

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

In the Matter of )  
 )  
Edlow International Company ) Docket No. 11006235  
 )  
(Export of 93.20% Enriched Uranium) ) License No. XSNM 03771  
 )  
 )  
\_\_\_\_\_ )

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

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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 Edlow International Company ("Applicant"), received by the Commission on June 3, 2016, and published in the Federal Register on July 13, 2016 (81 Fed. Reg. 45311), and subsequently

modified in a revised application received by the Commission on July 11, 2016, for a 10-year license to export 144.0 kilograms (kg) of 93.20% enriched uranium in fabricated fuel to Belgium for 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](http://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 describes past, present, and potential future efforts to minimize export and use of HEU for non-weapons purposes. He is also author of "Nuclear Nonproliferation via Coercion and Consensus: The Success and Limits of the RERTR Program (1978-2004)," which is a book chapter in International Cooperation on WMD Nonproliferation, ed. Jeffrey W. Knopf (Athens, GA: University of Georgia Press, 2016), pp. 46-71.

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 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.

In 2001, Petitioner authored a petition for leave to intervene by the Nuclear Control Institute, regarding an export license application (XSNM-03192) for HEU for use as fuel at the BR-2 reactor in Belgium, after which the applicant suspended its application.<sup>1</sup> Similarly, in 2015, Petitioner authored a petition for leave to intervene, regarding an export license application (XSNM-03758) for HEU for use as fuel at the BR-2 reactor in Belgium, after which the applicant again withdrew its application.<sup>2</sup>

Petitioner has important institutional interests that 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.

Petitioner's 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 usable 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") -- defined as enriched to less than 20 percent in the fissile isotope U-235 -- which is unsuitable for nuclear weapons but is capable of providing the same civilian benefits without large penalties.

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.<sup>3</sup>

Consequently, HEU is an attractive target for national diversion or seizure by terrorists. Indeed, the late Manhattan Project physicist Luis Alvarez once noted that with a sufficient amount of "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."<sup>4</sup>

B. Belgian Reactor Site Has Been Targeted by Malevolent Actors Including Islamic State Terrorists

The ultimate foreign consignee of the proposed HEU export--

the Belgian Nuclear Research Center (SCK-CEN) in Mol, Belgium -- has in recent years been targeted by malevolent actors, including Islamic State terrorists. According to the New York Times, "In 2013, two individuals managed to scale the fence at Belgium's research reactor in the city of Mol, break into a laboratory and steal equipment."<sup>5</sup> Subsequently, in December 2015, French police discovered that Islamic State terrorists involved in recent European terrorist attacks had conducted video surveillance of a senior official at the Belgian Nuclear Research Center. According to the Washington Post, "The hours-long film tracked a senior official between his home and workplace at SKN-CEN, a nuclear research facility that houses a substantial amount of highly enriched uranium."<sup>6</sup> The New York Times also reported that "Three men linked to the surveillance video were involved in either the Paris or the Brussels attacks."<sup>7</sup> In addition, Sébastien Berg, a spokesman for Belgium's Federal Agency for Nuclear Control, told the New York Times that Belgian officials had "concrete indications that showed that the terrorists involved in the Paris attacks had the intention to do something involving one of our four nuclear sites."<sup>8</sup> This clear and present danger underscores the urgency of minimizing the supply of HEU to the BR-2 reactor, and ending that supply as soon as possible.

### C. The RERTR Program.

In recognition of the dangers associated with continued reliance on HEU in research reactors, the United States instituted the Reduced Enrichment for Research and Test Reactors (RERTR) program in 1978. Originally under the leadership of Argonne National Laboratory, this program developed 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 significantly reducing the amount of HEU in commerce.<sup>9</sup>

The results of the RERTR program have been impressive. Around the world, at least 67 HEU-fueled research reactors have been converted to LEU fuel, and nearly all new reactors have been built to use LEU fuel.<sup>10</sup> Moreover, conversion to LEU fuel has been highly successful, according to a recent survey, which reported that at reactors that had undergone conversion to LEU fuel, the "operators overwhelmingly perceived any negative impacts to be outweighed by positive ones."<sup>11</sup>

### D. U.S. Policy, Law and Regulation.

U.S. policy has long strongly favored reducing the use of HEU. Thus, the Commission itself as early as 34 years ago sought to "reduc[e], to the maximum extent possible, the use of



HEU in ... foreign research reactors."<sup>12</sup> The same Policy Statement affirmed 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 required all licensed research reactors to convert to LEU.<sup>13</sup> 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."<sup>14</sup> 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," according to the U.S. Department of Energy.<sup>15</sup>

