

TECHNICAL BASIS FOR 10 CFR PART 74 RULEMAKING PLAN

1. BACKGROUND

Following the terrorist attacks of September 11, 2001, (9/11) the Nuclear Regulatory Commission's (NRC's) Chairman asked the staff to conduct a comprehensive review of the NRC's safeguards and security programs. Since that time, staff has worked to clarify, strengthen, and enhance NRC's physical protection requirements. On August 5, 2005, the staff recommended in a policy issue paper (SECY-05-0143) that the Commission consider revising NRC's MC&A regulations, since Material Control and Accounting (MC&A) programs complement physical security programs in safeguarding nuclear materials against malevolent acts. Recommendations for program revisions were based on eight considerations:

- Issuance of NRC Orders following 9/11 which implemented new physical protection measures (e.g., access controls).
- Recommendations from an audit by the Office of the Inspector General (e.g., to better risk-inform the MC&A program).
- Issues in licensee and NRC programs, which may have contributed to the apparent loss or misplacement of spent fuel in reactor spent fuel pools which were identified in event investigations.
- Results of recent MC&A inspections that indicated a need to better clarify regulations and policies.
- The outcome of the recent Nuclear Materials Management and Safeguards System Rebaselining Project.
- Material control related incidents that have occurred at fuel fabrication facilities.
- The potential need for revised MC&A program elements to account for practices at new types of licensees, such as for the Department of Energy's (DOE's) Global Nuclear Energy Partnership (GNEP)-related fuel processing facilities
- Recognized issues with current regulations which have resulted in a substantial reliance on exemptions.

In a Staff Requirements Memorandum (SRM) dated November 18, 2005, the Commission directed the staff to evaluate NRC's MC&A regulations, identify issues and areas for regulatory improvement, work with internal and external stakeholders to develop a comprehensive agency approach to MC&A programs, and develop a rulemaking plan to update NRC's MC&A regulations for special nuclear material (SNM). The Commission requested that the rulemaking plan address the relationships and synergisms between MC&A and physical protection programs, consider the needs and constraints faced by domestic and international users, consider the latest available threat analyses, and be risk informed. Recognizing that this effort crossed traditional organizational boundaries, the Commission also asked the staff to review agency staffing requirements for conducting a comprehensive MC&A rulemaking effort.

This document provides the historical and technical bases for developing a rulemaking plan to revise NRC's MC&A regulations. Specific issues include, but are not limited to, the prompt detection of the theft or unauthorized diversion of nuclear materials, especially by potential facility insiders, and revising NRC regulations to provide a risk-informed, performance-based MC&A regulatory framework for all NRC licensees.

ENCLOSURE

2. STATEMENT OF THE REGULATORY PROBLEM

The SRM directed the staff to develop a rulemaking plan to: 1) identify and articulate needed revisions to NRC's MC&A regulations, 2) call out and prioritize specific MC&A issues which need to be addressed, and 3) provide suggestions on how to streamline and strengthen the MC&A regulatory framework in concert with other NRC regulatory activities.

The main issues are:

- Changes to the Threat Environment
- Synergistic Effects between Physical Protection and MC&A
- International Program Implications
- Current Grading and Possible Changes for MC&A Requirements for SNM
- Anticipating New Types of Nuclear Facilities
- Risk-Informed Regulation

Changes to the Threat Environment

First issued in 1966, NRC's MC&A safeguards regulations were revised in the 1970s and again in the 1980s, with some minor changes undertaken in 2002. However, the 9/11 attacks have dramatically changed the nature of the threat environment and, therefore, NRC must use the best and most recent threat analyses information available as the basis for its safeguards regulations.

Synergistic Effects between Physical Protection and MC&A

NRC monitors intelligence sources to keep abreast of foreign and domestic events and of the capabilities of potential adversaries. We use this information, and other sources, to determine the appropriate level of detail for our safeguards regulations to ensure that licensees establish and maintain a program capable of meeting and successfully withstanding design basis threats (DBTs). Physical protection and MC&A programs compliment each other in the safeguarding of nuclear materials from unauthorized use or diversion by providing for a variety of measures to promptly identify and withstand sabotage, theft, or diversion attempts. MC&A primarily focuses on detecting covert theft or diversion, especially by potential facility insiders, while physical protection focuses on areas such as penetration by an external threat.

A sound MC&A program should deter theft or diversion by using practices and procedures that enable early detection of unauthorized changes in the material inventory and which trigger an appropriate and timely response. NRC's MC&A regulations should consider the effects of the physical protection program and be written to complement post 9/11 physical protection program enhancements. Such an approach will produce a risk-informed regulatory structure, minimize redundancy, and optimize licensee actions to safeguard these materials.

