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Alliance for Nuclear Accountability

A national network of organizations working to address issues of nuclear weapons production and waste cleanup

Comments Submitted at NRC's Meeting on Global Laser Enrichment Environmental Impact Statement (EIS), Wilmington, North Carolina

-- Also Filed in Docket No. PRM–70–9; NRC–2010–0372 and in ADAMS --

Laser Enrichment: Dual Use Technology with Commercial and Military Applications?
Lack of Nuclear Proliferation Assessment a Serious Oversight, Threatens National Security

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Little Boy – Hiroshima HEU bomb

Brunswick GE Mark I (Fukushima) reactors

The direct environmental impacts of licensing of a laser enrichment plant to be located on a 209-acre tract of land adjacent to the existing General Electric-Hitachi (GEH) uranium fuel fabrication facility - Global Nuclear Fuels-Americas, LLC - are rightly issues that merit full review. Environmental impacts to Northeast Cape Fear River drainage, to undeveloped forest lands and to flora and fauna on the General Electric-Hitachi Global Laser Enrichment LLC (GLE) site are, as the Nuclear Regulatory Commission staff says, are "small to moderate," and thus the Environmental Impact Statement and licensing of the GLE facility itself must not simply be rubberstamped by the NRC.

Proliferation Assessment Needed for Laser Enrichment Technology

The EIS is clearly lacking in one area of great concern on a national level – the proliferation impact of the GLE technology. The Nuclear Regulatory Commission (NRC) has already determined that the GLE technology presents concerns and admits that the "SILEX technology is classified up to the Secret Restricted Data level."[1] While recognizing the risks of the technology involved, refusal by the NRC to prepare a nuclear proliferation assessment or urge and support its preparation by another agency of the U.S. Government could have far-reaching and negative

[1] http://www.nrc.gov/reading-rm/doc-collections/commission/secys/2007/secy2007-0031/2007-0031scy.pdf

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proliferation risks. The gravity of this situation cannot be underestimated given the potential proliferation implications of the spread of the laser enrichment technology.

The claim by the NRC in a March 15, 2010 letter that a proliferation assessment "is outside the scope of the agency's responsibilities under the National Environmental Policy Act ("NEPA")" and that the "NRC considers a nuclear nonproliferation impact assessment to be outside the scope of the agency's statutory responsibilities" is nothing short of an abrogation of the U.S. commitment to develop and implement policies to halt the spread of nuclear weapons technologies and nuclear weapons materials.[2]

Without the proliferation assessment being prepared as part of the EIS process, which is in no way constrained by NEPA, there is so far no branch of the U.S. Government which is formally and openly reviewing the proliferation risks of laser enrichment, as far as publicly known. The failure by the NRC to make sure that such an assessment is prepared means that a new nuclear technology is moving forward with no formal consideration of its potential proliferation impact. This is unacceptable but the government has time to change course before the technology has been licensed, is operating and is being considered for export via formal or clandestine methods.

Transfer of SILEX from Australia to U.S. Not the Same as Transfer from the U.S. to the Globe

In an NRC meeting on September 1, 2010 on the laser enrichment license application, when concern about proliferation was raised during the public comment period, an NRC official indicated that "the Department of State performed a nonproliferation assessment as part of the preparation of the Agreement of Cooperation between the United States and Australia that allowed the Australian Silex technology to enter the United States."[3]

In approving the *Agreement for Cooperation Between the United States of America and Australia Concerning Technology for the Separation of Isotopes of Uranium by Laser Excitation*, President Clinton stated on to the Congress on November 3, 1999 that:

> The proposed Agreement provides for cooperation between the parties and authorized persons within their respective jurisdictions in research on and development of the SILEX process (the particular process for the separation of isotopes of uranium by laser excitation). The Agreement permits the transfer for peaceful purposes from Australia to the United States and from the United States to Australia, subject to the nonproliferation conditions and controls set forth in the Agreement, of Restricted Data, sensitive nuclear technology, sensitive nuclear facilities, and major critical components of such facilities, to the extent that these relate to the SILEX technology.

