used in the Hiroshima bomb (Little Boy). According to the late J. Carson Mark, former head of weapons design at Los Alamos National Laboratory, a

"competent group" could build an implosion weapon with as little as about 12 kg of this material.[2]

Consequently, HEU is an attractive target for national diversion or seizure by terrorists. Indeed, the late Manhattan Project physicist Luis Alvarez once noted, "[W]ith modern weapons-grade uranium ... terrorists, if they had such materials, would have a good chance of setting off a high-yield explosion, simply by dropping one-half of the material on the other half."[3]

B. The RERTR Program.

In recognition of the problems associated with continued reliance on HEU in research reactors, the United States instituted the RERTR program in 1978. Under the leadership of Argonne National Laboratory, this program has been developing high density, LEU fuels and targets -- material not suitable for fabrication into weapons but suitable for use in research reactors -- thereby allowing conversion to LEU and much reducing the amount of HEU in commerce.[4]

The results of the RERTR program have been impressive. Around the world, 67 HEU-fueled research reactors have been converted to LEU fuel, and 20 have shut down.[5] Conversion to LEU fuel has been highly successful, according to a recent survey,

which reported that "operators overwhelmingly perceived any negative impacts to be outweighed by positive ones."[6]

C. U.S. Policy, Law and Regulation.

U.S. policy has also been strongly in favor of reducing use of HEU. Thus, the Commission itself for almost twenty years has sought to "reduc[e], to the maximum extent possible, the use of HEU in ... foreign research reactors."[7] The same Policy Statement affirms that "any reduction in the potential for access to these [HEU] inventories would constitute a reduction in the proliferation risk." Moreover, domestically, the Commission has since 1986 been requiring all licensed research reactors to convert to LEU.[8] In taking this action, the Commission asserted that the "domestic conversions are intended to be put on solid footing by setting a strong, resolute and sensible example, consistent with U.S. national policy, to encourage foreign operators of non-power reactors to convert to the use of LEU fuel."[9] In recognition of such policies, in 1995 the United States abandoned plans for a new HEU-fueled research reactor, the Advanced Neutron Source, at least partly because the bomb-grade fuel presented "a non-proliferation policy concern."[10]

In 1986, Congress first acted specifically to curb the

risks associated with commerce in HEU. It passed the Omnibus Diplomatic Security and Anti-Terrorism Act, calling upon the President "to take, in concert with United States allies and other countries, such steps as necessary to keep to a minimum the amount of weapons-grade nuclear material in international transit."[11] Under this legislation, HEU exports were limited only to those countries "... which have cooperated closely with the U.S. in the Reduced Enrichment for Research and Test Reactors (RERTR) Program. Exports have further been limited to supply of only those research reactors which either cannot be converted at present to LEU fuel or which need additional HEU fuel while in process of conversion to LEU."[12] Finally, Section 603 of the 1986 law added a new Section 133 to the Atomic Energy Act, 42 U.S.C. § 2160c., specifically requiring Commission consultation with the Secretary of Defense concerning the adequacy of physical security in connection with any proposed export or transfer of HEU.

Congress again dealt with commerce in HEU in Title IX, Section 903, of the Comprehensive National Energy Policy Act, Pub. L. No. 102-486, 106 Stat. 2944, enacted October 24, 1992 (the "Schumer Amendment"). The Schumer Amendment added a new Section 134 to the Atomic Energy Act, 42 U.S.C. § 2160d., which limits the circumstances in which any HEU can be exported for

use as a fuel or target in a research or test reactor. As its principal author stated, "[T]his bill codifies once and for all that bomb grade uranium is simply too dangerous to continue indefinitely shipping it overseas for non-military purposes."[13] Under the Schumer Amendment, no HEU exports are permitted for use in a research or test reactor unless three conditions are met:

> (1) there is no alternative nuclear reactor fuel or target enriched in the isotope 235 to a lesser percent than the proposed export, that can be used in that reactor;
>
> (2) the proposed recipient of that uranium has provided assurances that, whenever an alternative nuclear reactor fuel or target can be used in that reactor, it will use that alternative in lieu of highly enriched uranium; and
>
> (3) the United States Government is actively developing an alternative nuclear reactor fuel or target that can be used in that reactor.[14]

