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REGULATORY GUIDE

REGULATORY GUIDE 5.51

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INDEPENDENT ASSESSMENT OF NUCLEAR MATERIAL CONTROL AND ACCOUNTING SYSTEMS

A. INTRODUCTION

Purpose

This regulatory guide (RG) describes a method that the staff of the U.S. Nuclear Regulatory Commission (NRC) considers acceptable for the independent assessment of nuclear material control and accounting (MC&A) systems.

Applicability

This RG applies to Category I, II, and III fuel cycle facilities, including uranium enrichment facilities, that are subject to the *Code of Federal Regulations* (10 CFR) Part 74, "Material Control and Accounting of Special Nuclear Material," (Ref. 1).

Applicable Regulations

- 10 CFR 74, "Material Control and Accounting of Special Nuclear Material," requires that certain licensees authorized to possess more than one effective kilogram of special nuclear material (SNM) shall implement and maintain a Commission-approved MC&A system that will achieve the objectives specific to the strategic significance of the material in its possession.
    - 10 CFR 74.31(c)(8) requires that licensees for facilities with SNM of low strategic significance must conduct a periodic independent assessment of the effectiveness of the MC&A system.
    - 10 CFR 74.33(c)(8) requires that licensees for low enriched uranium enrichment facilities must conduct a periodic independent assessment of the effectiveness of the MC&A system.
    - 10 CFR 74.43(b)(8) requires that licensees for facilities with SNM of moderate strategic significance must conduct a periodic independent assessment of the effectiveness of the MC&A system.

Written suggestions regarding this guide or development of new guides may be submitted through the NRC's public Web site under the Regulatory Guides document collection of the NRC Library at http://www.nrc.gov/reading-rm/doc-collections/reg-guides/contactus.html.

Electronic copies of this regulatory guide, previous versions of this guide, and other recently issued guides are available through the NRC's public Web site under the Regulatory Guides document collection of the NRC Library at http://www.nrc.gov/reading-rm/doc-collections/. The regulatory guide is also available through the NRC's Agencywide Documents Access and Management System (ADAMS) at http://www.nrc.gov/reading-rm/adams.html, under ADAMS Accession No. ML16223A915. The regulatory analysis may be found in ADAMS under Accession No. ML16223A917 and the staff responses to the public comments on DG-5049 may be found under ADAMS Accession No. ML16223A913.

- 10 CFR 74.59(h)(4) requires that licensees for facilities with formula quantities of strategic SNM must conduct a periodic independent assessment of the effectiveness of the MC&A system.

Related Guidance

- NUREG-1065, "Acceptable Standard Format and Content for the Fundamental Nuclear Material Control (FNMC) Plan Required for Low-Enriched Uranium Facilities" (Ref. 2), provides guidance in the assessment and review of MC&A systems for low-enriched uranium facilities.

- NUREG-1280, "Standard Format and Content Acceptance Criteria for the Material Control and Accounting (MC&A) Reform Amendment: 10 CFR Part 74, Subpart E," (Ref. 3), provides guidance in the assessment and review of MC&A systems for facilities with formula quantities of strategic SNM.

- NUREG/CR-5734, "Recommendations to the NRC on Acceptable Standard Format and Content for the Fundamental Nuclear Material Control (FNMC) Plan Required for Low-Enriched Uranium Enrichment Facilities" (Ref. 4), provides guidance in the assessment and review of MC&A systems for low-enriched uranium enrichment facilities.

Purpose of Regulatory Guides

The NRC issues regulatory guides to describe to the public methods that the staff considers acceptable for use in implementing specific parts of the agency's regulations, to explain techniques that the staff uses in evaluating specific problems or postulated events, and to provide guidance to applicants. Regulatory guides are not substitutes for regulations and compliance with them is not required. Methods and solutions that differ from those set forth in regulatory guides will be deemed acceptable if they provide a basis for the findings required for the issuance or continuance of a permit or license by the Commission.

Paperwork Reduction Act

This regulatory guide contains and references information collections covered by 10 CFR Part 74 that are subject to the Paperwork Reduction Act of 1995 (44 U.S.C. 3501 et seq.). These information collections were approved by the Office of Management and Budget (OMB), control number 3150-0123.

Public Protection Notification

The NRC may not conduct nor sponsor, and a person is not required to respond to, a request for information or an information collection requirement unless the requesting document displays a currently valid OMB control number.

TABLE OF CONTENTS

B. DISCUSSION

Reason for Revision

This revision of RG 5.51 (Revision 1) provides guidance that conforms with the requirements in 10 CFR Part 74, "Material Control and Accounting of Special Nuclear Material," as well as incorporating experience gained since the RG was initially published in June 1975. For example, the guidance for performing independent assessments has been expanded to include process monitoring and item monitoring for Category I fuel cycle facilities, and to include guidance for uranium enrichment facilities. In addition, Revision 1 addresses changes in MC&A terminology since this RG was published in 1975; for example, the term "management review" has been replaced by "independent assessment," and "material unaccounted for" by "inventory difference."

Background

The basis of any effective system of control is a program of review to ensure that the procedures are effective and appropriate and that such procedures are being carried out in practice. The NRC conducts inspections to ensure that licensees' MC&A systems are compliant with the NRC-approved fundamental nuclear material control (FNMC) plans and that the performance of such systems effectively meets the requirements of the 10 CFR Part 74 regulations and any applicable license conditions. Licensee management, however, is responsible for implementing the NRC requirements by maintaining an effective MC&A system.

The individuals performing independent assessments should be independent both from nuclear material control management and from personnel who have direct responsibility for the receipt, custody, use, measurement, measurement quality, and shipment of nuclear material. On-site MC&A staff may be used for portions of such assessments as long as they are not assessing areas for which they are directly responsible.

These assessments include a review of MC&A procedures and practices, and a review of nuclear material records. The results of the independent assessments, along with recommendations for improvements, should be documented, reported to the licensee's corporate and plant management, and kept available at the plant for inspection for a period specified in: 10 CFR 74.31(d) for facilities with SNM of low strategic significance (i.e., Category III facilities); 10 CFR 74.33(d) for low enriched uranium enrichment facilities; 10 CFR 74.43(d) for facilities with SNM of moderate strategic significance (i.e., Category II facilities); and 10 CFR 74.59(g) for facilities with formula quantities of strategic SNM (i.e., Category I facilities).

Assessment, evaluation, and modification of the system by licensee management or representatives ensures the adequate discharge of this responsibility. It is assumed for such an assessment that a system has been established, documented, and implemented. The purposes of the assessment are to ensure that the MC&A system is being operated as designed and to determine if the established system is appropriate and effective for the current operations.

Changes in management relationships, production technology or capacity, operating practices, or plant mission could result in the need to change the MC&A system. The independent assessment will provide evaluation of the system to determine whether such changes should be made.

This assessment process should extend beyond a routine review for compliance with existing procedures and commitments. An acceptable assessment should provide perspectives relative to overall program effectiveness and to the adequacy of the program to meet and satisfy regulatory intent.

The people most knowledgeable of a facility's MC&A system are those directly responsible for its operation. These people, however, would have difficulty in conducting an objective evaluation of their own system. Personnel other than those directly responsible for the system, but still knowledgeable of its basic concepts, can provide an independent viewpoint. Such personnel also can view the system from a management standpoint, as well as from a purely technical standpoint.

Harmonization with International Standards

The NRC staff reviewed guidance from the International Atomic Energy Agency (IAEA), and the International Organization for Standardization (ISO), and did not identify any standards that provided useful guidance to NRC staff, applicants, or licensees.