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[2] http://pbadupws.nrc.gov/docs/ML1003/ML100321787.pdf
[3] http://pbadupws.nrc.gov/docs/ML1025/ML102520033.pdf

> The nonproliferation conditions and controls required by the Agreement are the standard conditions and controls required by section 123 of the Atomic Energy Act, as amended by the Nuclear Non-Proliferation Act of 1978 (NNPA), for all new U.S. agreements for peaceful nuclear cooperation. These include safeguards, a guarantee of no explosive or military use, a guarantee of adequate physical protection, and rights to approve re-transfers, enrichment, reprocessing, other alterations in form or content, and storage. The Agreement contains additional detailed provisions for the protection of sensitive nuclear technology, Restricted Data, sensitive nuclear facilities, and major critical components of such facilities transferred pursuant to it.[4]

That the State Department had completed such an assessment as part of the negotiation of the section 123 agreement between the United States and Australia, where SILEX was initially developed, was both germane and sufficient for the question at hand, which was transfer of the technology to the United States (which had earlier explored laser enrichment of uranium and purification of plutonium via a laser process).

However, when one considers the State Department's assessment, it clearly is not adequate. That assessment was only concerned with whether it was in the interest of the nonproliferation regime to have some US-Government control over SILEX technology, to which the obvious answer was yes.

It is an entirely different matter to decide to deploy SILEX technology on a large scale or to possibly export the technology in the future, and the US Government is now failing to live up to its presumed nonproliferation leadership by refusing to do a further assessment about the nonproliferation consequences of potentially large-scale deployment now before us.

There have been reports that GLE itself has prepared a brief proliferation assessment, possibly being in the range of four to seven pages, and though it was insufficient in its review of the technology a claim may be made that there is no proliferation risk associated with the technology, possibly in part due to technological challenges associated with it. In any event, no version of this document has been made public by GLE or the NRC. Additionally, as it does not appear that GLE has been supportive of a government-sponsored or independent proliferation review the question must be asked: why doesn't GLE support a full, independent proliferation assessment of its technology if there is nothing of concern that will be identified?

The NRC has claimed that nonproliferation concerns are indirectly evaluated through the normal Environmental Impact Statement process and other aspects of the licensing application. Indeed, it is because of this NRC position that this now becomes the appropriate time and place to raise nonproliferation issues.

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[4] http://usrsaustralia.state.gov/us-oz/1999/11/03/wh1.html

GLE Outlines Proliferation Concerns in Environmental Report

If we look at the December 2008 Environmental Report for the GLE Commercial Facility prepared by GE-Hitachi Global Laser Enrichment LLC, we will find the following claims:[5]

> The GLE laser-based technology also maintains the advantages of two earlier-generation laser-excitation technologies—the Molecular Laser Isotope Separation Process (MLIS) and the Atomic Vapor Isotope Separation Process (AVLIS)—in terms of anticipated high separation factors, low energy intensity, low cooling water requirements, small footprint, and low capital and operating costs. The technological advantages of the GLE laser-based enrichment technology also are expected to result in reduced environmental impacts due to the smaller facility footprint for the same Separative Work Units (SWU) capacity, the lack of chlorofluorocarbon (CFC) use, and lower energy requirements. (page 1-4)

Thus, key advantages to the laser technology also hold proliferation risks:

- For any given capacity, the footprint of a laser enrichment plant is smaller than for other enrichment technologies;
- For any given capacity, the energy use of a laser enrichment plant is expected smaller than for other technologies;
- For any given capacity, the equipment and operating requirements are less costly, which is a key driver for this new technology;
- For any given level of enrichment, the number of enrichment modules is fewer.

Those are all potentially advantageous features from an environmental and economic perspective. However, each and every one of those qualities is also a reason to believe that laser enrichment might pose a serious proliferation risk. If the footprint is smaller and the energy use less, it may well be easier to hide and thus harder to detect clandestine operation. If the capital requirements are lower, it could be within the reach of a greater number of proliferators. If the number of enrichment modules is fewer, it may well be capable of making highly-enriched uranium from low-enriched uranium faster.

