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REGULATORY GUIDE

DIRECTORATE OF REGULATORY STANDARDS

REGULATORY GUIDE 5.45

STANDARD FORMAT AND CONTENT FOR THE SPECIAL NUCLEAR MATERIAL CONTROL AND ACCOUNTING SECTION OF A SPECIAL NUCLEAR MATERIAL LICENSE APPLICATION (Including that for a Uranium Enrichment Facility)

USAEC REGULATORY GUIDES

Regulatory Guides are issued to describe and make available to the public methods acceptable to the AEC Regulatory staff of implementing specific parts of the Commission's regulations, to delineate techniques used by the staff in evaluating specific problems or postulated accidents, or to provide guidance to applicants. Regulatory Guides are not substitutes for regulations and compliance with them is not required. Methods and solutions different from those set out in the guides will be acceptable if they provide a basis for the findings requisite to the issuance or continuance of a permit or license by the Commission.

Published guides will be revised periodically, as appropriate, to accommodate comments and to reflect new information or experience.

Copies of published guides may be obtained by request indicating the divisions desired to the U.S. Atomic Energy Commission, Washington, D.C. 20545, Attention: Director of Regulatory Standards. Comments and suggestions for improvements in these guides are encouraged and should be sent to the Secretary of the Commission, U.S. Atomic Energy Commission, Washington, D.C. 20545, Attention: Docketing and Service Section.

The guides are issued in the following ten broad divisions:

1. Power Reactors
2. Research and Test Reactors
3. Fuels and Materials Facilities
4. Environmental and Siting
5. Materials and Plant Protection
6. Products
7. Transportation
8. Occupational Health
9. Antitrust Review
10. General

ENCLOSURE 3

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INTRODUCTION

The Atomic Energy Act of 1954, as amended, directs the U.S. Atomic Energy Commission (AEC) to regulate the receipt, manufacture, production, transfer, possession, use, import, and export of special nuclear material in order to protect the public health and safety and to provide for the common defense and security. The principal requirements with respect to special nuclear material licensing are found in Title 10, Code of Federal Regulations, Part 70 (10 CFR Part 70), "Special Nuclear Material." Paragraph (b) of §70.22 of 10 CFR Part 70 specifies that special nuclear material control and accounting information must be provided in a license application to show how compliance with the fundamental nuclear material control requirements of §70.58 of 10 CFR Part 70 will be accomplished. A special nuclear material control and accounting section must be prepared for the license application, which must be submitted prior to the beginning of construction. In addition to the requirements of 10 CFR Part 70, certain special requirements for material control and accounting would be included in a proposed Part 52 that is currently being prepared specifically for license applications for uranium enrichment plants.

Purpose and Applicability

This Standard Format has been prepared to provide uniformity and completeness in the preparation and review of the special nuclear material control and accounting section of license applications, to minimize lost time attributable to incomplete applications, and to standardize the licensing review process. Chapter 12 of this document applies to applications for construction and operation of uranium enrichment plants and the additional material control and accounting information required for such plants. In order to facilitate presentation of Chapter 12, it has been written as though the proposed Part 52 currently in preparation were in effect.

This document is applicable to applications for licenses to possess at any one time and location more than one effective kilogram of special nuclear material and to use such material as sealed sources and for activities other than those involved in the operation of a nuclear reactor licensed pursuant to 10 CFR Part 50 and those involved in a waste disposal operation.

The applicant is encouraged to prepare his application in accordance with the Standard Format and to provide information in each section to support the conclusion that he will be able to operate in accordance with the pertinent regulations. The information specified in the Standard Format is the minimum for a license application. Although strict conformance with the Standard Format is not mandatory, presentation of an equivalent level of information is necessary. Additional information may be required for completion of the staff review of a particular application. The applicant should include additional information, as appropriate. In this regard, it is the applicant's responsibility to be aware of new and revised AEC regulations. The information provided should be up to date with respect to the state of technology for the control of, measurement of, and accounting for special nuclear material.

The applicant is advised to discuss his plans and programs with the Regulatory staff in advance of preparing his license application. This will allow pertinent information to be discussed with respect to the depth of information required for the proposed license.

Upon receipt of an application, the Regulatory staff will perform a preliminary review to determine if the application provides a reasonably complete presentation of the information needed to form a basis for the findings required before issuance of a license. The Standard Format will be used by the staff as a guideline to identify the information needed. If the application does not provide a reasonably complete presentation of the necessary information, further review will be suspended until needed information is provided.

As developments and changes in the nuclear industry occur, the Commission's requirements for information may need modification; revisions to the Standard Format will be made as necessary to accommodate these changes.