It was expected that in the absence of continued funding for the RERTR program, the only option would be to "cut off the bomb-grade exports immediately."[15]

The Commission's regulations fully incorporate the requirements of the Schumer Amendment. They provide that no HEU may be exported unless the Commission determines that:

> (A) There is no alternative nuclear fuel or target enriched to less than 20 percent in

> the isotope U-235 that can be used in the reactor;
>
> (B) The proposed recipient of the uranium has provided assurances that, whenever an alternative nuclear reactor fuel or target can be used in that reactor, it will use that alternative fuel or target in lieu of highly-enriched uranium; and
>
> (C) The United States Government is actively developing an alternative nuclear reactor fuel or target that can be used in that reactor.[16]

In accordance with 42 U.S.C. § 2160d.(b)(3), the Commission's regulations further define the phrase “can be used" to mean that (A) the fuel or target has been "qualified" by the RERTR program and (B) “Use of the fuel or target will permit the large majority of ongoing and planned experiments and isotope production to be conducted in the reactor without a large percentage increase in the total cost of operating the reactor." 10 C.F.R. § 110.42(a)(9)(ii).

In 2014, the U.S. Department of Energy (DOE) reaffirmed that it “implements the long-standing U.S policy to minimize and eliminate the use of highly enriched uranium (HEU) in civilian applications by working to convert research and test reactors and isotope production facilities to the use of low enriched uranium (LEU).”[17]

D. Recent Commission Precedent Limits U.S. Exports of HEU to Single Year Quantities.

In recent years, the United States has sought to incentivize recipients of U.S. HEU exports to convert to LEU as soon as possible, in accordance with the letter and spirit of the Schumer amendment, by limiting exports to a single year's worth of HEU. Indeed, since 2011, Petitioner believes that every export license for HEU approved by the Commission has been for a single year's worth of HEU. This includes the following: XSNM-3708, XSNM-3726, XSNM-3729, XSNM-3730, XSNM-3745, XSNM-3730-1, XSNM-3729-1, XSNM-3752, XSNM-3755, and XSNM-3756.

E. Previous U.S. Exports of Multi-Year Quantities of HEU Have Been Misused in Ways that Undercut U.S. Nonproliferation Policy

A primary reason that the United States has limited recent exports of HEU to an amount sufficient for no more than a single year is that previous exports of multi-year quantities of HEU have been misused in ways that undercut U.S. nonproliferation policy. For example, in the 1990s, the United States exported multi-year quantities of HEU to fuel Germany's THTR reactor. When that reactor shut down prematurely, it created a surplus of U.S.-origin HEU in Europe. Part of that surplus of U.S.-origin

HEU was then used to undercut U.S. nonproliferation policy by being used as fuel for the FRM-II reactor, which the United States had refused to supply with HEU on nonproliferation grounds.[18]

Another, more recent example also underscores the risk of misuse.[19] Russia exported a multi-year quantity of HEU to CERCA for use as fuel in the RHF-Grenoble research reactor. However, CERCA decided to use an estimated 70 kg of that HEU surplus to fabricate targets for production of medical isotopes by two European companies, IRE and Mallinckrodt, which at the time were barred from receiving US exports of HEU because they refused to convert to LEU. As a result, the operator of the RHF-Grenoble needed to acquire more HEU than it had anticipated for future operation. The operator already had applied for an HEU export from the United States but, as a result of the misuse of its HEU surplus, it was compelled to increase that request by 70 kg. Beforehand, the reactor operator had requested an export license (XSNM-3633, received by the Commission on 20 December 2010) for 116 kg of HEU for fuel. After the reactor operator discovered the diversion of its HEU by CERCA, it amended its export license application (received by the commission on 21 October 2011) to increase the requested amount of HEU to 186 kg. There is no other known explanation for this increase other than CERCA's

misuse of the surplus HEU that had been intended for use as fuel in the RHF-Grenoble.

These examples show that when surpluses of HEU have been created in Europe, at least twice they have been diverted from their original purpose to end-users who were not eligible for US exports of HEU due to nonproliferation policy restrictions, thereby undercutting U.S. nonproliferation objectives.

