

*Adams*

UNITED STATES  
NUCLEAR REGULATORY COMMISSION  
WASHINGTON, D.C. 20555-0001



OFFICE OF THE  
GENERAL COUNSEL

May 16, 2002

Charles Bechhoefer, Chairman  
Administrative Judge  
Atomic Safety and Licensing Board  
U.S. Nuclear Regulatory Commission  
Washington, D.C. 20555

Richard F. Cole  
Administrative Judge  
Atomic Safety and Licensing Board  
U. S. Nuclear Regulatory Commission  
Washington, D. C. 20555

Charles N. Kelber  
Administrative Judge  
Atomic Safety and Licensing Board  
U.S. Nuclear Regulatory Commission  
Washington, D.C. 20555

In the Matter of  
DOMINION NUCLEAR CONNECTICUT, INC.  
(Millstone Nuclear Power Station, Unit 3)  
Docket No. 50-423-LA-3

Dear Administrative Judges:

In connection with the Licensing Board's request that the NRC staff provide any inspection reports regarding the licensee's inability to account for two spent fuel rods at the Millstone 1 spent fuel pool Tr. 587 (May 24, 2001), the NRC Staff is forwarding to the Board and parties copies of a Memorandum from the Executive Director of Operations to the Commission, "Lessons Learned About Material Control and Accounting from the Millstone Unit 1 Loss of Two Spent Fuel Rods". The Lessons Learned memorandum is an outgrowth of the NRC inspection effort at Millstone 1, and it is being provided to the Board because of its connection to the Millstone 1 inspection report. Inspection Report No. 05000245/2001013 was attached to the memorandum. The Staff is not attaching a copy of the inspection report as the report was previously provided to all parties. Attachment B to the Memorandum is Inspection Procedure 85102; this attachment is enclosed.

Sincerely,

Sara Brock  
Counsel for NRC Staff

Enclosures: As stated  
cc w/encls: Service List

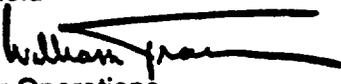


UNITED STATES  
NUCLEAR REGULATORY COMMISSION

WASHINGTON, D.C. 20555-0001

April 30, 2002

MEMORANDUM TO: Chairman Meserve  
Commissioner Dicus  
Commissioner Diaz  
Commissioner McGaffigan  
Commissioner Merrifield

FROM: William D. Travers   
Executive Director for Operations

SUBJECT: LESSONS LEARNED ABOUT MATERIAL CONTROL AND  
ACCOUNTING FROM THE MILLSTONE UNIT 1 LOSS OF TWO  
SPENT FUEL RODS

The purpose of this memorandum is to inform the Commission of lessons learned about material control and accounting (MC&A) at power reactors as a result of the investigation of Millstone Unit 1's loss of two spent fuel rods. The lessons learned concerning the power reactor MC&A program are discussed in greater detail in the following Attachment.

In summary, control over the two spent fuel rods failed because the licensee's MC&A procedures (and their implementation) were not adequate. No problems with the NRC regulations were identified; however, MC&A guidance could be improved and clarified. The MC&A inspection program at power reactors has been dormant since 1988. However, it is not clear that inspections would have detected this loss of accountability. Finally, the Nuclear Material Management and Safeguards System performed as it was designed to.

Staff plans to examine MC&A vulnerabilities as part of the top-to-bottom review of the Agency's safeguards and security program that is being undertaken in response to the terrorist activities of September 11, 2001. While the MC&A review will benefit from the broader view of the entire safeguards program, as a first step the staff intends to develop a Temporary Instruction (TI) to ascertain the breadth and scope of the MC&A issues which were identified at Millstone. The TI will be implemented over the next year at selected sites and, depending on how widespread the problem is, staff will consider the need for revised guidance and whether appropriately focused inspections are needed. Changes to the MC&A program will be evaluated as a whole and in the context of the overall safeguards program. Because recommendations will follow the review of the entire program and because the current risk to human health and safety from the missing fuel rods is negligible (see following Attachment), no recommendations concerning MC&A at power reactors are being made at this time.

Attachment:  
Lessons Learned

cc: SECY  
OGC  
OCA  
OPA  
CFO

CONTACT: M. Williams, NMSS/FCSS  
(301) 415-7878

If the licensee's procedures and practices had effectively implemented the regulations, control over the rods would likely have been maintained.

**2. Lesson Learned: Guidance on MC&A could be clarified and improved.**

MC&A guidance documents on establishing and implementing an MC&A program at power reactors are: (1) Regulatory Guide 5.29, "Nuclear Material Control Systems for Nuclear Power Plants"; (2) Regulatory Guide 5.49, "Internal Transfers of Special Nuclear Material"; and (3) ANSI N15.8-1974, "Nuclear Material Control Systems for Nuclear Power Plants." The ANSI standard was withdrawn in 1987, because no action had been taken within 10 years to revise or reaffirm it, and Regulatory Guide 5.29 was withdrawn in 1998. The guidance documents have several related shortcomings:

- They identify the assembly as the basic unit for control and provide no guidance on accounting for rods that have been removed from their parent assembly.
- They are not clear about what constitutes a "physical" inventory and fail to establish guidelines for conducting an inventory.
- They do not consider whether "spent fuel pool" is sufficient as the location of record.
- They do not address problems that may arise when spent fuel rods are stored outside the racks.
- They do not explain how to compare book inventory and physical inventory.