C. STAFF REGULATORY GUIDANCE

The independent assessment of MC&A systems should include the following considerations and coverage. Although this guide is prepared for assessments of facilities having special nuclear material, production facilities having only source material are encouraged to conduct independent assessments using this guide, as appropriate.

1. Purpose and Scope of the Independent Assessment

The purpose of the independent assessment of an MC&A system should be to ensure that approved procedures are followed, that practices and procedures are appropriate for current operations and are in compliance with NRC-approved FNMC plans, and that performance of MC&A functions are effectively executed. The scope of the assessment should include evaluation of the effectiveness of the system in maintaining control of and accounting for the nuclear materials. Measures of effectiveness should be considered in each part of the assessment.

a. MC&A systems should be divided into the following areas of investigation for purposes of an independent assessment:

   (1) Organization and Management;
   (2) Internal Control, including storage and internal handling, item identification and control, shipping and receiving control, scrap and waste control, and detection of unauthorized production for enrichment plants;
   (3) Measurement System, including the measurement and sampling procedures and the measurement quality-assurance program;
   (4) Statistical Control, including the statistical aspects of the measurement quality-assurance program, shipper-receiver difference control and evaluation, statistical methodology associated with measurement and material balance standard errors, and statistical methods used for item and process monitoring;
   (5) Physical Inventory; and
   (6) Records and Reports.

b. Other divisions or groupings should be used, depending on the design and complexity of the system being reviewed and the disciplines represented on the assessment team. For example, the measurement and sampling procedures might be considered as a category separate from the measurement quality-assurance program. The way in which the system is divided or assigned for assessment is not particularly significant. It is important, however, that the division and assignment of assessment tasks is such that all aspects are covered.

c. In addition to independent periodic assessments, the facility management of the MC&A function should also conduct ongoing internal reviews of the same subject matter in a manner that reflects continuing attention to assessing operational performance and identifying opportunities for improvement.

d. Consistent with methodologies described in 10 CFR Part 74, the assessments should include a review and evaluation of any contractor who performs special nuclear material accountability measurements for the licensee.

2. Personnel Qualifications for the Independent Assessment Team

a. Personnel assigned to the assessment team should be knowledgeable in the basic MC&A principles. They also should be selected so that their responsibilities on the assessment team do not cause a conflict of interest with their regular duties. They should provide an independent viewpoint that is management-oriented as well as technically oriented. On-site MC&A staff may be used for portions of the assessment as long as they are not assessing areas for which they are directly responsible.

b. Individual members of the team should be knowledgeable in the specific disciplines appropriate to their assigned areas of investigation. Assessment team personnel should be sufficiently knowledgeable to permit them to evaluate the appropriateness of procedures as applied in a given system. In this respect, assessment team personnel should keep in mind the question, "Is there a better way of doing this and still meet the system requirements?"

c. Task assignments for assessment team personnel should be made in writing to ensure complete coverage and minimize duplication of effort. One person should be assigned the task of overall assessment coordination. For small facilities, the entire assessment may be done by one person if that person is knowledgeable in all aspects of the system.

3. Planning for the Independent Assessment

Assessment of MC&A systems should include advanced planning to establish the extent and depth of coverage in each part of the system, and to ensure that all parts are covered.

a. Assessment Program

(1) A program for the assessment should be prepared to ensure complete coverage and development of adequate information on which to base assessment decisions. The assessment program should include a checklist for the assessment that covers all parts of the material control and accounting system. A preprinted program can save considerable time in planning but should not be used as an inflexible checklist or as a substitute for judgment and initiative in investigation.

(2) The basic assessment program should be supplemented with checklists and questionnaires for more detailed coverage of the various parts of the assessment. Appendix A to this guide is an example of an assessment program checklist.

b. Procedure Manual

Review of the current procedure manuals and completion of a procedure manual checklist should be a part of the assessment planning. Reviewers should use such reviews to familiarize themselves with current procedures and to identify changes that may need coverage in more depth. Appendix B to this guide is an example of a procedure manual checklist.

c. Prior Assessment Documentation

Prior assessment documentation should be used to acquaint the team members with past performance and review procedures, and to identify control practices that were previously found to be weak or inadequate. Such practices should be noted for more thorough investigation,

whereas areas that were found to be satisfactory and that had been reviewed thoroughly on the prior assessment could be given less emphasis in the current assessment.

d. Correspondence, Reports, and Discussions

MC&A correspondence and reports, as well as preliminary discussions with plant management, plant operations personnel, and MC&A personnel should be used to identify problem areas and areas that require a thorough investigation during the assessment. Discussion with the plant material control staff should also provide information for scheduling reviews of nuclear material records; and, when the review team plans to observe any parts of the physical inventory, the schedule for the inventory observations.

4. Coverage of the Independent Assessment

All parts of the MC&A system should be covered in each assessment. However, not all parts of the MC&A system need be given the same depth of coverage each time. Decisions as to depth of coverage should be based on considerations such as evidence of problems in any parts of the MC&A system, changes in procedures, or coverage in prior assessments. Information on which to base such decisions should be obtained before an assessment begins. In this regard, information should be obtained from sources such as prior assessment documentation and reports, plant reports that give indications of problem areas, review of procedure manuals, and discussions with appropriate plant personnel.

The effectiveness of collusion-protection procedures should also be included in assessments. The MC&A system needs to protect against a single material control and accounting insider colluding with an external person, providing that the insider does not have authority within the physical protection system that would permit participation in an attempt to defeat the MC&A system. Additional guidance regarding collusion protection related to material control and accounting is contained in NUREG-1280, "Standard Format and Content Acceptance Criteria for the Material Control and Accounting (MC&A) Reform Amendment: 10 CFR Part 74, Subpart E (NUREG-1280, Revision 1)."

The independent assessment should include elements which test the performance of MC&A staff in the discharge of their responsibilities. Specific testing should include general areas of performance unless known weaknesses have been identified, in which case more comprehensive testing should be performed in those areas. Appendices D through I to this guide contain examples of performance tests that could be conducted with the understanding that the testing to be performed should be appropriate for the type of operations conducted at the facility.

To ensure complete coverage, assessment checklists and questionnaires should be used. Such checklists and questionnaires are cited in the following sections. These checklists and questionnaires should be considered only as guides and should not be used as a substitute for judgment and investigative initiative. The subdivision of the assessment into parts covered in the following six sections should be considered flexible. Other arrangements may be used where appropriate to the facility and the talents of the assessment team.

a. Organization and Management

This part of the assessment should include review and evaluation of the following:

(1) organizational relationships;
(2) functional statements of responsibilities and authorities;

(3) the system for development, revision, implementation, and enforcement of procedures; and
(4) the effectiveness of the system in terms of losses and material unaccounted for relative to expected values for these items.

Appendix C to this guide is an example of an organization and management review checklist. Personnel conducting this part of the assessment should be knowledgeable of the basic concepts of management and administration. All assessment team personnel should be made aware of the information developed in this part so that they may take into consideration any areas that might be pertinent to their specific part of the assessment.

Information regarding organization and management should be contained in the facility's organization manuals and charts, job descriptions, and instruction manuals.

b. Internal Control

This part of the assessment should include review and evaluation of the following:

(1) internal storage and handling,
(2) item identification and control,
(3) tamper-safing,
(4) shipping and receiving controls,
(5) scrap and waste controls, and
(6) detection of unauthorized production for enrichment facilities.