F. Inadequate European Efforts to Develop Alternative LEU Fuel

Three of the four European high-performance research reactors that still use HEU fuel, including the BR-2, require successful development of U7Mo dispersion fuel to convert to LEU, according to the operators of these facilities. However, development of such LEU fuel in Europe has been significantly retarded, in part due to inadequate funding. According to a recent overview of the European LEU fuel development effort, "The U7Mo dispersion fuel system qualification has experienced a number of unexpected setbacks."[20] U.S. government officials inform Petitioner that European delays in development of U7Mo dispersion LEU fuel have been exacerbated by inadequate European funding for the fuel development effort.[21]

This suggests that Europeans perceive a lack of incentive

to develop high-density LEU fuel. Such lack of incentive may arise from a perception that the United States will provide HEU fuel in perpetutity. If the Commission approves the proposed multi-year export of HEU, it will contribute to such a perception, thereby reducing further the incentive in Europe to develop high-density LEU fuel. The consequence would be to perpetuate U.S. exports of HEU, thereby increasing risks of nuclear proliferation and nuclear terrorism, directly contrary to U.S. law and policy.

G. The BR-2 Reactor and the Pending Application.

(1) The Reactor.

The HEU at issue in this proceeding is intended to be used as reactor fuel in the 50 to 80 megawatt BR-2 research reactor located in Mol, Belgium. The BR-2 performs at least four basic functions: (1) fuel testing; (2) material testing; (3) medical isotope production; and (4) doping of silicon ingots.

Annually, under normal operation, the reactor is estimated to require fresh HEU fuel containing approximately 27 kg of U-235, equivalent to approximately 29 kg of 93.2%-enriched HEU.[22] The operator, in an exchange of notes with the United States, has reportedly pledged to convert to LEU fuel as soon as fuel of sufficient density (approximately 7 g/cc) has been qualified, as

required under the Schumer Amendment as a condition for exports of HEU.[23] This exchange of notes has not been made public.

(2) Proposed Export Represents a Five-Year Supply.

The proposed export of 144 kg of HEU represents a five-year supply, assuming no interruptions in normal operation, based on the estimated requirement of 29 kg HEU per year under normal operation.

H. Risks of Supplying Excess HEU to Applicant.

Approving export of a multi-year supply of HEU for the BR-2 reactor would raise at least three serious risks. First, it would reduce the incentive for Europeans to develop an alternative LEU fuel that could be substituted in the reactor. As noted above, inadequate funding in Europe is already retarding development of high-density LEU fuel and thereby delaying conversion to LEU fuel of Europe's high-performance research reactors, including the BR-2 reactor indicated as the ultimate recipient of the proposed export.

Second, approving export of a multi-year supply of HEU fuel would reduce the incentive for the operator to convert to LEU fuel, even if such an alternative fuel were qualified. This scenario is not merely hypothetical. In the 1990s, a research

reactor in Germany, the FRJ-2, used fresh HEU fuel and was not converted to LEU fuel, even though suitable LEU fuel for the reactor had been qualified for well over a decade. The operator was able to refuse to convert to LEU fuel because it possessed a surplus stock of U.S.-origin HEU on which it could rely.[24] This experience shows clearly that providing a multi-year supply of HEU risks undermining the leverage that the United States has, by virtue of its effective monopoly on HEU supply, to persuade operators to convert to LEU.

The third risk of approving export of a multi-year supply of HEU fuel is that the reactor could shut down prematurely, prior to exhausting this supply of HEU, thereby creating a surplus stock of U.S.-origin HEU in Europe that could be used to undermine U.S. non-proliferation policy.[25] For example, the HEU could be sold to an end-user that did not satisfy the requirements for fresh exports of HEU from the United States. Again, this scenario is not merely hypothetical. As noted, the United States previously approved the export of a multi-year supply of HEU to the German THTR reactor, a unique power reactor that relied on HEU fuel. When the THTR shut down, the operator retained several hundred kg of U.S.-origin HEU. Subsequently, a substantial portion of that HEU was sold to the operator of the German FRM-II reactor -- a controversial facility that was the

first high-power (greater than one megawatt) research reactor in the western world built to use HEU since establishment of the RERTR program in 1978.[26] The United States refused on nonproliferation grounds to supply this new reactor with HEU,[27] but the reactor nevertheless was able to obtain U.S.-origin HEU from the surplus that had previously been provided to the THTR.