International Program Implications

The International Atomic Energy Agency (IAEA) has established nuclear material accountancy measures to detect diversion at a national level, where a government itself might be clandestinely diverting materials. Each country is responsible for protecting materials within their borders against potential threats from sub-national groups. In order to minimize any adverse

impacts on domestic and international commerce, NRC must consider the provisions of standing U.S. treaties and international safeguards, as well as the nature of import and export activities. Therefore, any proposed changes to the MC&A regulations should be closely coordinated with NRC's Office of International Programs.

Current Grading and Possible Changes for MC&A Requirements for SNM

NRC's MC&A regulations must consider two major issues: 1) definition of a consistent risk-informed, performance-based MC&A program which can be applied to all current and future NRC licensees, and 2) consideration and, where appropriate, alignment with the safeguards requirements of other Federal organizations.

NRC's current safeguards regulations for SNM are consistent with the nuclear material categorization format employed in the IAEA's INFCIRC/225, Revision 4, "The Physical Protection of Nuclear Material and Nuclear Facilities." The IAEA categorization scheme considers material type, quantity, and enrichment, and suggests tiered safeguards applications consistent with the relative strategic significance for each material category. Factors considered in the categorization scheme include external radiation dose levels and the ease of separability of SNM from other radioactive materials. Although NRC's system follows IAEA's INFCIRC/225, there are differences between the two.

As defined in 10 CFR Part 74.4, the existing scope and coverage for MC&A are similar to the categorization of SNM for physical protection purposes in 10 CFR Part 73.2 and in Appendix M to 10 CFR Part 110. Except for specified irradiation histories and certain facility types (e.g., nuclear reactors, reprocessing plants, and storage and disposal sites), the current MC&A categorization does not consider material form or attractiveness.

In addition, spent nuclear reactor fuel, whether in spent fuel pools, in independent spent fuel storage installations, or geologic repository disposal facilities, does not fit well into NRC's current MC&A material categorization structure. These facilities are only licensed for receipt and possession, and are not considered to be utilization facilities. Current MC&A regulations focus on facility operations covering SNM which is either in use or in storage. NRC MC&A regulations should be revised to explicitly address these materials. NRC's regulations should be revised to include requirements for SNM under NRC purview for all phases of operations through the decommissioning process.

Material categorization alone does not necessarily reflect relative risk of certain SNM in different forms and configurations. In some situations and configurations, Category I amounts may not necessarily have high strategic significance in that their form may not be conducive to making a device of concern, such as a radiological dispersion device (RDD) or an improvised nuclear device (IND). Likewise, Category III materials are not always of low strategic significance in that, if their form is conducive to making an IND and sufficient quantities are gathered together, their strategic significance could be very high. NRC should reexamine its material categorization scheme and consider definition of sub-categorizations utilizing risk-informed attractiveness levels to address the changes in strategic significance of materials in light of the post 9/11 threat environment.

When considering revision of NRC's MC&A regulations, NRC must consider the safeguards requirements of other Federal organizations. For example, DOE's graded safeguards program

differs significantly from that of NRC and IAEA. Specifically, DOE uses four SNM categories (I, II, III, and IV) and five attractiveness levels (A, B, C, D, and E) for radioactive materials. Attributes include material form, concentration, composition, and configuration.

Currently the NRC's MC&A regulatory program assures, through requirements, licensing actions, and related on-site inspections, that fundamental licensee controls are in place to detect the loss, theft, or diversion of licensed materials and the continued knowledge of the quantities of licensed materials at each facility. DOE's MC&A system differs from NRC's in that it includes three additional program elements as control functions: containment, surveillance, and access control. Unlike NRC, DOE relies on vulnerability assessments to identify and close any gaps or shortfalls in safeguards and security system capabilities. DOE also emphasizes MC&A program performance testing and actively incorporates new, state-of-the-art detection technologies into its MC&A programs in a timely manner.

NRC should consider whether or not it should adopt some or all of DOE's MC&A revised categorization table as part of a comprehensive risk-informed, performance-based MC&A program for NRC licensees.

Anticipating New Types of Nuclear Facilities

As the nation moves forward with its energy strategy, new, advanced nuclear facilities will likely be built. Recently, increased support and interest in revitalizing the nuclear power industry as part of the domestic energy strategy has resulted in DOE's GNEP proposal. (See <http://www.gnep.energy.gov/pdfs/06-GA50506-01.pdf> for more information.) The resurgence of nuclear power is expected to lead to new nuclear facilities for uranium enrichment, mixed-oxide (MOX) fuel fabrication, spent fuel reprocessing, and plutonium recycling. NRC's MC&A regulations should be broad enough to address these and other new facilities by creating a risk-informed, performance-based MC&A program which could be applied to any nuclear-based facility, regardless of its primary function.

Risk-Informed Regulation

The MC&A regulations should be consolidated; written in clear, plain English; and be more risk-informed and performance-based. NRC needs to establish a regulatory framework that is flexible yet effective, and which supports the timely detection of material theft or unauthorized diversion of materials which, in the aggregate, could be used to fabricate a viable RDD or IND.