If the guidance had addressed these aforementioned topics, the licensee's inventory and control procedures might have been more comprehensive.

**3. Lesson Learned: Even if an MC&A inspection program had been implemented, this loss of accountability might not have been identified.**

The inspection program for MC&A at power reactors is guided by NRC Inspection Manual Chapter (IMC) 2515C, "Special and Infrequently Performed Inspections." The applicable Inspection Procedure (IP) is 85102, "Material Control and Accounting - Reactors" (Attachment B). This chapter and procedure were not considered during development of the revised Reactor Oversight Process. IMC 2515C states that this IP is "...implemented infrequently for special situations" and is "...not part of the baseline or supplemental inspection program elements." The MC&A inspection program at power reactors has been dormant since 1988, at which time responsibility for inspection of MC&A programs was split up, with responsibility for inspections at fuel cycle facilities being transferred to NMSS and responsibility for inspection of MC&A at reactors remaining in the Regions.

The absence of an inspection program in this area does not mean that loss of accountability for the two Millstone Unit 1 rods would have been identified if MC&A inspections had been conducted. MC&A inspections were conducted at Millstone before 1988, and the problem was not identified. The inspection guidance uses the MC&A guidance for power reactors, discussed in Lesson 2, as its standard. In particular, the inspection guidance defines the assembly as the basic unit for control and accounting and does not address the special circumstance of individual rods separated from their parent assembly. If the inspection procedure had addressed the topics noted as shortcomings under Lesson 2, inspections would have been more effective.

# NRC INSPECTION MANUAL

---

## INSPECTION PROCEDURE 85102

---

### MATERIAL CONTROL AND ACCOUNTING - REACTORS

PROGRAM APPLICABILITY: 2513, 2515, and 2525

#### 85102-01 INSPECTION OBJECTIVES

- 01.01 Determine whether the licensee has limited his possession and use of special nuclear material (SNM) to the locations and purposes authorized under license.
- 01.02 Determine whether the licensee has implemented an adequate and effective program to account for and control the SNM in his possession.

#### 85102-02 INSPECTION REQUIREMENTS

##### 02.01 Possession and Use of SNM

- a. Review inventory, receipt, and shipment records (NRC Forms 741 and 742) to determine whether the licensee has limited his possession and use of SNM to the location and purpose authorized under license.
- b. Conduct a random spot-check of new fuel, irradiated fuel in spent fuel pool, sources, test specimens, etc., by comparing actual location with that indicated on loading diagrams, transfer forms, or other accounting records, as applicable. Check ten assemblies or bundles of new and irradiated fuel, and one source, test specimen, etc.

02.02 Control and Accounting of SNM. Determine whether the licensee has prepared, maintained, and implemented an adequate and effective program and procedures to control and account for the SNM in his possession, as required by 10 CFR 70.41(a); 70.42; 70.51(b), (c), and (d); 70.52; 70.53; 70.54; and 73.71(b).

#### 85102-03 INSPECTION GUIDANCE

03.01 Inspection Requirement 02.02 - Possession and Use of SNM. When conducting physical verification of fuel bundles or assemblies, verify that there are bundles or assemblies in racks identified as containing same. Do not verify by serial numbers unless discrepancies surface that warrant an extensive verification.

ATTACHMENT B

- o. Inventory procedures provide for management review of MC&A system at intervals not to exceed 12 months, and records document management followup action based on results of the annual reviews.
- p. Inventory documentation includes review of the applicable NRC Forms 741, 742, and 742C for cold fuel storage area; irradiated fuel assemblies in the reactor and in storage; fission chambers; sealed sources; test specimens; etc., such as:
  - 1. Internal card files or log books, source documents, and any other records that include serial number identification, location, and amount of SNM contained in fission chambers, sealed sources, test specimens, etc., until the Commission authorized their disposition.
  - 2. Operating logs and core loading diagram for irradiated fuel assemblies in the reactor (trace listings of assemblies to the source documents).
  - 3. Loading diagrams and source documents for irradiated fuel assemblies in storage.<sup>2</sup>
- q. Records retained for the period specified by the appropriate regulation or license condition. If a specific retention period was not otherwise required by regulation or license condition, records should have been maintained until the Commission authorized their disposition.

#### 85102-04 REFERENCES

Regulatory Guide 5.29, Nuclear Material Control Systems for Nuclear Power Plants.

Regulatory Guide 5.49, Internal Transfers of Special Nuclear Material.

NUREG Guide BR-0006, Instructions for Completing Nuclear Material Transaction Reports.

NUREG Guide BR-0007, Instructions for Completing Material Balance Report, Physical Inventory Listing and Concise Note Forms.

END

---

<sup>2</sup>Perpetual inventory records are maintained for in-reactor and storage showing the identity and location of all items containing the SNM. If the records do not also include SNM quantitative data, supporting records should be available.