Appendix D to this guide is an example of an internal control checklist. Personnel conducting this part of the assessment should be knowledgeable of the basic concepts of material control.

Information regarding internal control should be contained in the facility's procedure manuals, instruction manuals, and other facility management directives.

c. Measurement System

This part of the assessment should include review and evaluation of the following:

(1) sampling and measurement points;
(2) weight and volume methods;
(3) analytical methods including nondestructive methods;
(4) measurement data control procedures; and
(5) measurement quality-assurance programs.

Appendix E to this guide is an example of a measurement system checklist. Personnel conducting this part of the assessment should be knowledgeable of the chemical and physical properties of the materials involved, of the fundamentals of sampling and measurement of such materials, and of the basic concepts of measurement quality assurance.

Information regarding measurement systems should be contained in the facility's procedure manuals, analytical manuals, laboratory data records, and measurement quality-assurance manuals and data logs.

d. Statistical Controls

This part of the assessment should include review and evaluation of the following:

(1) the determination of measurement bias, random error variances, and systematic error variances;
(2) the determination of material balance limits of uncertainty, i.e., the standard error of the inventory difference (SEID);
(3) inventory difference (ID) and SEID evaluation;
(4) process monitoring and abrupt alarms;
(5) shipper-receiver difference evaluation and control; and
(6) statistical methodology used in measurement quality assurance.

Appendix F to this guide is an example of a statistical control checklist. Personnel conducting this part of the assessment should be knowledgeable of the basic concepts of mathematical statistics and their application to nuclear material control.

Information regarding statistical controls should be contained in the facility's procedure manuals, analytical manuals, laboratory data records, and measurement quality-assurance manuals and data logs.

e. Physical Inventory

This part of the assessment should include review and evaluation of the facility's physical inventory procedures, instructions, and practices. The assessment should include observation of at least part of a routine physical inventory. The assessment need not include independent verification of the physical inventory by the review team.

Appendix G is an example of a physical inventory checklist. Personnel conducting this part of the assessment should be knowledgeable of the basic concepts of material control and accounting, especially those pertaining to the conduct of physical inventories.

Information regarding physical inventories should be contained in the facility's procedure manuals and physical inventory instruction directives.

f. Records and Reports

This part of the assessment should include review and evaluation of the facility's data-handling practices and procedures and an audit of nuclear material records. Appendix H is an example of a records and reports checklist.

Appendix I is an example of a nuclear material records audit program. Personnel conducting this part of the assessment should be knowledgeable in the basic concepts of data handling, audit techniques, and MC&A procedures.

D. IMPLEMENTATION

The purpose of this section is to provide information on how applicants and licensees[1] may use this guide and information regarding the NRC's plans for using this regulatory guide. In addition, it describes how the NRC staff complies with the Backfit Rules in 10 CFR 70.76, 10 CFR 72.62, and 10 CFR 76.76, each titled "Backfitting."

Use by Applicants and Licensees

Applicants and licensees may voluntarily[2] use the guidance in this document to demonstrate compliance with the underlying NRC regulations. Methods or solutions that differ from those described in this regulatory guide may be deemed acceptable if they provide sufficient basis and information for the NRC staff to verify that the proposed alternative demonstrates compliance with the appropriate NRC regulations. Current licensees may continue to use guidance the NRC found acceptable for complying with the identified regulations as long as their current licensing basis remains unchanged. The acceptable guidance may be a previous version of this regulatory guide.

Licensees may use the information in this regulatory guide for actions which do not require NRC review and approval such as changes to a facility design under 10 CFR 70.72, "Facility Changes and Change Process"; 10 CFR 72.48, "Changes, Tests, and Experiments"; or 10 CFR 76.68, "Plant Changes." Licensees may use the information in this regulatory guide or applicable parts of this guide to assist in resolving regulatory or inspection issues.

Use by NRC Staff

The NRC staff does not intend or approve any imposition or backfitting of the guidance in this regulatory guide on licensees. The NRC staff does not expect any existing licensee to use or commit to using the guidance in this regulatory guide unless the licensee makes a change to its licensing basis. The NRC staff does not expect or plan to request licensees to voluntarily adopt this regulatory guide to resolve a generic regulatory issue. The NRC staff does not expect or plan to initiate NRC regulatory action which would require the use of this regulatory guide. Examples of such unplanned NRC regulatory actions include issuance of an order requiring the use of the regulatory guide, generic communication, or promulgation of a rule requiring the use of this regulatory guide without further backfit consideration.

During regulatory discussions on plant-specific operational issues, the staff may discuss with licensees various actions consistent with staff positions in this regulatory guide as one acceptable means of meeting the underlying NRC regulatory requirement. Such discussions would not ordinarily be considered backfitting even if prior versions of this regulatory guide are part of the licensing basis of the facility. However, unless this regulatory guide is part of the licensing basis for a facility, the staff may not represent to the licensee that the licensee's failure to comply with the positions in this regulatory guide constitutes a violation.

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1 In this section, "licensees" refers to holders of, and the term "applicants" refers to applicants for, the following: (1) special nuclear material licenses under 10 CFR Part 70, (2) licenses for independent spent fuel storage installations or monitored retrievable storage installations or certificates of compliance for spent fuel storage cask designs under 10 CFR Part 72, "Licensing Requirements for the Independent Storage of Spent Nuclear Fuel, High-Level Radioactive Waste, and Reactor-Related Greater Than Class C Waste," and (3) certificates of compliance or approvals of a compliance plan for gaseous diffusion plants under 10 CFR Part 76, "Certification of Gaseous Diffusion Plants."

2 In this section, "voluntary" and "voluntarily" means that the licensee is seeking the action of its own accord, without the force of a legally binding requirement or an NRC representation of further licensing or enforcement action.

If an existing licensee voluntarily seeks a license amendment or change and (1) the NRC staff's consideration of the request involves a regulatory issue directly relevant to this new or revised regulatory guide and (2) the specific subject matter of this regulatory guide is an essential consideration in the staff's determination of the acceptability of the licensee's request, the staff may request that the licensee either follow the guidance in this regulatory guide or provide an equivalent alternative process that demonstrates compliance with the underlying NRC regulatory requirements. This is not considered backfitting as defined in 10 CFR 70.76(a)(1), 10 CFR 72.62(a), or 10 CFR 76.76(a)(1).

Additionally, an existing applicant may be required to comply with new rules, orders, or guidance if 10 CFR 70.76(a)(3), 10 CFR 72.62(c), or 10 CFR 76.76(a)(3) applies.

If a licensee believes that the NRC is either using this regulatory guide or requesting or requiring the licensee to implement the methods or processes in this regulatory guide in a manner inconsistent with the discussion in this Implementation section, the licensee may file a backfit appeal with the NRC in accordance with the guidance in NUREG-1409, "Backfitting Guidelines" (Ref. 5), and NRC Management Directive 8.4, "Management of Facility-Specific Backfitting and Information Collection" (Ref. 6).

REFERENCES[3]

1. *U.S. Code of Federal Regulations*, "Material Control and Accounting of Special Nuclear Material," Part 74, Chapter I, Title 10, "Energy."

2. U.S. Nuclear Regulatory Commission, "Acceptable Standard Format and Content for the Fundamental Nuclear Material Control (FNMC) Plan Required for Low-Enriched Uranium Facilities," NUREG-1065.