In 1986, Congress first acted specifically to curb the risks associated with commerce in HEU. The Omnibus Diplomatic Security and Anti-Terrorism Act of 1986, as enacted, called 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."<sup>16</sup> Under this law, the executive branch reported that its practice was to permit HEU exports 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."<sup>17</sup> In addition, 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."<sup>18</sup> Under the Schumer Amendment, no HEU exports are permitted for use in a research or test reactor unless all of 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.<sup>19</sup>

The law explicitly defined "alternative nuclear reactor fuel or target" as LEU. Congress envisioned that in the absence of funding for development of such LEU alternatives, the only option would be to "cut off the bomb-grade exports immediately."<sup>20</sup>

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.<sup>21</sup>

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)."<sup>22</sup> At the 2016 Nuclear Security Summit, the United States and 21 other countries "pledged to make every effort to achieve further progress with regard to minimizing and eliminating the use of highly enriched uranium (HEU) in civilian applications."<sup>23</sup>

E. Requested 10-Year Duration of Export License is Inconsistent with Recent Policy and Practice

In recent years, the United States government 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 export licenses to a single year's worth of HEU. Indeed, since April 2012, 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, XSNM-3756, and XSNM-3761. By contrast, the pending application requests a license for export of HEU for approximately 10 years -- from March 1, 2017 to December 31, 2026 -- which is a duration about ten times longer than the Commission has in recent practice approved for HEU export licenses.

F. Requested 10-Year Duration of Export License Would Violate U.S. Law

As already noted, one of the conditions of U.S. law (in the Schumer Amendment) for export of HEU is that "The United States Government is actively developing an alternative nuclear reactor fuel or target that can be used in that reactor." This

condition arguably is satisfied today for the export of HEU to the BR-2 reactor. However, it is impossible for the Commission to determine in advance if this condition would be satisfied for the entire 10-year duration of the proposed license. Indeed, the U.S. government could well terminate development of alternative nuclear reactor fuel, as it did at least once before from 1990 to 1996.<sup>24</sup> Nor can the Commission predict the future of European development of alternative nuclear reactor fuel. Accordingly, it would violate the letter and spirit of U.S. law for the Commission to approve the proposed 10-year license for export of HEU.

Another condition of U.S. law (in the Schumer Amendment) for export of HEU is that "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." In this case, however, there is such an alternative nuclear fuel -- LEU silicide -- that could be used in the reactor. LEU silicide fuel already is qualified and has replaced HEU fuel in many reactors around the world, including one that is comparable in several ways to the BR-2: the High-Flux Reactor (HFR) in Petten, the Netherlands. Converting the BR-2 to LEU silicide fuel might incur a marginal increase in the total cost of operating the reactor, due to factors such as shortened core life. Under U.S. law, however,

that would not disqualify LEU silicide as an alternative nuclear fuel that "can be used" in the BR-2, unless conversion would impose a "large percentage increase in the total cost of operating the reactor."

Indeed, more than 15 years ago the operator of the HFR-Petten opted to convert to LEU silicide fuel, despite incurring a marginal increase in operating cost resulting mainly from the shortened core life in comparison to the previously used HEU fuel. He explained in several presentations that the reactor eventually could be converted again -- to LEU molybdenum fuel, to lengthen the core life -- if such fuel ever were qualified.<sup>25</sup> By contrast, the BR-2 operator has requested a 10-year U.S. export license for HEU based on the erroneous assumption that the reactor cannot be converted to LEU prior to qualification of LEU molybdenum fuel. In reality, not only could the BR-2 be converted to already qualified LEU silicide fuel, but for two reasons this might not increase operating costs any more than potential future conversion to LEU molybdenum fuel, which the operator claims it would be willing to do. First, although silicide fuel could require more uranium per year due to a shorter core life, the fabrication capability for silicide fuel exists and is reasonably priced; by contrast, LEU molybdenum fuel fabrication capability does not yet exist, and the

requisite construction and operating costs could inflate the price of the fuel. Second, previous concerns about back-end disposition of silicide fuel have been alleviated by AREVA's announcement that it expects to obtain authorization in 2017 to start reprocessing spent silicide fuel.<sup>26</sup> Thus, in light of the existing feasibility to convert the BR-2 reactor to qualified LEU silicide fuel, a decision by the Commission to approve the proposed 10-year HEU export license would perpetuate unnecessary and risky international commerce in HEU, directly contrary to the letter and spirit of U.S. law.

