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SESSION 35: TYPICAL NRC INSPECTION PROCEDURES FOR MODEL PLANT

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I. INTRODUCTION

The NRC inspection program for low enriched uranium (LEU) fabrication plants is designed to assure that effective, on-going safeguards are maintained. The inspection program has been segmented into modules; the routine program assigns an inspection frequency for each module.

For LEU fuel fabrication plants the routine inspection effort includes the following modules and the indicated frequency of application:

|       |                                     |          |
|-------|-------------------------------------|----------|
| 85202 | Facility Organization               | Annual   |
| 85204 | Facility Operation                  | Annual   |
| 85206 | Measurement Control                 | Annual   |
| 85208 | Ship/Rec. Verification              | Annual   |
| 85210 | Internal Control Program            | Annual   |
| 85212 | Physical Inventory                  | Annual   |
| 85213 | Inventory Verification              | Annual   |
| 85214 | ID/LEID Evaluation                  | Annual   |
| 85216 | Records and Reports                 | Annual   |
| 85218 | Nuclear Material Control Management | Annual   |
| 30703 | Ent/Exit Management Meetings        |          |
| 92706 | Independent Inspection              | On-going |

The inspection program schedules four routine visits a year; most modules will be completed during these visits. Some modules may be completed during a single visit, others may require more than one visit. The manpower allocated for the inspection program at a given facility is based on prior inspection experience and projection by the appropriate regional office.

The safeguards inspection program draws the program requirements from three sources: 10 Code of Federal Regulations (CFR), the Materials and Plant Protection Amendment (license conditions), and the approved Fundamental Nuclear Material Control (FNMC) plan submitted in accordance with 10 CFR Part 70.51, 70.57, and 70.58.

The 10 CFR is the most general document, giving a broad framework for the safeguards program. In response to 10 CFR requirements, licensees submitted written programs in three sections. The 10 CFR 70.51 plans were implemented during 1974 and cover tamper-safing, inventory frequency, record keeping requirements, and ID/LEID. The 10 CFR 70.58 plans were implemented during 1976 and cover such topics

as organizational structure, separation of function, the material balance area/item control area (MBA/ICA) structure, reviews and audits, scrap controls, and inventory procedures. The 10 CFR 70.57 program was implemented during 1978-79 and covers measurement control. Collectively, these three sections comprise the fundamental nuclear material control program.

The MPP amendment (licensee conditions) either gives exemptions to 10 CFR requirements or places additional requirements on the licensee.

## II. TEXT

The individual inspection modules will next be described. Each inspection module describes specific areas for the inspector to examine. The purpose is to make the inspection both uniform and comprehensive among Regional Offices.

### A. Module 85202: Facility Organization

This module examines the management structure of the organization, the safeguards function within that organization, the authority and responsibilities assigned to the management positions, and the reporting channels established by written procedures.

To complete this module the following items are checked:

- The safeguards material control and accounting function is vested in a single individual; this requirement prevents the fragmenting of the program among several functions or offices. This designated individual is the primary contact at a facility for questions or requests for information about the safeguards program.
- The safeguards manager is independent of production functions. The individual responsible for administering the program should have the safeguards program as his primary function. This prevents conflicts with production schedules or responsibilities.
- The safeguards organization structure identifies key positions and is approved by NRC.
- Delegation of the MC&A responsibility and authority has been established in writing. This pinpoints individual authority and responsibility for such positions as control coordinator, custodians, measurement control coordinators, and various safeguards staff function.
- Reporting channels for safeguards are clearly defined. The safeguards program generates information that flows up and down the organizational structure. By clearly defining the reporting channels, both routine and nonroutine information are directed to the individual responsible for reviewing or responding to the data.

- o Management conducts annual reviews and audits of the safeguards program. An audit confirms the accuracy and flow of information. The review assures that the program is adequate in fulfilling the requirements as set forth by regulations, license conditions, and other legal authority.
- o Recommendations contained in the licensee's annual review and audit have been implemented.