As a result, the FRM-II was able to commence operations, which threatened to undermine the international nonproliferation norm and the RERTR program. Had it not been for the availability of surplus U.S.-origin HEU in Europe, the United States might well have prevailed on the operator of the FRM-II to convert to LEU prior to start-up. In the same manner, providing surplus HEU to Applicant could undermine U.S. efforts to persuade other operators to convert their fuel or targets to LEU.

In short, to approve export to Applicant of a multi-year supply of HEU would raise grave risks of undermining the U.S. nonproliferation goal and policy of phasing out international HEU commerce as quickly as possible. This issue deserves in-depth consideration by the Commission before any licensing decision is made.

III. Petitioner's Contentions.

In accordance with Section 53 of the Atomic Energy Act of 1954, as amended, 42 U.S.C. § 2073, and 110 C.F.R. §§ 110.42(a)(8) and 110.45(a), the Commission may not issue a license for the export of special nuclear material, such as the HEU at issue in this proceeding, unless it determines that "[t]he proposed export would not be inimical to the common defense and security." Petitioner does not necessarily oppose the granting of the license application for some portion of the HEU sought, assuming that the requisite need can be demonstrated. However, Petitioner submits that at least one issue must be resolved in this proceeding in order to ensure compliance with the Commission's statutory and regulatory obligations:

A. The Commission Must Not Approve Export of HEU in Excess of Applicant's Demonstrated Needs.

It is a documented fact that reactors sometimes shut down prematurely. The causes may range from technical problems, to aging, to a full-blown accident. Such premature shutdown, by definition, cannot be anticipated. Thus, if the Commission approves the proposed export of a multi-year supply of HEU, it runs the grave risk of providing a large surplus of HEU

significantly in excess of the needs of the BR-2 reactor. We urge the Commission not to approve export of HEU in excess of Applicant's demonstrated needs.

Refusing to supply surplus HEU for the BR-2 reactor would be consistent with the Commission's recognition in Transnuclear, Inc., CLI-00-16, 52 NRC 68 (2000), that it is appropriate to take licensing action "as necessary to avoid the potential accumulation of HEU fuel significantly in excess of . . . [a] reactor's needs."

Failure to limit the export would entail unacceptable proliferation and terrorism risks and would undermine the U.S. common defense and security. First, to the extent positive Commission licensing action could imply U.S. government approval of either domestic or foreign use of substantial amounts of HEU in research or test reactors in excess of demonstrated need, this would undercut the RERTR program, exacerbating the risk that operators who have not yet converted their reactors would refuse to do so and that operators who have converted would revert to HEU use, contrary to the United States' non-proliferation interests. Second, approval of the pending application in full would lead to unnecessary, increased international transport of weapons-usable material, aggravating the risk of interception by rogue states, criminals or

terrorists. Third, the nuclear proliferation and terrorism risks associated with increasing amounts of HEU in international commerce necessarily outweigh any hypothetical benefits to Applicant or others from the proposed export of any amount of HEU in excess of demonstrated need. In a world in which major efforts are underway to eliminate HEU surpluses, putting more than is needed into circulation makes little sense.[28] Certainly, the United States should not help create a situation that may potentially free up more HEU for use in a reactor like the FRM-II, in which it opposes use of HEU fuel.

IV. The Need for a Full Oral Hearing.

A full oral hearing to examine Petitioner's contentions is essential both to serve the public interest and to assist the Commission in making its statutory determinations. Such a hearing would fulfill the Commission's mandate to explore fully the facts and issues raised by export license applications, where appropriate through full and open public hearings in which (a) all pertinent information and data are made available for public inspection and analysis and (b) the public is afforded a reasonable opportunity to present oral and written testimony on these questions to the Commission. See 42 U.S.C. § 2155a. and 10 C.F.R. §§ 110.40(c), 110.80-110.91, 110.100.[29]

There is substantial controversy surrounding any continued use of HEU, but especially commerce in excess of demonstrated need. Indeed, the questionable wisdom of permitting unnecessary commerce in HEU has been sharply illustrated by the U.S. policy, after the terrorist attacks of September 11, 2001, of accelerating the collection and return to the United States, at great expense, of previous exports of HEU.

