
INSPECTION PROCEDURE 85401

MANAGEMENT STRUCTURE

PROGRAM APPLICABILITY: 2683

85401-01 INSPECTION OBJECTIVES

The objective of this inspection procedure is to verify that the management structure for the licensee's¹ material control and accounting (MC&A) program, for a Category III fuel facility or uranium enrichment facility, meets the general performance objectives stated in the regulatory requirements for the applicable type of facility.

85401-02 INSPECTION REQUIREMENTS

Verify that the licensee has established, and maintains, a management structure that ensures effective functioning of the MC&A system through (1) clear overall responsibility for MC&A functions; (2) MC&A management independent of production; (3) separation of key MC&A responsibilities from one another; (4) documented and approved written MC&A procedures; and (5) periodic reviews of such procedures.

To perform this verification, review the following:

- 02.01 Licensee Organization
- 02.02 MC&A Position Descriptions and Responsibility Statements
- 02.03 MC&A Training and Qualification
- 02.04 Procedures for Supervising Personnel and Monitoring Error Rates
- 02.05 Critical MC&A Procedures

¹Hereinafter, the term licensee subsumes the term "certificate holder," which applies in the case of the gaseous diffusion plants (GDPs). Likewise, all certificate-related requirements, including those in GDP compliance plans and corrective action commitments, are subsumed under the term "licensee."

General Guidance

The MC&A system and its procedures must be effectively implemented. The management structure should separate key MC&A functions from each other: (1) to provide cross-checks that increase MC&A reliability, and that counter attempts to defeat the system through neglect, deceit, or falsification; and (2) to free MC&A management from conflicts of interest with production and other major responsibilities.

The training and qualification of key MC&A personnel must promote the effectiveness of the MC&A system by minimizing the potential for human errors. The program should be structured to define job requirements; to establish minimum qualifications for candidates; to train, qualify, and certify the candidates; and to define requalification criteria.

Specific Guidance

03.01 Licensee Organization. The inspector should verify that all MC&A functions are identified on the facility organizational charts, and appropriately located in the facility organization. For example, control functions should be separated from operating functions, accounting functions should be separated from manufacturing and measurement functions, and the audit and control functions should be separated from those functions that are subject to audit or control.

To ensure freedom of action, the control and audit functions should be at a level of management equivalent to or higher than the management function subject to control and audit. The overall planning, coordination, and administration of the MC&A functions for special nuclear material (SNM) should be vested in a single individual at an organizational level that is sufficient to ensure independence of action and objectivity of decisions. The individual must be in a position to recommend and to initiate timely action for the control and accounting of SNM, including delaying production, if necessary, and must not be relegated to a position that could inhibit or compromise independent action.

The above provisions most likely were adhered to in the licensee's NRC approved Fundamental Nuclear Material Control (FNMC) Plan. However, the management structure originally approved in the FNMC Plan can change over time, with or without being properly updated, so it is important to verify the required attributes of the extant or "as-found" management structure during the inspection, rather than simply relying solely on the FNMC Plan.

The inspector should verify the following:

- a. Current organizational charts show the level and interrelationship of the MC&A manager with other facility managers, as well as other personnel responsible for MC&A functions, their areas of responsibility, and their lines of authority and communication.
- b. A management official is designated to be directly responsible for nuclear MC&A.
- c. Management of the centralized accounting system is assigned to a single position, independent of all positions having responsibilities for custody of SNM, the generation of source data, and production operations.
- d. Organizational positions with responsibilities related to SNM control are identified.
- e. Staffing and personnel assignments are sufficient to support the MC&A functions.
- f. The person responsible for the MC&A system has direct access to the facility manager.
- g. Administrative control of each material balance area (MBA) is defined.

- h. A single individual in each MBA is designated as being responsible for ensuring that MC&A policies are implemented in the MBA.
- i. The custodianship of all SNM within an MBA or item control area (ICA) is delegated in writing to one individual. (An individual may be the custodian of more than one MBA or ICA provided that a single individual may not sign as both shipper and receiver in any transfer between these areas.)

03.02 MC&A Position Descriptions and Responsibility Statements.

a. Functional Relationships

The inspector should verify that the functional relationships between positions responsible for MC&A functions (as described in the FNMC Plan) ensure proper checks and balances of safeguards responsibilities. The assignment of MC&A functions in the licensee's organization should provide a separation of functions, so that the activities of one individual or organizational unit serve as controls over and checks on the activities of other individuals or organizational units. The MC&A organization should be separate from the SNM production organization and any other organization that generates source data. Controls should be in place to ensure that: (1) process operations, measurements, measurement controls, accounting functions, and any other activities that influence MC&A system performance are carried out in accordance with approved procedures; and (2) decisions concerning production or other plant functions that could affect MC&A are independently approved by the MC&A manager.

