

Petition for NRC Rule Change

The American Physical Society (APS) is filing a petition to request the following rule change: that the Nuclear Regulatory Commission include proliferation assessments as part of the licensing process. In order to address the points required in an NRC rule change request, this petition is broken into four parts:

- I. Background on the Petitioner
- II. Petitioner's Concerns
- III. Petitioner's Specific Request for a Rule Change
- IV. Methods for Implementation

I. Background on Petitioner:

The APS, established more than 110 years ago, is the nation's leading organization of research physicists, with more than 48,000 members in academia, national laboratories, and industry. APS "strives to be the leading voice for physics and an authoritative source of physics information for the advancement of physics and the benefit of humanity." It is within this spirit that APS submits its petition to the NRC.

APS has a long and distinguished history of speaking publicly about issues surrounding both nuclear power and nuclear weapons. Its involvement with such issues is appropriate given that it was physicists who were centrally involved in the creation of nuclear weapons and who continue to be involved in the U.S. nuclear weapons complex and the development of nuclear power.

APS supports nuclear power, but it also emphasizes that nuclear power and nuclear materials must be deployed in a safe, secure and responsible manner. Several public APS statements speak to the Society's position on nuclear issues and the way in which energy security, national security and non-proliferation are coupled.ⁱ Consistent with these public statements of support of nuclear power and positions on nuclear non-proliferation, APS believes its petition for an NRC rule change is in the national security and energy interests of the United States.

II. Petitioner's Concerns:

On February 18, 2010, the APS Panel on Public Affairs (POPA) released a report entitled "Technical Steps to Support Nuclear Arsenal Downsizing".ⁱⁱ The membership of the Study Group that drafted the APS/POPA "Downsizing" report comprises some of the country's leading experts on both the technical and policy issues related to nuclear power, nuclear weapons and proliferation. They have served in key positions in the IAEA, on treaty negotiating teams and on on-site inspection teams. They have also contributed to the research and development of technical safeguards at our national laboratories.

In the APS/POPA “Downsizing” report, the select Study Group took special note that:

“Over the next several years, the Nuclear Regulatory Commission will be reviewing license applications for new technologies that could carry substantial proliferation risks.”ⁱⁱⁱ

Specifically, the Study Group found that some of the new enrichment and reprocessing (ENR) technologies could represent proliferation “game changers” since they would lead to smaller, more efficient, and possibly less expensive methods for the production and use of nuclear materials that would be more difficult to detect. One example is laser isotope separation, which, according to company comments and presentations,^{iv} is both 75% smaller and substantially more energy efficient than centrifuge technology. Consequently, the technology has raised proliferation concerns.^v The current NRC Chairman, Gregory Jaczko, acknowledged this concern:

“It's a very new technology, or a novel technology. It's not similar to the kinds of enrichment facilities we've licensed in the past. So, I certainly think there may be some things we need to take a look at and make sure we've got the right approach to ensuring that kind of protection of the technology and the material.”^{vi}

The APS Study Group is not the first to conclude that new ENR technologies could pose unique proliferation risks.^{vii} A briefing to the Study Group from the IAEA, in particular, highlighted the issue of the detection of covert facilities and the inadequacy of existing detection technologies.^{viii} Indeed, the IAEA is sufficiently concerned about this issue that it established a division specifically tasked with improving detection technology.^{ix} The U.S. National Nuclear Security Agency (NNSA) has also established a program tasked with carrying out R&D to improve detection technology, with one effort dedicated to detecting laser enrichment.^x

In light of its concerns about the impact of new ENR technologies on proliferation and to understand how proliferation concerns affect decisions on licensing, the Study Group requested and received a briefing from NRC.^{xi} Based upon that briefing and further analysis, the Study Group concluded that the NRC should elevate the priority of non-proliferation. *APS believes this can be best addressed by including a Nuclear Proliferation Assessment (NPA) in the ENR licensing process.*

Members of the U.S. House of Representatives Nuclear Security Caucus reached a similar conclusion in a letter they sent to the NRC Commissioners.^{xii} They made a compelling point about the proliferation paths associated with enrichment programs, such as the theft of plans from the URENCO facility in the Netherlands. Specifically, they noted, “the uncovering of the A.Q. Khan proliferation network has demonstrated that we can never be too careful in protecting nuclear materials technologies.” And while Nuclear Proliferation Assessments by NRC “will not ensure that nuclear technologies are not diverted to weapons production or other military other purposes” the Members concluded that NPAs “can provide an additional and perhaps crucial layer of protection against their proliferation and use against the United States.”

There is an additional proliferation concern related to ENR technologies: successful commercialization of the technology may itself stimulate the interests of proliferants. Indeed,

this particular concern - as well as our concerns regarding the proliferation risks of more efficient ENR technologies - have been acknowledged in an NPAS that NRC participated in.^{xiii}

In responding to these concerns, the NRC staff indicated that while they currently do not require proliferation assessments of ENR technologies, the “net effect” of the current licensing process may be sufficient to cover all issues that would arise in a NPA.^{xiv}

We believe the “net effect” approach is insufficient for two reasons:

- 1) By having a proliferation assessment emerge as a “net effect” rather than having it as an explicit request in the licensing process, non-proliferation is not given an adequate level of attention. Under the current process, proliferation-relevant issues are spread across the license application and never synthesized. Consequently, the current process may overlook some proprieties of the technology which merit attention in a proliferation context.
- 2) Key questions that indicate the degree of proliferation risk of an ENR technology currently can go unaddressed under the NRC’s “net effect” approach. Such questions include, but would not be limited to, the following:
 - Could the design of the technology be altered easily to allow for diversion of nuclear material?
 - Could the facility be constructed and operated in a manner that is undetectable?
 - Are there unique components of the technology whose acquisition would indicate the construction of such a facility and could be easily tracked?