3. U.S. Nuclear Regulatory Commission, "Standard Format and Content Acceptance Criteria for the Material Control and Accounting (MC&A) Reform Amendment," NUREG-1280, Rev. 1, Washington DC, April 1995.

4. U.S. Nuclear Regulatory Commission, "Recommendations to the NRC on Acceptable Standard Format and Content for the Fundamental Nuclear Material Control (FNMC) Plan Required for Low-Enriched Uranium Enrichment Facilities," NUREG/CR-5734 (K/ITP-415). (ADAMS Accession No. ML031340297).

5. U.S. Nuclear Regulatory Commission, "Backfitting Guidelines," NUREG-1409, July 1990.

6. U.S. Nuclear Regulatory Commission, "Management of Facility-Specific Backfitting and Information Collection," Management Directive 8.4, October 2013.

[3] Publicly available NRC published documents are available electronically through the NRC Library on the NRC's public Web site at: http://www.nrc.gov/reading-rm/doc-collections/. The documents can also be viewed online or printed for a fee in the NRC's Public Document Room (PDR) at 11555 Rockville Pike, Rockville, MD; the mailing address is USNRC PDR, Washington, DC 20555; telephone 301-415-4737 or 800-397-4209; fax 301-415-3548; and e-mail pdr.resource@nrc.gov.

APPENDIX A

Assessment Program Checklist

A-1. Planning the Assessment

a. General

Arrange with plant management and nuclear material control and accounting management for the assessment dates, inventory dates, and discussions with appropriate plant personnel. Request information from plant personnel on specific areas that they believe should be given special attention during the assessment.

b. Personnel

Prepare a schedule of the assessment with specific assignments for each assessment team member. Each assessment team member should be given a copy of the schedule.

c. Document Review

Each member of the assessment team should survey previous assessment documentation, plant reports, and other documents pertinent to his or her assigned part of the assessment and should prepare a schedule of items for special investigation.

d. Procedure Review

Each member of the assessment team should survey plant organization and procedure manuals pertinent to his or her part of the assessment, and prepare a schedule of items for special attention. Each member should complete a procedure manual checklist, or that portion of the checklist pertinent to his or her assigned tasks.

e. Physical Inventory

Review the plant procedures and instructions pertaining to the conduct of plant physical inventories. If observing any part of a routine physical inventory, make personnel inventory assignments and prepare specific inventory instructions for the assessment team.

f. Measurement System Review

Review plant procedure manuals, prior assessment documentation, special reports, and other information to prepare or update measurement system flowcharts or data sheets as shown in the measurement system checklist (see Appendix E for examples). Select areas of the measurement system to be given special emphasis during the assessment.

g. Statistical Controls Review

Review measurement system reliability data, measurements quality-assurance procedures, and other material balance uncertainties to select areas for special emphasis during the assessment.

h. Records and Reports

Identify the records that will be subject to the audit and special report items that merit special investigation. Complete the planning portion of the audit program.

A-2. Conducting the Assessment

a. General

(1) Discuss with plant management the general aspects of the scope of assessment.
(2) Discuss details of the assessment with material control and accounting management, and arrange meetings with other plant personnel as necessary.

b. Organization and Management

Complete the organization and management checklist on the basis of document reviews, discussions with plant personnel, and observations during the assessment.

c. Internal Control

(1) Review notes and findings from previous assessments of the various aspects of internal control to determine adequacy with respect to the following:
    (a) procedures reflecting actual practice, and
    (b) appropriateness and effectiveness of the procedures.
(2) Complete the internal control checklist using notes and observations collected during the assessment.

d. Measurement System

(1) Review the measurement system with appropriate plant personnel to determine adequacy with respect to the following:
    (a) procedures reflecting actual practice, and
    (b) completeness, appropriateness, and effectiveness of the procedures.
(2) Observe those areas selected in planning for emphasis during the assessment. Complete the checklists as appropriate for the various aspects of the measurement system.

e. Statistical Controls

(1) Review and evaluate the statistical basis for measurement reliability for individual measurements, factors, and material balances in the areas selected for emphasis during the assessment.
(2) Review and evaluate the statistical methodology and controls used in determining and controlling limits of error for measurements, factors, and material balances.
(3) Complete the statistical control checklist and evaluate the controls with respect to the following:
    (a) procedures reflecting actual practice, and
    (b) appropriateness and effectiveness of the procedures.

f. Physical Inventory

(1) Review detailed inventory plans with appropriate plant personnel.

(2) When observing the physical inventory process, note any changes and deviations from the inventory plan. Document observations and complete the physical inventory checklist.
(3) Evaluate inventory practices and procedures with respect to the following:
(a) procedures and plans reflecting actual practice, and
(b) appropriateness and effectiveness of the procedures.

g. Records and Reports

Complete the assessment of the records and reports, and the audit of the nuclear material records according to the audit program.

A-3. Reporting Assessment Results

a. The team leader should discuss the assessment results with the assessment team to:

(1) Determine the effectiveness and appropriateness of the plant material control and accounting system in its entirety and in its several parts.
(2) Determine the accuracy with which procedures reflect actual practice.
(3) Determine areas in which to make recommendations for improvement.
(4) Develop points for discussion with plant and material control and accounting managements.

b. Discuss the findings of the assessment with plant and material control and accounting managements.

c. Prepare and issue the written report.

d. Establish mechanisms for tracking action items.

A-4. Reviewing Documentation

a. Review all assessment documentation for completeness.

b. Index and cross-reference all documentation to the following:

(1) other documents,
(2) the assessment report, and
(3) appropriate plant files.

APPENDIX B

Procedures Manual Checklist

Performance should be reviewed to ensure compliance with approved procedures. The items below suggest areas for coverage.

B-1. Facility Organization

a. Organization charts of:
   (1) the facility organization, and
   (2) the nuclear material control and accounting unit.

b. Statements of responsibility and authority for:
   (1) the central material control and accounting unit, and
   (2) others concerned with material control and accounting.

B-2. Facility Operations

a. Functional statement of the facility's operations and processes

b. Material flow description:
   (1) by charts,
   (2) by narrative,
   (3) including material composition and type at significant points, and
   (4) including usual or normal material quantities.

B-3. Receiving, Shipping, and Other Receipts and Removals

a. Description of shipping and receiving points:
   (1) notation of these points on the material flowchart, and
   (2) description of the receiving and shipping procedures at each point.

b. Procedures for review, evaluation, and resolution of significant shipper-receiver differences.

c. Description of and procedures for determining, reporting, and recording other additions to or removals from inventory.

d. Procedures for evaluation and control of removals from inventory such as inventory difference (ID) and measured discards.

e. Statements of receiving and shipping responsibilities.

B-4. Inventory

a. statements of inventory timing and frequency,

b. cutoff and plant shutdown procedures,

c. inventory measurement procedures,

d. description of general inventory techniques,

e. supplemental inventory instructions, and

f. statement of inventory responsibilities.

B-5. SNM Storage, Internal Transfers, and Item Control

a. description of procedures and mechanisms for segregating nuclear materials by material type and enrichment;

b. specific nuclear material identification and labeling procedures;

c. description of tamper-safing procedures and devices;

d. description of storage facilities;

e. description of burial grounds, including location records;

f. description of procedures, documents, and document flows for internal transfers of nuclear material;

g. methods of determining nuclear material quantities transferred or stored;

h. statements of storage and internal transfer responsibilities; and

i. description of item monitoring activities.