The inspector should verify the following:

1. No individual has the sole authority to check, evaluate, or audit MC&A data or information for which that individual is responsible.
2. An individual who generates source data (e.g., performing measurements, preparing transfer forms, or preparing analytical reports) does not perform any accounting or record control functions, unless cross-checks of the work are performed to detect falsification.
3. An individual with approved access to SNM does not perform any accounting record control functions.
4. Measurement and measurement-control personnel are organized to facilitate: (a) independence from process responsibilities; and (b) quality of performance.
5. No individual has responsibility for, and control of, both MC&A and physical protection functions, unless independent cross-checks are in place to preclude defeat of the overall safeguards system by such individual.
6. Cross-checks include, as a minimum, countersigning by one other person of any SNM transfer from the facility.
7. Personnel responsible for the material control system or the material accounting records systems do not have responsibility for direct access to SNM.
8. Custodians do not have responsibility for transport of SNM out of their MBSs by themselves.
9. Custodians are not responsible for the determination of measured discard quantities or any other measured losses.

10. Custodians do not remove materials or modify records in any MBA, except their own.
11. Personnel with responsibility for custodial functions may not validate physical inventories.
12. An individual with measurement responsibilities and who has authorized access to significant quantities of SNM does not perform both maintenance and calibration functions unless adequate overchecks are implemented and maintained.
13. An individual making changes to automated accounting system software is independent from and not responsible for authorizing or validating the changes.

- b. Delineation of MC&A Responsibilities. The overall management responsibility for the MC&A system should be at a level at least comparable to that of an organization having responsibility for production or storage of SNM; if not, a direct line of communication should be provided to a management level that has the authority to implement measures essential to effective MC&A. The responsibilities and authorities for each position assigned an SNM accounting function should be clearly defined in position descriptions that are accessible to all affected personnel and to the NRC on request. The individuals responsible for each MC&A function should have sufficient authority to perform the function in the prescribed manner.

The inspector should verify the following:

1. Organizational responsibilities for the control of and accounting for nuclear materials and procedures that delegate authority are documented.
2. The authorities and responsibilities of the MC&A manager are documented and include providing technical MC&A guidance to the facility.
3. The authorities and responsibilities of the measurement-control manager are documented.
4. Job descriptions that delineate responsibilities of management personnel and senior staff having responsibility for MC&A functions are documented.
5. The authorities and responsibilities for MC&A functions (e.g., accounting systems, material access controls, surveillance, measurements, measurement control, inventories, and auditing) are documented.
6. The responsibilities and identities of organizational units that exercise custody over SNM are documented.
7. The responsibilities and identities of organizational units responsible for auditing and reviewing the MC&A system are documented.
8. The responsibilities and identities of organizational units responsible for providing statistical analyses are documented.
9. The responsibilities and identities of organizational units responsible for implementing the item control program are documented.
10. Procedures specifying how authority and responsibilities are delegated are documented.

- c. Assignment of Custodial Responsibility. The management structure should assign responsibility, to an individual, for SNM undergoing processing and in storage within an

MBA or ICA. The objectives of the custodial position are to control materials, to provide nuclear material cognizance, to maintain accountability, and to ensure that MC&A procedures are followed by all personnel. The duties of the custodians should include maintaining appropriate inventory control over the SNM in their assigned areas; authorizing and recording all movements of SNM into and out of their assigned areas; maintaining appropriate local MC&A records; participating in physical inventories as required; assisting in internal or external alarm resolution activities, as required; ensuring that only authorized persons have hands-on access to the material, the process system, and the process controls; and notifying proper authorities of irregularities in material movements and MC&A data-handling.

The inspector should verify the following:

1. Procedures for the selection and appointment of custodians and other material control positions are documented and include separation of material custody from material accountability functions.
2. Custodial responsibilities for SNM in an MBA are delineated and assigned to an individual.
3. SNM custodians function as an integral part of the MC&A organization regardless of whether they are members of the MC&A organization or not.
4. Custodian responsibilities are defined to prevent conflicts between custodial and other job responsibilities.
5. Procedures for performing routine custodial operations and for responding to off-normal situations are developed and documented.
6. Custodians identify and resolve conditions that could lead to an excessive inventory difference (ID).