Only a public hearing in which issues related to the appropriateness of exporting HEU are fully aired and subjected to public scrutiny can serve to resolve legitimate public questions concerning both the need for granting this license application and the risks associated with such action. Certainly, the unchallenged assertions of Applicant and/or the Executive Branch are not enough to satisfy the public interest in the case.

Petitioner has broad experience and expertise in technical and policy matters directly relevant to the risks and implications of the proposed export. Additionally, Petitioner is fully familiar with all aspects of the RERTR program. Thus, Petitioner would bring to the instant proceeding perspectives that are presently lacking and are pivotal to an understanding and resolution of the factual and legal issues raised by the pending license application.

V. Relief Requested.

For the reasons set forth above, Petitioner respectfully requests that the Commission:

1. Grant this Petition for Leave to Intervene;

2. Order that an oral hearing be held in connection with the pending license application; and

3. Act to ensure that all pertinent data and information regarding the issues addressed by Petitioner be made available for public inspection at the earliest possible date.

Respectfully submitted,

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Associate Professor, LBJ School of Public Affairs
Coordinator, Nuclear Proliferation Prevention Project
University of Texas at Austin

Dated: March 18, 2015
Austin, TX

ENDNOTES

[1] Ann MacLachlan and Mark Hibbs, "SCK/CEN Asks U.S. to Stop Work on Export Until Status of its HEU Stocks Is Resolved," Nuclear Fuel 26, 23 (November 12, 2001), at 19.

[2] Carson Mark, "Some Remarks on Iraq's Possible Nuclear Weapon Capability In Light of Some Known Facts Concerning Nuclear Weapons" (Nuclear Control Institute, May 16, 1991), at 2.

[3] Alvarez, Adventures of a Physicist 125 (Basic Books 1987).

[4] See generally Alan J. Kuperman, "Nuclear Nonproliferation via Coercion and Consensus: The Success and Limits of the RERTR Program (1978-2004)," in International Cooperation on WMD Nonproliferation, ed. Jeffrey W. Knopf (University of Georgia Press, 2015, forthcoming).

[5] Alan J. Kuperman, ed., Nuclear Terrorism and Global Security: The Challenge of Phasing out Highly Enriched Uranium (New York: Routledge, 2013). U.S. Department of Energy, National Nuclear Security Administration, "GTRI's Convert Program: Minimizing the Use of Highly Enriched Uranium," Fact Sheet, May 29, 2014, http://nnsa.energy.gov/mediaroom/factsheets/gtri-convert (accessed November 21, 2014).

[6] Ferenc Dalnoki-Veress, "Primarily Positive Perceptions: A Survey of Research Reactor Operators on the Benefits and Pitfalls of Converting from HEU to LEU," presented at the European Research Reactor Conference (RRFM 2014), Ljubljana, Slovenia, April 1, 2014.

[7] See 47 Fed. Reg. 37007 (August 24, 1982).

[8] See 51 Fed. Reg. 6514 (February 25, 1986).

[9] Id. at 6516. Commission policy, it should be noted, has reflected the consistent views of the Executive Branch that it is important to U.S. non-proliferation policy to minimize the amount of HEU in international commerce. See Presidential Non-Proliferation Policy Statement of April 7, 1977, 13 Weekly Comp. Pres. Doc. 507 (April 11, 1977); U.S. Nuclear Non-Proliferation and Cooperation Policy (July 16, 1981), 17 Weekly Comp. Pres. Doc. 769 (July 20, 1981); Nonproliferation and Export Control Policy Statement, 29 Weekly Comp. Pres. Doc. 1901 (September 27, 1993).

[10] U.S. Department of Energy, "DOE Facts: A New Neutron Source for the Nation" (February 1995).

[11] See Omnibus Diplomatic Security and Anti-Terrorism Act of 1986, Pub. L. No. 99-399, Sec. 601(a)(3)(A) (August 27, 1986).

Congress had previously passed resolutions supportive of Executive Branch efforts to reduce HEU use. See S.J. Res. 179, 97th Cong., 1st Sess. (July 27, 1981); S. Con. Res. 96, 97th Cong., 2d Sess. (May 27, 1982).

[12] 1991 Annual Report Under Section 601 of the NNPA, 22 U.S.C. § 3281 (July 2, 1992), at 77.