#### B. Module 85204: Facility Operation

This module in the LEU fabrication plant inspection program focuses on the facility operation within the constraints of the fundamental fuel cycle license, the MBA/ICA structure, and changes to the FNMC plan. This module includes checks of:

- The special nuclear material (SNM) license is current. If the license is active but has expired, the licensee must have a renewal application pending action by NRC.
- Current conditions of the license are confirmed. Among those items that are checked are ownership, authorized SNM possession limits, type of activity, and type, form, and enrichment of SNM at the facility.
- The MBAs/ICAs must be described in the FNMC plan. The MBA/ICA structure should be sufficiently small as to allow the localization of losses. As an example, assume one area consistently shows an inventory gain and another processing area consistently shows an offsetting inventory loss. The MBA structure should be able to identify such conditions so that corrective action can be taken before a significant inventory difference is reported.
- Custody and control of the SNM within the MBA/ICA are consistent with the approved FNMC plan. A custodian may have control over only one MBA and cannot sign a material transfer form both as shipper and receiver. A custodian may have multiple ICAs; however, an authorized alternate must sign the material transfer form as either shipper or receiver to preclude the custodian from signing the form twice.
- Changes to FNMC plan are submitted to the NRC on a timely basis. If the licensee plans to make any significant changes to the safeguards program, prior approval by NRC is required before implementation becomes effective. Examples of such changes would be major process modifications, reorganization of the safeguards, and so on. If the licensee makes minor changes that do not decrease the effectiveness of the safeguards, the changes may be implemented, provided the NRC is notified within the statutory time limits specified in 10 CFR Part 70. These latter changes are made in accordance with 10 CFR Part 70.32(c).

**C. Module 85206: Measurement Control Program**

Another area that is examined at a LEU fabrication plant is the measurement control program. A module that addresses this subject covers all aspects of measurement control. This segment of the inspection program assures the credibility of the licensee's accountability measurements and includes such topics as measurement techniques, standards, calibration, training of personnel, and generation of error data to calculate limit of error associated with inventory differences and SRDs. Items checked included:

- Overall program management is vested in the measurement control coordinator. The safeguards manager cannot be designated the measurement control coordinator.
- The measurement control plan has primary responsibility for developing, planning, coordinating, and administering the measurement control program. This assures that the program is not fragmented among various functions.
- The measurement control plan is current. Chapter Four of the FNMC plan describes most of the measurement control program. This chapter should accurately define the program, as implemented.
- Mathematical models for determining random and systematic errors are appropriate and described in the FNMC plan. All accountability measurement systems, such as mass, volume element analysis, isotopic analysis, and NDA are to be included, as appropriate.
- Calibration and control of measurement systems are described in the approved FNMC plan. Also, the licensee should describe criteria for recalibration once every two months regardless of standards data, or until such time as standards data fall into the warning region or the out-of-control region. The number of standards measured at the time of calibration, the range of calibration, and the use of point calibration should be included in the description.
- Control charts monitor the measurement system performance. Related areas to be inspected include the warning limits and out-of-control limits associated with control charts and actions taken when these limits are exceeded.
- Control chart limits are updated periodically and on a timely basis. This should be addressed in the FNMC plan.
- The measurement control program is subject to an annual audit. This may be done at the same time as the audit required by 10 CFR 70.58. The results must be forwarded to higher management and any identified weaknesses corrected.

- If the licensee uses a contractor laboratory for SNM measurements, the measurement control program of the contractor laboratory is subject to an annual audit. This audit may be conducted by either the licensee or his designated agent. The inspector also verifies that the contractor laboratory provides adequate measurement information to the licensee for his use in the measurement control program.
- The licensee must maintain a current list of reference standards. This includes both standards purchased from the National Bureau of Standards or other recognized sources and any working standards fabrication by the licensee or his agent.
- Records and reports are accurate and timely.
- Training is described for personnel measuring SNM. This training may consist of classroom instruction, reading assignments, on the job training, or some combination of methods.