03.03 MC&A Training and Qualification

- a. Training Program Syllabi and Documentation. The inspector should verify that MC&A training programs are effectively implemented, and are providing the necessary instruction to personnel with MC&A responsibilities. Training programs should be based on performance objectives and should provide for a reasonable balance of: (1) theory and practice (i.e., oral and written instruction versus demonstration and learning-by-doing); (2) use of on-the-job training for positions that are primarily operational or clerical; and (3) individualized instruction. The training program should provide for retraining of personnel already experienced and functioning in MC&A positions when the need is indicated by performance factors. Retraining should be based on whether an individual can function at the level of proficiency called for in the qualification criteria.

The responsibility for preparing and updating training curricula should be assigned to personnel who are qualified to write such documents. All initial training materials and subsequent modifications should be: (1) reviewed for ambiguity, unnecessary complexity, or inconsistency with generally accepted training techniques and MC&A procedures; and (2) approved before being implemented.

The inspector should review records of human errors that significantly affected the MC&A system, and compare the types of errors noted with relevant training, to ensure that the training program addresses those problems that degrade MC&A system effectiveness. A list of key positions or functions should be maintained that includes all those for which errors or faulty performance could directly degrade SNM control and accounting. The training program should provide a curriculum that emphasizes the job purpose and scope, relationship to other positions (especially to other MC&A positions), and the job's role and

significance with respect to MC&A objectives. The training program should produce qualified personnel by increasing workers' technical knowledge and understanding of duties, responsibilities, and procedures, and by developing skills that improve employees' work performance.

The inspector should verify the following:

1. Responsibilities for providing training and qualification criteria for trainers are documented.
 2. Personnel performing MC&A functions are trained to perform their duties and responsibilities.
 3. Personnel performing MC&A functions are knowledgeable about the requirements and procedures related to their functions.
 4. Criteria for retraining are established and documented.
 5. Records of personnel training and retraining are maintained.
 6. Training program information is technically accurate.
 7. The training program addresses causes of MC&A errors and other subjects necessary to correct actions detrimental to the effective implementation of the MC&A system.
 8. Personnel responsible for conducting special inventories and other nonroutine functions are trained to perform these functions.
 9. A program for training nuclear material custodians is documented and implemented.
 10. Custodians and handlers of SNM receive initial and periodic (i.e., at least once every 2 years) training regarding their duties, responsibilities, and obligations.
 11. Current training records for each person performing MC&A functions are maintained.
 12. Training and performance evaluations of personnel involved in material control are documented and maintained.
 13. The custodian and material handler qualification programs ensure that training records indicate the topics covered and the dates of training.
- b. Qualification of MC&A Personnel. The inspector should ensure that tests for positions requiring MC&A measurements, calculations, or recording of data and information: (1) include demonstration of correct and accurate job performance; and (2) have been carried out under the direct observation of a qualified examiner. When operating procedures or manipulative skills are required, the tests should include hands-on demonstrations of competence. The qualification criteria for the key positions should be consistent with the position descriptions and focus on minimum levels of education and experience; knowledge of the job content and its purposes, types, and levels of skills or proficiency; and understanding of the safeguards role and its importance. The criteria should be defined in terms of measurable performance goals, whenever possible.

The inspector should verify the following:

1. Qualification criteria for MC&A and related positions (e.g., custodians) are documented.

2. MC&A staff are knowledgeable about requirements and commitments in the FNMC plan related to their functions.
3. Personnel are knowledgeable about requirements and procedures related to their functions with respect to the resolution of indicators of possible missing SNM.
4. Custodians are aware of all forms used, records generated, and reports prepared for their MBA.
5. Personnel performance is evaluated and certified if it meets the qualification criteria, or retraining provided if qualification criteria are not met.

03.04 Procedures for Supervising Personnel and Monitoring Error Rates. The inspector should review procedures and job-performance aids to determine whether they contribute to minimizing the rate of human errors in MC&A information. The record of the frequency of the human errors should be reviewed to determine whether the licensee is monitoring human error rates and using this information to identify procedures and tasks to reduce these errors. The results of system design reviews, cross-checks, and audits, to prevent or detect errors in the records that would affect (IDs) or item location records, should be reviewed. Human error levels should be monitored so that the number of errors can be limited by training or changes in procedures.

MC&A procedures should ensure that the frequency and consequences of human errors are minimized. These procedures should include job-performance aids, where applicable, and should be formatted in a manner facilitating a reduction of human errors and helping to make errors easier to identify. MC&A activities associated with collecting and processing data, record-keeping, and auditing should be automated where it is practical and advantageous to do so. The quality control system should monitor the frequency of human errors and permit categorization of the types of errors encountered.