As mentioned, the Schumer Amendment clearly defines that an alternative nuclear fuel "can be used" if it is qualified and would permit the large majority of reactor activities without a "large percentage increase" in the total cost of operating the reactor. With regard to the pending license application, the applicant has not provided any evidence that, by this definition, LEU silicide fuel cannot be used in the BR-2 reactor. In the absence of such evidence, the Commission is prohibited by law from approving the export of HEU for this reactor, unless the applicant "has provided assurances" that it will convert to silicide LEU fuel as soon as possible. However, the applicant has provided no such assurances. If the applicant were to provide such assurances, the conversion to LEU silicide



fuel could be accomplished within approximately three years, judging from the historical duration of safety studies, licensing procedures, and fuel fabrication. Thus, even if the applicant were to commit to convert to LEU silicide fuel as soon as possible, the Commission would be prohibited by U.S. law from approving export of HEU to the BR-2 reactor in excess of a three-year supply, which would be sufficient to enable the reactor to operate during an interim period prior to conversion.

G. Incremental Shipment is Consistent with U.S. Law

The applicant states that its plan is to export HEU "in increments of up to 5 kg per shipment" in fabricated fuel. If such shipments were scheduled at the same rate that the BR-2 reactor were using fresh fuel, this aspect of the application would be consistent with U.S. law by reducing the potential for creation of surplus HEU abroad that could undermine U.S. nonproliferation policy, as has occurred in the past. When surpluses of HEU have been created in Europe previously, at least twice they have been diverted from their original purpose to end-users who were not eligible for U.S. exports of HEU due to nonproliferation policy restrictions, thereby undercutting U.S. nonproliferation objectives.<sup>27</sup>

## H. 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.

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 has been qualified, as required under the Schumer Amendment as a condition for exports of HEU.<sup>28</sup> This exchange of notes has not been made public.

### (2) Duration of License Should Match Its Quantity of HEU Fuel.

The applicant states that the requested export of 144 kg is sufficient for six years, implying that the annual requirement is 24 kg of fresh 93.2%-enriched HEU, assuming normal operation. Nevertheless, the applicant requests a 10-year license, arguing that the extended duration is to provide "some margin for unforeseen delays." It is not obvious what sort of delays the applicant envisions. However, if the reactor were to shut down for an extended period, the reactor would require less HEU fuel prior to conversion to LEU fuel, which would not justify

extending the license's duration. Accordingly, regardless of how many years' worth of HEU fuel, if any, the Commission might ultimately decide to license for export in the instant proceeding, the duration of the license should match that number of years, in order to incentivize expeditious conversion to LEU fuel, as intended by U.S. law.

I. Risks of Approving a 10-Year HEU Export License.

Approving a 10-year export license for HEU for the BR-2 reactor would raise two serious risks. First, it would reduce the incentive for the operator to convert to already qualified LEU silicide fuel. 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 silicide 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.<sup>29</sup> This experience shows clearly that a multi-year supply of HEU risks undermining the explicit goal of U.S. law to persuade operators to convert to LEU. Second, a 10-year HEU export license could reduce the incentive for Europeans to develop and qualify LEU molybdenum fuel that could be used in the BR-2 and other research reactors.

In short, approving a 10-year HEU export license would violate U.S. law and 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 requested duration and amount of HEU, consistent with U.S. law, 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 a Long-Term License for Export of HEU, Especially for a Reactor that Can Convert to Qualified LEU Fuel.

U.S. law is unambiguous that the Commission may not license the export of HEU unless "The United States Government is actively developing an alternative nuclear reactor fuel or target that can be used in that reactor." Although the Commission can make such a determination for the near term, it cannot know if such fuel development will persist for ten years into the future. Accordingly, to comply with U.S. law, the Commission may approve HEU export licenses only of short duration. Since April 2012, the duration of such licenses has been limited to approximately one year. To be consistent with U.S. law, the Commission may not approve an HEU export license of considerably longer duration.

U.S. law is also unambiguous that the Commission may not license the export of HEU unless "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." In this case, however, there is such an alternative nuclear fuel -- LEU silicide -- which the applicant could convert to within about three years. Unless the applicant provides assurances that it will convert to silicide LEU fuel as soon as possible, U.S. law

prohibits the Commission from issuing an export license for HEU. Even if the applicant were to provide such assurances, U.S. law implies that the Commission should not approve export of more than a three-year supply of HEU fuel for the BR-2 reactor, an amount sufficient to enable the reactor's operation during the interim period prior to conversion to LEU.