Module 85208: Shipper/Receiver Verification

An important area to be explored during the inspection is the shipper/receiver verification. This segment of the program compares the measurement capabilities of both parties. Thus, this module verifies the control over shipment and receipt of SNM at the licensed facility. Elements of the module are:

- Shipments of SNM are made to authorized recipients only. The licensee is responsible for validating the recipients' authorization.
- The shipper is responsible for completing a Material Transfer Document (Form 741) and mailing it the same day the SNM is shipped.
- The licensee has an active shipper/receiver program to monitor and evaluate:
  1. Identification and measurement of SNM shipped and received,
  2. Review and evaluation of shipper/receiver data on an individual or lot basis, as appropriate,
  3. Action taken to investigate and correct statistically significant differences, and
  4. Records of shipper/receiver evaluations, investigation, and corrective actions maintained a minimum of 5 years.
- Incoming Material Transfer Documents (Form 741) are received and returned to the sender within 10 days. If receipts measurements have not been complete, Form NRC-284 is used. When

receiver measurements are completed the results are reported on Form NRC-741. This data must be reported within 30 days after receipt of shipment.

- The shipper/receiver function must be independent.
- All pertinent information relating to a shipment is reported to control accounting records at completion of shipment.

#### E. Module 85210: Internal Control Program

The requirements of 10 CFR 70.58 require the licensee to have an internal control system designated to protect SNM from loss and theft. For LEU facilities this module examines the control exercised over internal SNM transfer and the associated documentation.

- Inventory records reflect current status of all special nuclear material to include location, item identification, and source and disposition of all such items. Accuracy of the inventory records can be verified by randomly selecting items and checking that the information is complete. Completeness of inventory records can be verified by selecting items in the facility and verifying that an accurate record exists.
- Source and disposition records are kept for a minimum of 5 years.
- Controls are maintained over distribution and use of internal transfer documents. Internal transfer documents are serial-numbered with a record maintained of the distribution of the form.
- Internal transfer documents are signed by authorized personnel. Those signature authorizations must be in writing.
- Movement of SNM between MBAs/ICAs is controlled and documented; all are accounted for.
- SNM procedures provide control over scrap accumulation and its associated measurement uncertainty. The licensee may not routinely retain scrap having a measurement uncertainty greater than 10% for more than 12 months.

#### F. Module 85212: Physical Inventory

An important segment of the inspection of a LEU fabrication plant is the physical inventory performed by the licensee and the inventory verification performed by the inspector. This module examines the schedule, performance, and reconciliation of the physical inventory by the licensee. The next module describes the verification.

- Physical inventories are scheduled at the required frequency which, with one exception, is every 6 months.

- Within 30 calendar days after the start of the physical inventory, the licensee has:
  1. Calculated the inventory difference associated with the material balance period for both element and isotope, and
  2. Reconciled and adjusted the book value to the results of the physical inventory for both element and isotope.
- Both the central accounting records and all appropriate subsidiary journals are checked.
- Physical inventory procedures address the following:
  1. Cutoff procedures have been established such that transfers and processed SNM are counted only once,
  2. All items on inventory are counted only once, and
  3. All quantities of SNM are based on measured values.
- Written procedures for physical inventory provide for:
  1. Assignment of inventory duties and responsibilities,
  2. Identification of SNM requiring a measurement for the physical inventory,
  3. Identification and location of items,
  4. Verification of inventory records, and
  5. Reconciliation of all prenumbered inventory stickers.

### 3. Module 85213: Inventory Verification

The inspection program provides for a periodic overcheck of inventory practices through observation and independent sampling and measurement.

- Observation is made of the licensee's practices for identification of SNM requiring measurement for closure of the material balance. This should consist of unsealed material not maintained under tamper-safing.
- Item verification is observed or double-checked on a random selection basis.
- Independent determination of material in process can consist of sampling process SNM for analysis or measurement for hold-up in processing equipment.
- The NRC has an independent measurement capability.

1. Regions I and II have measurement vans and portable NDA equipment; Region V has all portable NDA equipment.
2. Samples can be taken for destructive analysis at Department of Energy laboratories under contract to NRC.

#### H. Module 85214: ID/LEID Evaluation

The licensee's inventory difference and limit of error are subject to constraint by 10 CFR 70.51(e). The module verifies that the inventory difference and its associated limit of error are appropriate and accurate. In addition, the licensee's mathematical model and data base are reviewed.