B-6. Scrap Control

a. description of procedures for segregating, packaging, and identifying scrap;

b. methods for determining the nuclear material content of scrap; and

c. description of procedures for recovering nuclear material from scrap, including offsite recovery, if appropriate.

B-7. Measurements and Statistical Controls

a. Description of nuclear material sampling and measurement points:
   (1) by process or material flowchart,
   (2) by narrative description, and
   (3) for all material streams.

b. Description of methods and techniques used at each sampling and measurement point, including:
   (1) weight or volume measurements,
   (2) sampling procedures,
   (3) special equipment for sampling or measurements,
   (3) analytical procedure, and

(5) measurements for calculation of quantities related to nuclear loss (such as ID), or production (such as receipts), or calculation of factors used in determining item or production quantities.

c. Description of supporting programs:
(1) scale and balance program,
(2) calibration programs,
(4) quality-control programs, and
(4) analytical control programs.

d. Description of techniques and programs used to determine and control the measurements systems' biases, random error variances, and systematic error variances.

e. Description of the flow and use of measurement data.

f. Procedures and techniques for statistical evaluation of:
(1) shipper-receiver differences;
(2) inventory differences;
(3) individual measurement and shipment limits of error;
(5) calibration uncertainty; and
(5) process monitoring data, if applicable.

g. Statements of responsibility for measurements and statistical controls.

B-8. Process Monitoring Program for Category I Facilities

a. description of process monitoring activities,

b. investigation and resolution of abrupt alarms, and

c. investigation of three-sigma and trend indicators.

B-9. Detection of Unauthorized Production and Enrichment for Uranium Enrichment Facilities

a. description of the unauthorized production and enrichment program, and

b. resolution activities for indicators of unauthorized production or enrichment.

B-10. Records and Reports

a. Charts of accounts:
(1) general ledger accounts,
(2) control accounts,
(3) subsidiary accounts, and
(4) plant accounts.

b. Document flowchart:
(1) physical flow of documents,
(2) posting points,
(3) retention points, and
(4) data elements.

c. Description of the system:
   (1) posting procedures,
   (2) sample forms, including instructions,
   (3) description and basis of reports, and
   (4) method of generating reports from records.

APPENDIX C

Organization and Management Checklist

C-1. Organization

a. Does the facility maintain current written procedures that contain organization charts or descriptions of the management structure, identifying all positions having responsibility for or control over special nuclear material? Is the nuclear material control structure described, including the relationship of the material control functions and responsibilities to those of other organizational functions and responsibilities?

b. Have appropriate separations of functions been identified in the procedures to provide a system of control checks and balances?
   (1) Are the nuclear material control and accounting functions organizationally independent of the operating departments?
   (2) Does the unit include (or have available) personnel qualified in:
      (a) accounting,
      (b) analytical chemistry,
      (c) physics or nondestructive assay,
      (d) quality control, and
      (e) statistics?
   (3) Can the material control and accounting unit cross organizational lines to enforce policy?
   (4) Are the analytical and assay measurement laboratories organizationally independent of the operating departments?

c. Are statements of responsibility and authority included for those positions having responsibility for receiving and shipping, inventory, storage, and the internal reports system?

d. Are statements of responsibility and authority provided for other positions concerned with input to the material control system, such as production quality control, the analytical laboratory, measurement system quality control, accounting, and auditing?

e. Does the procedures contain the job titles of the key positions in the safeguards program, and describe the required qualifications for these positions?

C-2. Management

a. Are nuclear material control procedures and revisions reviewed and approved by appropriate management?

b. Are delegations of material control and accounting responsibilities documented?

c. Are nuclear material control procedures contained in standard operating procedures, process specifications, manufacturing instructions, etc., so that the worker is informed of the accountability requirements of his or her job?

d. Is there evidence that appropriate management action has been taken to ensure that practices comply with procedures?

e. Is there evidence that appropriate management action has been taken to ensure that procedures are revised to reflect approved changes in material control and accounting practices?

f. Were there any losses of discrete items or containers of special nuclear material? If so, was appropriate management action taken?

g. Did the inventory difference (ID) for any material balance exceed the associated control limits for that balance? If so, was appropriate management action taken?

APPENDIX D

Internal Control Checklist

D-1. Internal Storage and Handling

a. Are containers and items containing special nuclear material properly labeled and uniquely identified?

b. Are records maintained for containers and items in storage? Transferred to or from storage?

c. Is there control of material removal from storage?

d. Is there segregation in storage of dissimilar materials, e.g., material types, enrichments, scrap, raw material, in-process material, and product?

e. Are records maintained showing the identity, location, source, disposition, and special nuclear material content of all containers and items?

f. Are there records showing the quantities of special nuclear material added to the process, removed from the process, and currently in process?

g. Are all transfers of special nuclear material documented by appropriate authorized individuals?

h. Are transfer transactions numbered, recorded, and controlled by authorized individuals?

i. Are tamper-safing procedures used for effective control of and accounting for special nuclear material?

j. Is access to tamper-safing devices and records controlled?

k. Do the tamper-safing procedures include installation of the devices by authorized personnel, and the recording of the date and time of installation, along with the identity of the device and the authorized installer?

D-2. Shipping and Receiving Controls

a. Receipts
   (1) Is receiving of special nuclear material centralized at the facility?
   (2) Is receiving performed by employees other than those who keep material accounting records?
   (3) Is receipt acknowledged and does it require the signature of an authorized person recorded manually (or by electronic means in the case of a computerized system)?
   (4) Is a lot or item number assigned on receipt?
   (5) Is the material identified by its assigned number on the various materials accounting and production forms?
   (6) Are copies of receiving reports sent to the materials accounting office:
      (a) Immediately, and
      (b) directly?

(7) Are differences in shipper and receiver data identified and investigated?
(8) Is the receipt verification performed and documented in the facility records before returning U.S. Department of Energy (DOE)/U.S. Nuclear Regulatory Commission (NRC) Form 741, "Nuclear Material Transaction Report," to the shipper?
(9) Are the DOE/NRC Form 741s completed by the receiver within the required time?
(10) Is an item count made and the gross weight of the material determined on receipt?
(11) Are tare (empty) and net weights determined?
(12) Is material sampled and analyzed on receipt?
(13) Does the receiver take an independent sample (or participate in the shipper's sampling)?

b. Shipments
(1) Are written instructions about lots or items to be shipped issued to the shipping department?
(2) Is notice of the shipment sent directly to the material accounting office?
(3) Is the shipping form, DOE/NRC Form 741, prepared from loading sheets or other data received from the shipping department?
(4) After the preparer completes DOE/NRC Form 741, is a copy crosschecked by a second person to confirm the correctness of the data entered?
(5) Are DOE/NRC Form 741s dispatched on time?
(6) Are there defined procedures for processing receipted shipping documents returned by the receiver, including documented acceptance of the information received by an authorized person?
(7) Is the gross weight of material determined before shipment?
(8) Is the tare weight of each individual shipping container determined?
(9) Are there procedures in use to ensure that the special nuclear material content of each container is valid?

c. Shipper-Receiver Difference
(1) Are there established procedures for detecting and evaluating statistically significant shipper-receiver difference?
(2) Do the plant records indicate any significant shipper-receiver difference during the period covered by the review?
(3) Were the significant shipper-receiver differences brought to the attention of the appropriate management personnel for evaluation?
(4) Are written reports prepared regarding the resolution of significant shipper-receiver differences?

