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Department of Energy  
Washington, DC 20585

January 15, 2004

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MEMORANDUM FOR MARSHALL O. COMBS, DIRECTOR  
OFFICE OF SECURITY

THROUGH: *Copy to Wilcher*  
LARRY D. WILCHER, DIRECTOR  
SECURITY POLICY STAFF  
OFFICE OF SECURITY

FROM: *J. Elkan*  
JOAN G. HAWTHORNE, DIRECTOR  
INFORMATION CLASSIFICATION AND CONTROL POLICY  
SECURITY POLICY STAFF  
OFFICE OF SECURITY

SUBJECT: **ACTION:** Approval of the Lawrence Livermore  
National Laboratory Declassification Proposal of the  
Technique and the Lasers Used to Access Atoms in  
Metastable States in the Plutonium Process (U)

ISSUE: Lawrence Livermore National Laboratory (LLNL)  
has requested declassification of the fact that, in the  
plutonium (Pu) Atomic Vapor Laser Isotope  
Separation (AVLIS) process, atoms in some  
metastable states are accessed by a technique called  
"optical pumping," and that the Auxiliary Laser  
Facility is a process laser system used to "optically  
pump" atoms from metastable states to the ground  
state where they are available for excitation and  
*photoionization by the dye laser system, per letter  
dated December 5, 2002 (attachment 1).*

|  |                                       |
|--|---------------------------------------|
| Department of Energy Declassification Review |                                       |
| Review Date: 1/20/04                         | Classification Authority: [Signature] |
| Authority: R. H. Fickens                     | Classification: [Signature]           |
| Review Date: 8/5/11                          | Classification: [Signature]           |
| Authority: S. Fanning                        | Classification: [Signature]           |
| Other Agency: 3A                             |                                       |

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This document contains Restricted Data as  
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SO-122  
Derived From: *[Signature]*  
C-SIS-1, 10/16/95

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**BACKGROUND:** The National Nuclear Security Administration is funding LLNL to demonstrate that the AVLIS process can be used to tailor the isotopic composition of Pu for nuclear weapons research in support of the Stockpile Stewardship Program. In this application of the AVLIS process, an electron beam is used to heat plutonium metal in a crucible and generate a vapor stream. About 40 percent of the Pu atoms in the vapor are in excited, metastable states.

**DISCUSSION:** It is currently unclassified that the Pu AVLIS process includes accessing atoms in metastable states, but the technique and the identity of the lasers used to do it remain classified **DELETED**

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However, in 1996, this information was declassified for uranium AVLIS.

The Technical Evaluation Panel reviewed the LLNL proposal on July 21, 2003, and recommended declassification of the technique and the lasers used to access atoms in metastable states in the Pu AVLIS process (attachment 2).

The six-point analysis of the proposed declassification is on pages 5-8 of attachment 1.

**SENSITIVITIES:** There should be no sensitivities since this type of information was declassified for the uranium AVLIS process in 1996 and has been widely disseminated.

**POLICY IMPACT:** The declassification will have no policy impact since the technique for accessing Pu atoms in the metastable state and this laser application are well known in the United States, Canada, Russia, and elsewhere.

**RECOMMENDATIONS:** That you determine, pursuant to section 142a of the Atomic Energy Act of 1954, as amended, that the following information can be published without undue risk to the common defense and security of the United States and can be removed from the Restricted Data category:

1. The fact that a technique called "optical pumping" is used to access plutonium atoms in a metastable state, and
2. The fact that a specified or unspecified commercially available laser is used for "optical pumping" to access atoms in metastable states in the plutonium AVLIS process.

Approve:

Marshall A. Condo

Disapprove:

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Date:

May 18, 2004

Attachments

cc: Christina M. Bromwell, DoD