

September 27, 2007

MEMORANDUM TO: Dennis K. Rathbun, Director  
Division of Intergovernmental Liaison  
and Rulemaking  
Office of Federal and State Materials  
and Environmental Management Programs

FROM: Robert C. Pierson, Director /RA/  
Division of Fuel Cycle Safety  
and Safeguards  
Office of Nuclear Material Safety  
and Safeguards

SUBJECT: USER NEED REQUEST FOR THE OFFICE OF NUCLEAR  
MATERIAL SAFETY AND SAFEGUARDS SUPPORT FOR  
10 CFR PARTS 20, 40, 50, 63, 70, 72, 74, 76, AND 110  
RULEMAKING

REFERENCE: MEMORANDUM TO CHARLES L. MILLER FROM GLENN M.  
TRACY DATED APRIL 19, 2006, SAME SUBJECT  
(ML060690494)

This memorandum requests support from the Office of Federal and State Materials and Environmental Management Programs to initiate rulemaking related to material control and accounting (MC&A) requirements for special nuclear material. This rulemaking effort will amend existing 10 CFR Parts 20, 40, 50, 63, 70, 72, 74, 76, and 110 requirements to incorporate regulatory improvements to the MC&A program as directed by Staff Requirements Memorandum (SRM) 05-0143 (ML053220618). It may also impact, or be impacted by, 10 CFR 60, 73, and 150.

Prior to the transfer of MC&A regulatory oversight staff to my office, the Director, Division of Nuclear Security, in the Office of Nuclear Security and Incident Response provided a user need request to the Division of Industrial and Medical Nuclear Safety Director in April 2006 (reference). The request did not contain a formal technical basis; rather, the contents of SECY-05-0143 (ML050870212) were provided as the basis for the rulemaking effort. Preliminary discussions between MC&A and rulemaking staff commenced in July 2006, and working group members were nominated in September 2006 and have met on occasion since that time. During a working group member meeting on May 17, 2007, MC&A staff agreed to provide a revised user need request that would include a formal technical basis to enable the commencement of rulemaking plan activities.

The detailed technical basis, as well as a summary, will be provided as enclosures to the rulemaking plan Commission paper. The publicly available technical basis is provided as an attachment to this memorandum, as requested by your staff in August 2007.

As background for the rulemaking plan effort, in August 2005, SECY-05-0143 provided the Commission with staff recommendations and requested Commission approval for proposed changes to the U.S. Nuclear Regulatory Commission's (NRC's) MC&A program, including regulatory requirements and licensing and inspection practices. The NRC had previously undertaken an MC&A program review, assisted by Oak Ridge National Laboratory. With respect to regulatory changes, the staff thoroughly discussed the following proposed actions in the Commission paper:

1. Introduction of a new MC&A requirement for certain nuclear facilities to undertake a Diversion Path Analysis (DPA).
2. Consolidation of the current MC&A regulations.
3. Amendment of the MC&A regulations to address facilities incorporating new technologies.
4. Amendment of the MC&A regulations to address concerns identified at operating and decommissioning fuel fabrication facilities.
5. Amendment of the MC&A regulations to strengthen/clarify requirements and update/develop current guidance documents.
6. Amendment of the MC&A regulations concerning Nuclear Material Management and Safeguard System (NMMSS) as discussed in SECY-05-0078. (Note: This is already being addressed under a separate rulemaking effort.)

In SRM-05-0143 the Commission directed the staff to develop a rulemaking plan, fully coordinated with all appropriate NRC offices. The due date for this action, tracked as FSME200700194 (WITS200500412), has been extended twice to April 18, 2008, primarily due to the involvement of the MC&A technical staff in an accelerated effort to develop significant revisions to the present Geological Repository Operations Area MC&A regulations, as well as challenges encountered in the development of the technical basis.

The staff has identified, in general, a number of areas in which they propose to change the regulations, and these areas are addressed in the Commission Paper and the detailed technical basis:

1. The changing threat environment, including the capability of adversaries to employ: 1) improvised nuclear devices, 2) radiological dispersion devices, and 3) radiological exposure devices.

2. Different U.S. civilian fuel cycle facilities and technologies subject to NRC oversight, including: 1) the utilization of plutonium in mixed-oxide fabrication and subsequent burning at power reactors; 2) advanced technologies, such as gas centrifuge and SILEX uranium enrichment; 3) possible Global Nuclear Energy Partnership ramifications, such as the use of UREX + 1 reprocessing and fast neutron reactors; and 4) the Geological Repository Operations Area at Yucca Mountain.
3. Comparability with Department of Energy (DOE) MC&A requirements. The current DOE nuclear material categorization table employs four categories and five attractive levels, which is significantly different from both NRC and International Atomic Energy Agency (IAEA) material categorizations. DOE's safeguards system also employs vulnerability assessments and systems performance testing, and its material control program explicitly includes containment, surveillance, and access control systems. DOE is in the process of revising its nuclear material categorization table, and NRC will strongly consider this in rulemaking-related efforts.
4. Risk-informing NRC's MC&A program, consistent with OIG audit recommendations. This includes improving NRC's grading and categorization of special nuclear material to: 1) be complete, including spent nuclear fuel and high level waste; 2) reduce the need for specific exemptions to individual licensees; 3) extend current Part 74 concepts for inaccessible material, and Category IA/IB material types as applicable to process monitoring and item monitoring programs; 4) extend graded safeguards throughout the entire special nuclear material fuel cycle, to include power reactors and Yucca Mountain; 5) assure the effectiveness of postulated theft/diversion scenarios through the use of diversion path analyses, which extends methods currently used for uranium enrichment facilities; and 6) consider the impacts of decommissioning with respect to the safeguards requirements for those facilities.