D-3. Scrap and Waste Control

a. Scrap
(1) Is scrap classified and identified for purposes of:
(a) measurement, and
(b) recovery?
(2) Is scrap packaged to facilitate accurate measurement?
(3) What portion of material balance uncertainty for each material type is caused by scrap?
(4) What percent of inventory is in scrap?
(5) Are there plans and schedules for timely recovery of scrap?
(6) Is there evidence of scrap on inventory longer than:
(a) 6 months, or
(b) 12 months?
(7) What basis is used for establishing the special nuclear material content of scrap?

(8) Is there a program to evaluate and reduce scrap generation?
(9) Is there a program to evaluate and improve scrap measurements?

b. Waste
(1) Are there procedures to ensure that wastes containing special nuclear material are measured before discard?
(2) What basis is used to determine the special nuclear material content of wastes?
(3) Are there recording and reporting procedures to ensure that the special nuclear material content of wastes is properly accounted for by:
(a) process,
(b) material type, and
(c) type of discard?
(4) Are there fail-safe procedures or devices in use to ensure that significant quantities of special nuclear material cannot be inadvertently discarded?
(5) Are there procedures for action in case a significant quantity of special nuclear material is inadvertently discarded?
(6) Are there procedures or devices to monitor waste streams that normally should not contain special nuclear material?
(7) Are there continuing studies with respect to process discard residues to:
(a) establish normal levels,
(b) improve measurements, and
(c) reduce losses?
(8) Are control charts or other series evaluation mechanisms used for routine discard streams?

D-4. Detection of Unauthorized Production and Enrichment for Enrichment Facilities

a. Does the facility have a detection program, independent from production, which provides high assurance of detecting unauthorized production and unauthorized enrichment?

b. Have all credible scenarios of unauthorized production or enrichment been identified?

c. For each scenario, is there a system in place for the timely detection of that scenario?

d. Are indicators of unauthorized production or enrichment investigated and resolved in a timely manner?

D-5. Performance Testing Examples

a. Observe the performance of application and removal of tamper-safing seals.

b. Observe the performance of checking and documenting the receipt of shipments.

c. Observe the performance of controlling, weighing, and documenting shipments.

d. Observe the performance of internal transfers of special nuclear material (SNM), including the timeliness of documenting the transfers.

APPENDIX E

Measurement System Checklist

E-1. Measurement Review

a. Based on the planning review of plant procedure manuals and other documents, select those measurement points in the system to be reviewed in more detail. For each such point, prepare a Measurement Point Data Sheet such as the one shown in Annex 1 to this appendix.

b. For each measurement point selected, review and discuss with the personnel responsible for the measurements the procedures actually used.
   (1) Note any deviations from specified procedures or from good practice, along with any reasons for such deviations.
   (2) Review available data supporting the precision and accuracy statements associated with each measurement point.

c. Observe analytical laboratory operations and procedures, including contract laboratories, if appropriate, and discuss them with laboratory personnel, as appropriate. An Analytical Laboratory Checklist such as the one shown in Annex 2 to this appendix should be used.

d. Check scales and balances using standard weights and observe their use. A Scale and Balance Checklist such as the one shown in Annex 3 to this appendix should be used.

E-2. Measurement Quality Control

a. Review and discuss the program of standardization and calibration of measurement equipment and analytical procedures with the personnel responsible.

b. Determine the extent of analytical control programs, participation in analytical exchange programs, validity and care of standards, and frequency of calibration measurement equipment.

c. Does the measurement control program include:
   (1) sampling,
   (2) bulk measurement,
   (3) nondestructive measurements,
   (4) analytical methods, and
   (5) use of control charts?

d. Review Measurement Point Data Sheets, Analytical Laboratory Checklists, and Scale and Balance Checklist for data pertinent to measurement control.

e. Are the performance trends shown by the control program acceptable?

f. Are the frequencies of calibration, standardization, and precision checks acceptable?

g. Are quality control checks made in a representative fashion over time to include different equipment, shifts, and operators?

h. Are personnel training and qualification programs carried out?

i. Are there records and procedures to ensure that only trained and qualified personnel carry out material accounting measurements?

E-3. Performance Testing Examples

a. Observe selected sample-taking and trace the actions performed on transfer of the samples to the analytical laboratory and receipt by the laboratory to ensure that controls of and accounting for the samples transferred are effectively performed.

b. Select items for nondestructive assay measurement, observe their measurement, evaluate the results against the book values, and evaluate the results to measurement limits of error.

c. Select items for weighing, observe their weighing, evaluate the results against the book values, and evaluate the results to measurement limits of error.

APPENDIX E – ANNEX 1

Measurement Point Data Sheet

This data sheet should be used to record observations and information regarding the actual functioning of the plant's material accounting measurement system. The reviewer should be familiar with the plant's written procedures before observing the actual functioning of the system.

E1-1. Identify the measurement point by location, process, flowchart reference, etc.

E1-2. Identify material by type, form, composition, normal quantities, source, use, and disposition.

E1-3. Review bulk measurements:

a. Scale, tank volume, or pipeline data;

b. Capacity;

c. Measurement increment;

d. Measurement control data;

e. Calibration procedure and frequency;

f. Calculation parameters and formulae;

g. Factor data, including:
   (1) basis,
   (2) measured parameters,
   (3) measurement control data, and
   (4) frequency of verification.

E1-4. Review sampling procedures, including:

a. portion sampled;

b. basis for sampling, e.g., statistical plan, economic criteria, judgment, etc.;

c. type and size of sample;

d. sampling equipment;

e. special or unique techniques;

f. compositing; and

g. measurement control data.

E1-5. Review analytical procedures, including:

a. Element concentration;

b. Isotopic concentration;

c. Nondestructive assay;

d. Measurement-control data; and

e. Laboratory, including:
   (1) process lab,
   (2) plant lab, and
   (3) contract lab.

E1-6. Are the measurement methods at this measurement point appropriate?

APPENDIX E – ANNEX 2

Analytical Laboratory Checklist

This data sheet should be used to record observations and information regarding the actual functioning of the plant's analytical laboratory. The reviewer should be familiar with the written procedures pertinent to the laboratory before observing the actual laboratory operation.

E2-1. Is the laboratory that performs material accounting analyses independent of the production organization?

E2-2. Are requests for analyses submitted to the laboratory identifiable with the samples?

E2-3. Are special pre-numbered forms used for analytical reasons? For computerized systems, are control numbers used to log samples for analysis?

E2-4. Do the analytical requests include:

a. analysis required;

b. date of request;

c. identity of requesting unit;

d. identity of material sampled;

e. identity, description, and quantity of sample;

f. disposition instructions for sample; and

g. reporting instructions for results?

E2-5. What record is made of incoming samples:

a. computerized tracking system,

c. manually prepared card file or log book,

d. analyst assigned, or

e. other?

E2-6. Are samples permanently and adequately identified?

E2-7. Are current written analytical procedures available to all appropriate analysts?

E2-8. Are there written approved procedures for handling changes in analytical procedures?

E2-9. Is there evidence that the analysts follow:

a. the written analytical procedures, and

b. the approved change procedures?

E2-10. Is there a standard form for reporting analytical results that includes:

a. Date of analysis?

b. Analytical results?

c. Identity of:
   (1) analytical request,
   (2) sample,
   (3) analytical method, and
   (4) analyst?

d. Disposition of sample?

E2-11. Are analytical results retained in the laboratory:

a. files;

b. log books; and

c. for the retention period in accordance with 10 CFR Part 74, "Material Control and Accounting of Special Nuclear Material."