Failure to limit the duration of the license and the amount of HEU that may be exported under the license consistent with that duration, to incentivize expeditious conversion to LEU fuel, would entail unacceptable proliferation and terrorism risks and would undermine the U.S. common defense and security, for several reasons. First, the issuance of a 10-year HEU export license 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, which could 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 policy and interests. Second, approval of the pending application could lead to unnecessary, increased international transport of weapons-usable material, aggravating the risk of interception by radical 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 a proposed export license that entails a duration and amount of HEU in excess of what is consistent with U.S. law.

#### 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.<sup>30</sup>

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,

A handwritten signature in black ink that reads "Alan J. Kuperman". The signature is written in a cursive style with a long, sweeping underline.

Alan J. Kuperman, Ph.D.  
Associate Professor, LBJ School of Public Affairs  
Coordinator, Nuclear Proliferation Prevention Project  
University of Texas at Austin

Dated: August 4, 2016  
Austin, TX

## ENDNOTES

<sup>1</sup> 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.

<sup>2</sup> David Kramer, "Belgium drops request for US bomb-grade uranium," Physics Today, March 24, 2016.

<sup>3</sup> 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.

<sup>4</sup> Alvarez, Adventures of a Physicist (Basic Books 1987), at 125.

<sup>5</sup> Alissa J. Rubin and Milan Schreuer, "Belgium Fears Nuclear Plants Are Vulnerable," New York Times, March 26, 2016.

<sup>6</sup> Steve Mufson, "Attacks Stoke New Fears About Nuclear Security," Washington Post, March 26, 2016.

<sup>7</sup> Rubin and Schreuer, op. cit.

<sup>8</sup> Milan Schreuer and Alissa J. Rubin, "Video Found in Belgium May Point to Bigger Plot," New York Times, February 19, 2016.

<sup>9</sup> 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).

<sup>10</sup> 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).

<sup>11</sup> 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.

<sup>12</sup> See 47 Fed. Reg. 37007 (August 24, 1982).

<sup>13</sup> See 51 Fed. Reg. 6514 (February 25, 1986).

<sup>14</sup> 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).

<sup>15</sup> U.S. Department of Energy, "DOE Facts: A New Neutron Source for the Nation" (February 1995).

<sup>16</sup> 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).

<sup>17</sup> 1991 Annual Report Under Section 601 of the NNPA, 22 U.S.C. § 3281 (July 2, 1992), at 77.

<sup>18</sup> 138 Cong. Rec. H. 11440 (daily ed., Oct. 5, 1992).

<sup>19</sup> 42 U.S.C. § 2160d.(a)(1)-(3).

<sup>20</sup> See 138 Cong. Rec. at H. 11440 (Statement of Rep. Schumer).

<sup>21</sup> 10 C.F.R. § 110.42(a)(9)(i).

<sup>22</sup> U.S. Department of Energy, "GTRI's Convert Program: Minimizing the Use of Highly Enriched Uranium," Fact Sheet, May 29, 2014.

<sup>23</sup> "NSS 2016: Gift Basket on Minimizing and Eliminating the Use of Highly Enriched Uranium in Civilian Applications," April 1, 2016.

<sup>24</sup> Armando Travelli, "Status and Progress of the RERTR Program in the Year 2004," Presented at the 2004 International Meeting on Reduced Enrichment for Research and Test Reactors, November 7-12, 2004, Vienna, Austria, at 2.

<sup>25</sup> J. Guidez, et al., "Status in 1999 of the High Flux Reactor Fuel Cycle," 22nd International Meeting on RERTR, Budapest, Hungary, October 3-8, 1999. J. Guidez, "What is the interest for a research reactor to use the new MTR fuel UMo?" RRFM 2000, Colmar, France, March 20-21, 2000. The reactor completed conversion to LEU silicide in 2006; see F.J. Wijtsma, "HEU / LEU conversion of the Petten HFR," RRFM 2006, Sofia, Bulgaria, May 3, 2006.

<sup>26</sup> J.F. Valery, et al., "Status on Silicide Fuel Reprocessing at AREVA La Hague," 36th International Meeting on Reduced Enrichment for Research and Test Reactors, Seoul, South Korea, October 11-14, 2015, at 1.

<sup>27</sup> See Alan J. Kuperman, "Petition for Leave to Intervene and

Request for Hearing," Docket No. 11006188, License No. XSNM 03758, March 18, 2015, at 11-13.

<sup>28</sup> 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.

<sup>29</sup> 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 the reactor shut down in 2006. Thus, the availability of U.S.-exported HEU unnecessarily hindered foreign conversion to LEU fuel and perpetuated risky and unnecessary foreign use of HEU fuel for nearly two decades.

<sup>30</sup> 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).