The inspector should verify the following:

- a. The accountability system provides overchecks to detect errors, discrepancies, or omissions of data in the records and to ensure completeness of the records.
- b. Human error levels are monitored, and reasonable efforts are made to minimize them.
- c. Audits are performed to provide independent assurance that the records reflect the MC&A activities.

03.05 Critical MC&A Procedures. MC&A functions should be documented in written procedures. The procedures and any revisions should be reviewed and approved by appropriate management personnel before implementation. The individual with overall responsibility for the MC&A system should approve all procedures generated in the MC&A organization and should be cognizant of all other procedures affecting MC&A.

Critical MC&A procedures should address: (1) establishing and maintaining MC&A system policies; (2) maintaining current knowledge of quantities and locations of SNM; (3) detecting loss of SNM; (4) performing physical inventories; (5) determining IDs and shipper-receiver differences; (6) establishing key measurement procedures and measurement control policies; (7) determining measurement and nonmeasurement errors critical to MC&A; (8) assessing the effectiveness of the MC&A system; (9) resolving indicators, (10) providing information to support investigations; and (11) maintaining complete and accurate records and reports. The critical procedures may exist on several levels of detail but should define specifically how operations will be performed to meet the 10 CFR 74.31 performance objectives and system capabilities.

The inspector should review critical MC&A procedures to verify that they are appropriately approved and to verify that only current, approved procedures are in use in all areas of the site. The reviews should verify that major procedures identified in the FNMC plan are being used.

The inspector should verify the following:

- a. The FNMC plan and the operational procedures are consistent.
- b. Critical procedures are identified that define how operations will be performed to meet the 10 CFR 74.31 requirements.
- c. Procedures specify how the FNMC plan is to be implemented.
- d. MC&A procedures are approved by the MC&A manager.
- e. Controls for revising and distributing procedures are documented.
- f. Approved procedures are distributed to all organizations and individuals who have responsibility for implementing the MC&A activities and who need to be cognizant of the procedures.
- g. A program for performing, and for controlling the accuracy of, SNM accountability measurements is documented and implemented.
- h. Procedures for maintaining the SNM accounting systems are documented and current.
- i. Procedures for maintaining accountability data by MBA, which reflect quantities of nuclear material received and shipped, adjustments to inventory, and quantities remaining on inventory, are documented and implemented.
- j. Types of accounting reports, along with their frequency, distribution, and timeliness, are documented.
- k. The inventory data base and required data elements for each material type are documented.
- l. Procedures for updating the inventory data base are documented and implemented.
- m. Procedures for conducting physical inventories are documented and implemented.
- n. Procedures for reconciling book inventory data against the physical inventory data are documented and implemented.
- o. Procedures that limit access to the accounting system and SNM accounting data are documented and implemented.
- p. Procedures to control and account for inter- and intra-facility transfers of SNM are documented and implemented.
- q. Procedures that limit access to SNM to authorized personnel only are documented and implemented.
- r. Procedures for the use and control of tamper-indicating devices are documented and implemented.
- s. Procedures for controlling SNM in storage and processing areas and during transfers are documented and implemented.

- t. Procedures for detecting the unauthorized removal of SNM from the facility are documented and implemented.
- u. Procedures for evaluating material control indicators are documented and implemented.
- v. Procedures for responding to and resolving conditions that indicate possible loss of control of SNM are documented and implemented.
- w. Procedures to facilitate providing information in support of facility investigations are documented.
- x. A program for the independent assessment of the effectiveness of the MC&A system is documented and implemented.

Additionally, the inspector should verify the subdivision of the facility into the stated MBAs and ICAs; verify the designation, location, boundaries, and activities for each MBA and ICA; and verify the material flows entering and leaving each MBA and ICA.

85401-04 REFERENCES

R. J. Brouns, B. W. Smith, and R. F. Eggers, "Human Errors in Nuclear Material Accounting and Control Data," *Journal of the Institute of Nuclear Materials Management*, 13 (1):48-56

Regulations

10 CFR 74.31(a) and 74.31(c)(1); 10 CFR 74.33(a) and 74.33(c)(1)

Regulatory Guides and Reports

NUREG-1065, Rev. 2, "Acceptable Standard Format and Content for The Fundamental Nuclear Material Control Plan Required for Low-Enriched Uranium Facilities," November 1995.

NUREG/CR-5734, "Recommendations to the U.S. Nuclear Regulatory Commission on Acceptable Standard Format and Content for the Fundamental Nuclear Material Control (FNMC) Plan Required for Low-Enriched Uranium Enrichment Facilities," Chapter 1, November 1991.

NUREG/CR-0773, "Training and Qualifying Personnel for Performing Measurements for the Control and Accounting of Special Nuclear Material," November 1980.

END