[13] 138 Cong. Rec. H. 11440 (daily ed., Oct. 5, 1992).

[14] 42 U.S.C. § 2160d.(a)(1)-(3).

[15] See 138 Cong. Rec. at H. 11440 (Statement of Rep. Schumer).

[16] 10 C.F.R. § 110.42(a)(9)(i).

[17] U.S. Department of Energy, "GTRI's Convert Program: Minimizing the Use of Highly Enriched Uranium," Fact Sheet, May 29, 2014.

[18] Ann MacLachlan and Mark Hibbs, "French-Russian HEU Accord Signed; EC Agreed To Russian Prior Consent," Nuclear Fuel, 21, 13 (June 17, 1996), at 1, reports that "FRM-2 has been the target of intensive efforts by U.S. RERTR program officials who seek to have it redesigned to burn low-enriched uranium. . . . The future operator of the reactor . . . has secured a 10-year forward fuel supply, or about 400 kg of HEU. So far, according to European industry sources, they have secured half that amount from HEU stocks originally destined for Germany's scuttled THTR-300 high-temperature gas-cooled reactor at Hamm-Uentrop."

[19] Alan J. Kuperman, "Quadripartite Agreement," in Nuclear Terrorism and Global Security: The Challenge of Phasing out Highly Enriched Uranium, ed. Alan J. Kuperman (New York: Routledge, 2013), at 92-94.

[20] S. Van Den Berghe and P. Lemoine, "Review of 15 Years of High-Density Low-Enriched U-Mo Dispersion Fuel Development for Research Reactors in Europe," Nuclear Engineering and Technology, 46, 2 (April 2014), at 140.

[21] Personal communication.

[22] Margarita Jimenez, "USA and Europe: High-Power Research Reactors," in Nuclear Terrorism and Global Security: The Challenge of Phasing out Highly Enriched Uranium, ed. Alan J. Kuperman (New York: Routledge, 2013), at 57.

[23] Ann MacLachlan, "U.S. Agrees to Continue HEU Shipments to BR2 After Belgians Agree To Convert," Nuclear Fuel Vol. 24, No. 24 (November 29, 1999), at 8.

[24] Discussions on conversion of the FRJ-2 reactor to LEU fuel were initiated in 1984 between the operator, German authorities,

and the RERTR program, and a schedule for conversion was established as early as 1987. However, in the mid-1980s, the operator acquired sufficient U.S.-origin HEU from surplus stocks in Europe to continue operating without conversion until it shut down in 2006. Thus, the existence of surplus overseas stocks of U.S.-origin HEU unnecessarily hindered conversion to LEU fuel and perpetuated risky international commerce in HEU for nearly two decades.

[25] Under the Agreement for Cooperation in the Peaceful Uses of Nuclear Energy between the United States and EURATOM, the movement of U.S.-origin materials from one country to another within EURATOM is not subject to any prior U.S. consent on "retransfers" under Sections 123a.(5) and 127(4) of the Atomic Energy Act, 42 U.S.C. §§ 2153a.(5), 2156(4). See H.R. Rep. No. 138, 104th Cong., 1st Sess. 101 (November 29, 1995); Transnuclear, Inc., CLI-00-16, 52 NRC 68 (2000).

[26] See A. Cowell, "Germans Rebuff U.S. on Plans for Nuclear Research Reactor," New York Times, July 22, 1995, at 3, col. 1.

[27] The U.S. State Department stated in 1994, "In accordance with USG policy, reinforced by the 1992 Energy Policy Act, the United States will not supply highly-enriched uranium (HEU) for any new foreign research reactor, such as the Garching facility [the FRM-II] that may be built at the University of Munich." U.S. Department of State, EUR (Voluntary) Press Guidance, "Germany: Garching Research Reactor" (May 10, 1994).

[28] The United States has already purchased, at an estimated cost of several billion dollars, hundreds of tons of Russian HEU for blend-down into LEU to eliminate this nuclear weapons-usable material and any risk of its diversion for nuclear weapons. Approving the proposed export would be at cross-purposes with this major U.S. post-Cold War initiative.

[29] The Commission's regulations, it should be noted, include specific recognition that public participation and input are encouraged. 10 C.F.R. § 110.81(a).