These matters deserve serious attention in a dedicated proliferation assessment.

Proliferation Double Standard?

Previous assessments expressed serious concern about laser enrichment development, including by Iran and Iraq.

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[5] http://pbadupws.nrc.gov/docs/ML0909/ML090910468.pdf

A Congressional Research Service report from 2006, entitled *Iran's Nuclear Program: Recent Developments*, states that "In three years of intensive inspections, the IAEA has revealed significant undeclared Iranian efforts in uranium enrichment (including centrifuge, atomic vapor laser and molecular laser isotope separation techniques) and separation of plutonium, as well as undeclared imported material."[6]

A report by the institute for Science and International Security (ISIS), entitled *Iraq's Programs to Make Highly Enriched Uranium and Plutonium for Nuclear Weapons Prior to the Gulf War* states that "In May 1994, the IAEA learned from member states that Iraq had pursued uranium enrichment through laser isotope separation (LIS) at the Al Tuwaitha site. According to member states, Iraq had studied both molecular (MLIS) and atomic vapor (AVLIS) technologies."[7]

If the United States would go to war or threaten to go war due to proliferation concerns in Iraq or Iran but refuse to consider the possibility of its own proliferation, does this reveal a double standard that serves to undermine the global nuclear non-proliferation regime?

New Nuclear Technologies Merit Proliferation Assessment by NRC as Part of Licensing

Indeed, SILEX was developed in Australia using only about 40 employees, including 12 PhDs and 11 engineers and the history of centrifuge proliferation shows the task of replicating a known technology is much less a challenge than the task of inventing it *de novo*.[8]

While there may be challenges in scaling SILEX technology to commercial scales, we should remember that a weapon-quantity of highly enriched uranium can be produced annually using only 1/600 the capacity of a commercial-scale facility.[9] All that is needed is to know which technical pathway to pursue, and to have the confidence to pursue it—both factors that would be solidified by the commercial development of SILEX.

Invariably, any new technology will create some proliferation risk. This is accepted. The obligation incumbent on the Government is to understand how much and in comparison to what benefit.

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[6] http://www.dtic.mil/dtic/tr/fulltext/u2/a454192.pdf

[7] http://www.isis-online.org/publications/iraq/iraqs_fm_history.html

[8] On the scale of SILEX, see: http://www.silex.com.au/public/uploads/announce/House%20of%20Reps%20Presentation%20090206.pdf On the relative scale of replication versus invention, see: R. Scott Kemp, "The End of Manhattan" *Technology & Culture*, Vol. 53, No 2. It took decades to perfect the centrifuge design, and many dozens of engineers. Subsequently, 14 other countries were able to replicate the centrifuge with more modest resources: the follow-on programs took an average of 1-2 years, and used staff sizes between 6 to 15 individuals.

[9] 1 SQ (25kg) of 90% HEU requires about 5000 SWU. A typical commercial plant is about 3 million SWU/year.

As new technologies do presents potential risks, a prudent approach is for there to be a requirement for proliferation assessments to be prepared for any new technology that comes before the NRC for licensing. This idea was presented in the form of a petition by the American Physical Society published on December 23, 2010 in the Federal Register - Docket No. PRM–70–9; NRC–2010–0372 - and is worthy of being embraced by the NRC.[10]

SILEX offered an untested claim in 2006 that SILEX might enrich uranium cheaper than by other enrichment methods.[11] Presumably, the company will only proceed with commercialization if the process proves cheaper than centrifuge enrichment. If laser enrichment is cheaper or not, is the cost worth the risk of additional nuclear-weapons proliferation and the enormous external costs which would be associated with controlling the technology if it proves to hold a unique proliferation risk?

In conclusion, the delays in avoiding preparation of a proliferation assessment on the laser enrichment technology are unjustified and potentially dangerous. The Nuclear Regulatory Commission must now prove it is a regulator that is indeed watching out for the national security interest of the United States and agree to prepare a proliferation assessment as part of the Global Laser enrichment license review process.

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[10] http://www.gpo.gov/fdsys/pkg/FR-2010-12-23/pdf/2010-32242.pdf
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