A proliferation assessment would be incomplete without a consideration of the above questions.

III. Petitioner’s Specific Request for Rule Change:

We propose that a Nuclear Proliferation Assessment be included in Title 10 of the Code of Federal Regulations, Part 70 “Domestic Licensing of Special Nuclear Material”, Subpart D “License Applications”, Section 70.22 “Contents of Applications” as follows:

70.22o Nuclear Proliferation Assessment.

Each applicant for the license of an enrichment or reprocessing facility shall include an assessment of the proliferation risks that construction and operation of the proposed facility might pose.

Such an NPA is consistent with the NRC requirement to evaluate whether the issuance of a license “would be inimical to the common defense and security or to the health and safety of the public.”^{xv}

IV. Methods for Implementation

The APS does not presume to know the best method for implementing its proposed rule change; the NRC staff itself is best positioned to make that determination. The APS will, however, make two comments for NRC staff consideration:

- 1) GE-Hitachi carried out an independent nuclear proliferation assessment of its laser enrichment facility. The assessment, as clarified by one of the assessment's participants, was done without: 1) jeopardizing any classified or proprietary information; 2) delaying the timeline; or 3) adding substantially to the cost of the project. Under the APS proposed rule change, all ENR license applicants would carry out such an assessment and submit it to the NRC staff for a review.
- 2) The term "Nuclear Proliferation Assessment" is used in the Atomic Energy Act, as amended, under Section 123, in the context of U.S. agreements for cooperation with a foreign nation. The NRC participates in these assessments with other federal entities, in the manner described in Section 123. In particular, the NRC has already engaged in the NPA of an enrichment facility. In 1999, the NRC participated with other federal entities in the NPA that allowed the SILEX technology to be transferred from Australia to the U.S.^{xvi} Similarly, under the APS proposed rule change, the NRC staff could work with other federal entities - such as the National Nuclear Security Administration - in reviewing the NPA provided by the licensee.

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ⁱ See, for example: APS Council statements 93.7; *Nuclear Power and Proliferation Resistance: Securing Benefits, Limiting Risks*, APS/POPA Report, 2005; *Readiness of the US Nuclear Workforce for 21st Century Challenges*, APS/POPA Report, 2008; *Nuclear Weapons in 21st Century US National Security*, APS/AAAS/CSIS Report, 2008. All statements and reports can be downloaded from www.aps.org.

ⁱⁱ "Technical Steps to Support Nuclear Arsenal Downsizing", APS/POPA Report, 2010:

<http://www.aps.org/link/downsizing.cfm>.

ⁱⁱⁱ Ibid, p 20.

^{iv} <http://www.silex.com.au/public/uploads/announce/House%20of%20Reps%20Presentation%20090206.pdf>.

^v John Lyman, "Enrichment Separative Capacity for SILEX," Los Alamos National Laboratory, LA-UR-05-3786.

^{vi} Laser Nuclear Technology Might Pose Security Risk, by Richard Harris, April 12, 2010,

<http://www.npr.org/templates/story/story.php?storyId=125787318>

^{vii} For example: Houston G. Wood, Alexander Glaser, R. Scott Kemp, "The Gas Centrifuge and Nuclear Weapons Proliferation," *Physics Today*, September 2008; R. Scott Kemp, briefing to APS/POPA committee:

<http://www.aps.org/policy/reports/popa-reports/loader.cfm?csModule=security/getfile&pageid=212695>; Martin B.

Kalinowski, University of Hamburg, committee briefing: <http://www.aps.org/policy/reports/popa-reports/loader.cfm?csModule=security/getfile&pageid=212699>.

^{viii} Julian Whichello, IAEA, briefing to APS/POPA committee: <http://www.aps.org/policy/reports/popa-reports/loader.cfm?csModule=security/getfile&pageid=212701>.

^{ix} N. Khlebnikov, D. Parise, and J. Whichello, “*Novel technologies for the detection of undeclared nuclear activities*,” IAEA-CN-148/32.

^x Rhys Williams, “NA-22: Program and R&D Overview,” briefing to APS/POPA committee:

<http://www.aps.org/policy/reports/popa-reports/loader.cfm?csModule=security/getfile&pageid=212697>.

^{xi} Brian Smith and Mike Tschiltz, briefing to APS/POPA committee, April 22, 2009.

^{xii} Letter from Representatives Spratt, Fortenberry, Carson, Schiff, Foster and Lamborn dated June 30th 2010.

^{xiii} Nuclear Proliferation Assessment Statement, Proposed Agreement for Cooperation Between the United States of America and Australia, 1999.

^{xiv} Public meeting with NRC, September 15, 2010.

^{xv} Atomic Energy Act of 1954, as amended: 42 USC 2077 and 42 USC 2099.

^{xvi} Nuclear Proliferation Assessment Statement, Proposed Agreement for Cooperation Between the United States of America and Australia, 1999.