In revising NRC's nuclear material categorization table, NRC intends to address all special nuclear material in one table. All MC&A requirements would be consolidated into Part 74, and new subparts will be reserved for reprocessing and geological repositories. While informed by changes to DOE's nuclear material categorization table, NRC would retain the concepts of Category I, II, and III quantities, thereby remaining generally consistent with IAEA requirements. NRC's current table would be refined by including three attractiveness levels (A, B, and C), while considering the configurations, forms, and degree of accessibility of special nuclear material. In addition, NRC would extend the accounting requirement down to the quantity of one gram of material, tighten low-enriched requirements, and loosen certain requirements, where appropriate.

The lead technical and rulemaking contacts are Thomas Pham at 301-492-3125 or via e-mail to [tnp@nrc.gov](mailto:tnp@nrc.gov), and Michael Kelly at 301-492-3127 or via e-mail to [mxk1@nrc.gov](mailto:mxk1@nrc.gov).

Enclosure:  
Publicly Available Technical Basis  
for 10 CFR Part 74 Rulemaking

2. Different U.S. civilian fuel cycle facilities and technologies subject to NRC oversight, including: 1) the utilization of plutonium in mixed-oxide fabrication and subsequent burning at power reactors; 2) advanced technologies, such as gas centrifuge and SILEX uranium enrichment; 3) possible Global Nuclear Energy Partnership ramifications, such as the use of UREX + 1 reprocessing and fast neutron reactors; and 4) the Geological Repository Operations Area at Yucca Mountain.
3. Comparability with Department of Energy (DOE) MC&A requirements. The current DOE nuclear material categorization table employs four categories and five attractive levels, which is significantly different from both NRC and International Atomic Energy Agency (IAEA) material categorizations. DOE's safeguards system also employs vulnerability assessments and systems performance testing, and its material control program explicitly includes containment, surveillance, and access control systems. DOE is in the process of revising its nuclear material categorization table, and NRC will strongly consider this in rulemaking-related efforts.
4. Risk-informing NRC's MC&A program, consistent with OIG audit recommendations. This includes improving NRC's grading and categorization of special nuclear material to: 1) be complete, including spent nuclear fuel and high level waste; 2) reduce the need for specific exemptions to individual licensees; 3) extend current Part 74 concepts for inaccessible material, and Category IA/IB material types as applicable to process monitoring and item monitoring programs; 4) extend graded safeguards throughout the entire special nuclear material fuel cycle, to include power reactors and Yucca Mountain; 5) assure the effectiveness of postulated theft/diversion scenarios through the use of diversion path analyses, which extends methods currently used for uranium enrichment facilities; and 6) consider the impacts of decommissioning with respect to the safeguards requirements for those facilities.

In revising NRC's nuclear material categorization table, NRC intends to address all special nuclear material in one table. All MC&A requirements would be consolidated into Part 74, and new subparts will be reserved for reprocessing and geological repositories. While informed by changes to DOE's nuclear material categorization table, NRC would retain the concepts of Category I, II, and III quantities, thereby remaining generally consistent with IAEA requirements.

NRC's current table would be refined by including three attractiveness levels (A, B, and C), while considering the configurations, forms, and degree of accessibility of special nuclear material. In addition, NRC would extend the accounting requirement down to the quantity of one gram of material, tighten low-enriched requirements, and loosen certain requirements, where appropriate.

The lead technical and rulemaking contacts are Thomas Pham at 301-492-3125 or via e-mail to [tnp@nrc.gov](mailto:tnp@nrc.gov), and Michael Kelly at 301-492-3127 or via e-mail to [mxk1@nrc.gov](mailto:mxk1@nrc.gov).

Enclosure:

Publicly Available Technical Basis  
for 10 CFR Part 74 Rulemaking

**DISTRIBUTION:**

FCSS r/f      MCAB r/f      FFLD r/f      \* See previous concurrences

**ML072130075**

<b>OFC</b>	MCAB	MCAB	MCAB	FFLD	FCSS
<b>NAME</b>	MKelly*	TPham*	JMarshall*	MTschiltz	RPierson
<b>DATE</b>	9/25 /07	9/25/07	9/26/07	9/26/07	9/27/07

**OFFICIAL RECORD ONLY**