- The limit of error associated with the inventory difference must be controlled within the regulatory requirement of 10 CFR 70.51. Most LEID models have many components. Normally, three to six of the components dominate the calculation. These components would be examined by the inspection in the event LEID exceeded the regulatory limit.
- Large contributors to ID are identified, documented, and evaluated.
- Significant ID/LEIDs are reported to the appropriate NRC Regional Office.
- A significant ID is one that exceeds both its associated LEID and the deminimis quantity as defined in the regulations.
- The licensee's mathematical model and data base are reviewed.

#### I. Module 85216: Records and Reports

An essential part of the accounting system for SNM is the records and reports that are used to determine material status and material control performance.

Completion of this module entails the checking of the following elements of the records and reports system.

- The records and reports system has been described in the FNMC plan. This description usually includes transaction codes, flow charts of forms, assignment of responsibilities for preparing the information, and internal audits performed on the system.
- The records and reports system provides accurate and timely information in sufficient detail to locate all SNM charged to a facility and to close a material balance around the process.
- SNM has been confined to the location and purposes authorized by license.
- Central accounting records are supported by transaction reports or journal entries and properly authorized with appropriate detailed supporting documentation.

- All licensees are required to submit a Material Status Report on Form NRC-742. These reports are to be filed semiannually on the licensee's holdings as of March 31 and September 30 of each year. The report is due within 30 days after the end of the period covered by the report.
- Each licensee who transfers or receives SNM shall complete and distribute a Nuclear Material Transaction Report on Form NRC-741 in accordance with the instructions for completing that form.
- SNM inventory reports are prepared, reconciled, and accurately reflect the results for the reporting period. Inventory reports must be submitted within the time constraints allowed by regulations and/or license conditions.
- All records, with the exception of training records, are retained for a minimum of 5 years. Records in long-term storage must be retrievable in a timely manner.
- Reports required by the regulations/license condition are accurate and are submitted on a timely basis.

#### Module 85218: Management of the Material Control System

The licensee's safeguards program is a dynamic function requiring on-going revision and change. The module reviews those aspects of the management of the material control system.

- The licensee has established, maintained, and followed a management system that provides for the development, revision, and implementation of the material control and accounting program.
- This system provides for the written approval of procedures and any modifications thereto. The approval chain for such modifications is described and has been followed.
- An annual review of the nuclear material control system was conducted. Those individuals conducting the review were independent of both the nuclear material control management and those who had direct responsibility for any part of the system.
- There was an annual audit of the material control and accounting procedures, practices, and records.
- The results of the annual review and audit and any associated recommendations were forwarded to corporate management. Copies of the results and recommendations from the review and audit are available for inspection at the facility for a minimum of 5 years.
- Any corrective action taken as a result of the review or audit has been documented.
- Any abnormal event has been investigated and reported, as required by 10 CFR 70.52.

**K. Module 30703: Entrance/Exit Management Meetings**

The module is performed whenever an inspector visits a LEU fabrication plant and consists of two elements:

- At arrival on-site, the inspector briefs licensee management as to the overall scope and schedule for inspection visit.
- Prior to leaving the site, the inspector briefs the licensee as to inspection findings.

**L. Module 92706: Independent Inspection Effort**

Approximately 20% of the inspector's time on-site during an inspection visit at a facility is set aside for the inspector to examine areas outside the defined inspection program to include such as:

- An inspector may conduct a walk-through inspection for an overview of current plant operations.
- An inspector may explore potential problems before they escalate into major problems.
- An inspector may interview employees.
- An inspector may need to acquire specific knowledge of facility operations.
- An inspector may explore areas of the inspector's specific interest or concern.

**III. SUMMARY**

The safeguards inspection program is a dynamic program--changing to best insure that the inspection objectives and goal are accomplished. This evolving program may be influenced in many ways: new regulations, better equipment, more efficient accounting practices, and so on. This also requires the training and retraining of the field inspectors.

As you have seen, there is slight overlapping of requirements among a few modules. The philosophy is to assure a complete and comprehensive inspection program. In many cases, the same inspector may be responsible for inspecting the modules that might contain the overlap.