E2-12. Does the laboratory control program include:

a. disguised samples when appropriate,

b. adequately disguised samples,

c. internal standards,

d. reference standards traceable to national standards,

e. analyst certification, and

f. independent evaluation such as participation in the safeguards analytical laboratory evaluation (SALE) program?

E2-13. Are analytical services obtained from laboratories outside the plants?

E2-14. Are the controls on any such outside analytical services adequate to ensure analytical results acceptable by the criteria of the in-plant analytical program?

APPENDIX E – ANNEX 3

Scale and Balance Checklist

This data sheet should be used to record observations and information regarding the actual use, maintenance, and calibration of scales and balances used for material accounting purposes. The reviewer should be familiar with the written procedures pertinent to the scales and balances used for material accounting before observing their actual use.

E3-1. Are written calibration and use procedures available?

E3-2. Is calibration performed properly and at satisfactory intervals?

E3-3. Are calibrations traceable to national standards?

E3-4. Are regular inspections, testing, and service performed?

E3-5. Are inspection stickers on equipment?

E3-6. Is there a training or qualification program for operators and supervisors?

E3-7. Are working standards available and satisfactory?

E3-8. Are working standards checked? How often?

E3-9. Are working standards accurate, handled with lifters or gloved hands, and kept under cover when not used?

E3-10. Is the equipment sufficiently accurate for its intended use?

E3-11. Is the equipment being used with the manufacturer's recommended capacity?

E3-12. Are control charts or other statistical media maintained for scale and balance precision and accuracy?

E3-13. Is statistical determination of precision and accuracy (weighing limits of error) performed?

E3-14. Are buoyancy corrections made when appropriate?

E3-15. Are weights handled carefully – not slid in place, etc.?

E3-16. Are temperature and air-current effects taken into consideration in the procedures and in practice?

E3-17. Is proper action taken to correct weighing errors?

E3-18. Are only approved scales used for material accounting?

E3-19. Are scales checked before each use?

E3-20. Are scales permanently identified?

E3-21. Are tags applied to scales that are out of order? Do these tags show the reason why the scales should not be used and that calibration is required after repair?

E3-22. Are weights verified by more than one person (or printed tape) for shipments, receipts, scrap, etc.?

E3-23. Is responsibility for scale and balance use, maintenance, and calibration assigned in writing?

APPENDIX F

Statistical Controls Checklist

F-1. Review any information recorded by the measurement system reviewer that is pertinent to the statistical controls of that system, including:

a. scale and balance calibration and measurement-control data,

b. sampling control data, and

c. analytical or non-destructive assay (NDA) measurement control data.

F-2. Are the data used for estimating bias and for determining error variances and limits of systematic errors of measurement:

a. generated by statistically valid procedures,

b. sufficient in quality and quantity, and

c. collected using procedures that ensure accuracy and completeness?

F-3. Are the data-handling and calculational procedures used to determine measurement precision and accuracy statistically valid and appropriate?

F-4. Are calibration data used appropriately in estimating measurement bias and the limits of systematic errors?

F-5. Are sampling precision and accuracy based on statistically valid sampling plans and studies?

F-6. Are replication program data used appropriately for determination of random errors?

F-7. Are data-handling and calculational procedures used to determine inventory difference (ID) and the limit of ID statistically valid and appropriate?

F-8. Are data-handling and calculational procedures used to determine the limits of error of the physical inventory valid and appropriate?

F-9. Can the ID be localized to a specific area? Can the ID be localized to a specific process within an area?

F-10. Are there routine procedures for investigating excessive ID?

F-11. What evidence is there that such procedures have been used?

F-12. Are valid statistical techniques employed to evaluate ID on a series, as well as on an individual basis?

F-13. Do such techniques include the use of control charts?

F-14. For process monitoring at Category I fuel cycle facilities, evaluate the status of abrupt alarms.

a. Determine the adequacy of the frequency of abrupt alarms.

b. Are abrupt alarm thresholds and number of false alarms statistically in sync?

c. Is the alarm threshold smaller or larger than the three-sigma limit?

d. Are there a large number of three-sigma indicators?

F-15. Evaluate alarm resolution and three-sigma and trend testing.

a. Are licensee decision rules for alarm resolution adequate and are they followed in resolving alarms?

b. Determine the significance of trends and/or whether alarm threshold models for each control unit are reasonable.

c. Do any of the alarms give indication of excessive process variation or improper modeling?

F-16. Evaluate the item monitoring program.

a. For Category I fuel cycle facilities, does the item monitoring program provide the detection capabilities required?

b. For all other fuel cycle facilities, do the item monitoring activities ensure current knowledge of items?

F-17. Are there routine procedures for evaluating shipper-receiver differences?

F-18. Do these procedures include valid statistical techniques for evaluating shipper-receiver difference by:

a. individual shipment,

b. shipment series, and

c. individual lot or container?

F-19. Do these procedures include the use of control charts?

F-20. Is there evidence that these procedures have been used?

F-21. Is there evidence that significant shipper-receiver differences have been investigated and reconciled?

F-22. Are results from statistical evaluations made available to management and operating personnel for control purposes?

F-23. Are data retained in accordance with appropriate requirements in 10 CFR Part 74, “Material Control and Accounting of Special Nuclear Material”?

F-24. Performance Testing Examples

a. Observe and evaluate the collection data and its use in estimating bias and determining error variances and limits of systematic errors of measurement.

b. Observe the process and evaluate the rationale used in preparing control charts.

c. Observe the performance of supervisory review of key elements of the program.

APPENDIX G

Physical Inventory Checklist

This checklist should be used to record observations and information regarding conduct of physical inventories. For any parts of the inventory to be observed, the reviewer should be familiar with the plant's general inventory procedures and the specific instructions under which the inventory is being conducted.

G-1. Was the inventory based on measured quantities?

G-2. Was the inventory a shutdown/cleanout type, a dynamic type, or a combination thereof?

G-3. Was measurement information based on:

a. prior measurements ensured through item identification and tamper-safing,

b. uniquely identified sealed sources,

c. prior measurements verified by remeasureing,

d. measurements made during the inventory, and

e. factors or calculated values? If factors were used, were the factors determined on the basis of measurement, their continued validity monitored through a measurement-control program, and the limits of error of the factors determined from the measurement-control program's data? If calculated values were used, were they based on completely known and measured components?

G-4. Were sufficient data available to determine the limits of error for the inventory?

G-5. Were the measurements and measurement controls adequate to establish the quantity of material on inventory within valid limits of uncertainty?

G-6. Were proper cutoff procedures used for:

a. internal transfers,

b. shipments and receipts,

c. records, and

d. processing?

G-7. Was one person assigned overall responsibility for the inventory?

G-8. Were written inventory instructions issued to:

a. the inventory teams, and

b. other appropriate operating personnel?

G-9. Did inventory orientation include:

a. review of instructions by inventory personnel,

b. tours of areas by team members unfamiliar with area activities, and

c. preliminary inspection by an inventory supervisor?

G-10. Were there any deviations from the written instructions?

G-11. Were such deviations approved by the inventory supervisor?

G-12. Were the various areas prepared for the inventory in that:

a. material was arranged to expedite inventory,

b. process conditions were arranged so that quantities in difficult-to-measure locations were at a minimum, and

c. items were properly labeled and identified?

G-13. Was the inventory taken in a systematic and accurate manner?

G-14. Were inventory lists prepared from listing items from the floor or were prelisted items checked off as items were located?

G-15. Were there procedures to ensure that all items, material, and locations were listed once and only once?

G-16. Was the physical inventory in agreement with the book inventory?

G-17. If there were differences, were appropriate actions taken to explain, investigate, and reconcile them?

G-18. Were the results of the physical inventory reflected in the material accounting records?

G-19. Was the inventory conducted within the required frequency interval?

G-20. Performance Testing Examples

a. Select specific inventory items from inventory data and investigate whether all data elements in the records are in agreement with corresponding data revealed by physical examination of the items on the floor.

b. Observe and evaluate the acceptability of the process for taking in-process inventory.

c. Observe performance of the inventory, if possible.

APPENDIX H

Records and Reports Checklist

H-1. Is the plant material accounting system designed so that it will clearly delineate the responsibility for the materials?

H-2. Are double-entry records maintained?

H-3. Are records maintained of:

a. material added to, and removed from, the process;

b. the quantity of material in process at any given time;

c. identity and location of items and containers containing special nuclear material; and

d. source and disposition of items containing special nuclear material?

H-4. Are control accounts periodically reconciled and adjusted to the results of physical inventories?

H-5. Is there written approval by authorized individuals for all adjustments to:

a. control accounts, and

b. perpetual inventory records?

H-6. Are standard approved forms or their computerized equivalents used to record all adjustments to the records, including the reason for the adjustment?

H-7. Is there a system for controlling and accounting for all such paper forms used? If a computerized system is used, have acceptable transaction controls been programmed into the software?

H-8. Are all special nuclear material accounting measurement data routinely reported to the material accounting office?

H-9. Are such measurement data reported on standard approved forms that adequately identify the material to which the measurement data apply?

H-10. Are such measurement data used appropriately in preparation of material accounting records and reports?

H-11. Have the required Material Status Reports (U.S. Department of Energy (DOE)/U.S. Nuclear Regulatory Commission (NRC) Forms 742, "Material Balance Report," and 742C, "Physical Inventory Listing") and Nuclear Material Transaction Reports (DOE/NRC Forms 741, "Nuclear Material Transaction Report," and 740M, "Concise Note") been:

a. prepared and submitted in the required time,

b. prepared accurately and according to approved plant procedures, and

c. verified to be accurate by a member of the material accounting staff other than the original preparer?

H-12. Performance Testing Examples

a. Examine book adjustments for the assessment period, identify representative adjustments, and interview all parties to the transactions in order to evaluate the process followed in each step; observe and evaluate any book adjustment made during the review.

b. Discuss with software representatives the computer logic used in selecting records and generating certain reports used by the accounting office as a way of evaluating whether the correct records were used in report generation; also, have a test conducted to illustrate the accuracy of the report-generation process.

c. If a software change is made during the assessment, determine whether at least one other person participated in the review of coding and testing of the change.

APPENDIX I

Audit Program

In addition to the specific topical areas described in the preceding appendices, the following audit steps cover the remaining general areas of interest.

I-1. Planning the Audit

I-1.1 Document Review

a. Review documents and contracts as indicated in the Assessment Program Checklist. Note items pertinent to records and reports examination.

b. Review plant reports for:
   (1) date and proper signature or authorized computerized equivalent;
   (2) proper form, including subschedules;
   (3) basis for inventory;
   (4) explanation of ID; and
   (5) timely receipt.

c. Review receiving and shipping documents for preparation and issuance in accordance with requirements and regulations.

d. Review backup documents and authorizations for measured discards.

e. Prepare notes on specific items to investigate.

I-1.2 Procedure Manuals and Internal Control

a. Review procedure manuals, Internal Control Checklist, and associated documents to become reacquainted with facility records and reports.

b. Prepare notes on specific items to be investigated.

I-1.3 Trial Balances

a. Select the categories of material balance data: external receipts, external shipments, and inventory adjustments (losses, measured discards, and inventory difference) by reporting identification symbol (RIS) (if more than one are used), contract number, material type, and date.

b. Using the categories of material balance data, prepare pro-forma trial balance and examine for unusual balances.

I-1.4 Sampling Plans

Prepare master data sheet and sampling plans for audit test to be performed on statistical sampling basis. Preliminary plans and sampling plan criteria can be established before the assessment by using data from prior assessments and reports and general knowledge of the plant.

I-2. Conducting the Audit

I-2.1 Initial Meetings

At the initial meeting with plant personnel:

a. Discuss information developed in audit planning.

b. Review audit plans where necessary.

c. Discuss any changes in plant procedures that affect records and reports.

d. Arrange for necessary assistance and availability of records and reports.

I-2.2 Review of Ledgers

Review general and subsidiary ledgers and list and investigate any unusual items occurring in journal vouchers or posting media.

I-2.3 Receipts

a. Procurement
   (1) Using invoices as bases, trace quantities to permanent records.
   (2) Test internal data supporting receipts (e.g., receiving reports and measurement results), using statistical samples where appropriate.
   (3) Review purchase orders and payment vouchers to determine whether quantities of material purchased are consistent with invoices.
   (4) Select data on a statistical sampling basis to verify accurate calculations of extensions, footings and postings of invoices and/or other documents supporting quantities procured.

b. Other Source and Special Nuclear Material Categories

   Check the bases of transfer and reconcile with the corollary account under "Removals" (see I-2.4 below).

c. U.S. Nuclear Regulatory Commission (NRC) Transfer Documents

   Test-check postings of U.S. Department of Energy (DOE)/NRC Form 741, "Nuclear Material Transaction Report," to the records. Use statistical sampling plans where appropriate.

I-2.4 Removals

a. Measured Discards, Losses, and Inventory Differences
   (1) Select data from material balance reports and generate schedules of each account for the survey period.
   (2) Trace schedules to ledgers.
   (3) Examine supporting evidence for posting documents.
   (4) Test-check posting of source documents to ledgers, using statistical sampling plans where appropriate.
   (5) Check footings, extensions, and descriptions of data on source documents to ascertain correctness and propriety of data.

b. Sales
   (1) Check sales authorizations.
   (2) Check sales slip and/or invoice quantities to ledgers.
   (3) Check footings, extensions, etc., of posting documents.
   (4) Trace postings to ledgers.

c. Decay

Check calculations on the basic posting documents and trace postings to records.

d. Other Source and Special Nuclear Material Categories

Check bases of transfer and reconcile with corollary account under "Receipts" (see I-2.3 above).

e. NRC Transfer Documents

Test-check postings of DOE/NRC Form 741 to the records. Use statistical sampling plans where appropriate.

I-2.5 Internal Transfers

a. Trace documents supporting internal transfers (e.g., production notes, laboratory reports, weight tallies, and transfer forms) to records.

b. Check footings, postings, and extensions of intra-area supporting documents.

c. Review internal transfer documents for propriety and numerical sequence of intra-area transfer forms.

d. Reconcile records of internal transfers to books of final entry.

I-2.6 Measurement Records

Trace on a selected basis, using statistical sampling plans when appropriate:

a. quantities from records to laboratory workbooks;

b. results in laboratory workbooks to quantities in records; and

c. extensions, footings, and descriptions, as applicable.

I-2.7 Performance Testing Examples

Observe the transfer of DOE/NRC Form 741 data to the Nuclear Materials Management and Safeguards System (NMMSS), and evaluate the effectiveness of actions taken by staff to ensure that the facility maintains agreement between its own data and data submitted to the NMMSS.

I-2.8 Findings

Summarize findings to be discussed with other team members, facility personnel, and management and included in the report.