Use of the Standard Format

The applicant should follow the numbering system of the Standard Format at least down to the level of sections such as Section 2.4.2. Under some circumstances, certain sections may not be applicable to a specific application. This should be stated clearly, and sufficient information should be provided to support that conclusion.

The applicant may wish to submit information in support of his application which is not required by regulations and is not essential to the description of the applicant's special nuclear material control and accounting program. This could include, for example, historical data submitted in demonstration of certain criteria, discussion of alternatives considered by the applicant, supplementary information regarding assumed models such as the LEMUF Models called for in Chapter 7, or data calculations. This information should be provided as an appendix to the application.

In addition, the information called for in Appendix A, "Site Description," to this Standard Format should be submitted as an appendix to the application. This information is necessary for the assessment of the acceptability of the applicant's material control and accounting plan but should not be incorporated in the special nuclear material license as technical specifications or license conditions.

Upon completion of the application, the applicant should use the table of contents of the Standard Format as a checklist to ensure that each subject has been addressed.

Style and Composition

A table of contents should be included in each submittal.

The application should strive for clear presentations of the information provided. Confusing or ambiguous statements and general statements of intent should be avoided. Definitions and abbreviations should be consistent throughout the submittal and consistent with generally accepted usage.

The applicant should direct his response to the subject matter of each section. Wherever possible, duplication of information should be avoided. Thus, information already included in other sections of the application may be covered by specific reference to those sections.

Where numerical values are stated, the number of significant figures should reflect the accuracy or precision to which the number is known. The use of relative values should be indicated clearly.

Drawings, diagrams, and tables should be used where the information may be presented more understandably or more concisely by such means. These should be located with the section in which they are primarily referenced. Due concern should be taken to ensure that all information presented in drawings is legible, symbols are defined, and drawings are not reduced to the extent that they cannot be read by unaided normal eyes.

Physical Specifications of Submittals

All material submitted as part of the license application should conform to the following physical dimensions of page size, quality of paper and inks, and numbering of pages:

1. Paper size

Text pages: 8-1/2 x 11 inches.

Drawings and graphics: 8-1/2 x 11 inches preferred; however, a larger size is acceptable provided the finished copy, when folded, does not exceed 8-1/2 x 11 inches.

2. Paper stock and ink

Suitable quality in substance, paper color, and ink density for handling and for reproduction by microfilming.

3. Page margins

No less than one inch on the top, bottom, and binding side of all pages submitted.

4. Printing

Composition: text pages should be single spaced.

Type face and style: suitable for microfilming.

Reproduction: may be mechanically or photographically reproduced. All pages of the text may be printed on both sides with the image printed head to head.

5. Binding

Pages should be punched for looseleaf ring binding.

6. Page numbering

Pages should be numbered by chapter and sequentially within the chapter, e.g., the first page of Chapter 3 would be 3-1, etc. Do not number the entire report sequentially.

7. Format references

References in the application to this Standard Format should be by chapter, section number, and subsection number.

Procedures for Updating or Revising Pages

The updating or revising of data and text should be on a replacement page basis.

Each changed or revised portion of a page should be highlighted by a vertical line. The line should be on the margin opposite the binding margin opposite each line changed or added. All pages submitted to update, revise, or add pages to the report should show the date of change. The transmittal letter should include an index page that lists the pages to be inserted and the pages to be removed. Where major changes or additions are made, pages for a revised Table of Contents should be provided.

Number of Copies

The licensee should submit the number of copies of each required submittal specified in §70.21 of 10 CFR Part 70 or which would be required in a new 10 CFR Part 52.

Public Disclosure

The AEC has determined that public disclosure of the details of special nuclear material control and accounting programs is not in the public interest, and withholds such details pursuant to paragraph 2.790(d) of 10 CFR Part 2. Thus the special nuclear material control and accounting section of each license application should be submitted as a separate enclosure. Other proprietary and classified information should be identified clearly and submitted in separate enclosures. Each submission of proprietary information should be accompanied with the applicant's detailed reason and justification for requesting exemption from public disclosure as required in paragraph 2.790(b) of 10 CFR Part 2.

Compatibility

The applicant should ensure that the special nuclear material control and accounting plan is compatible with the other sections of his application.

STANDARD FORMAT AND CONTENT FOR THE SPECIAL NUCLEAR MATERIAL CONTROL AND ACCOUNTING SECTION OF A SPECIAL NUCLEAR MATERIAL LICENSE APPLICATION
(Including that for a Uranium Enrichment Facility)

CHAPTER 1 DESIGN OF STRUCTURES, COMPONENTS, EQUIPMENT, AND SYSTEMS

This chapter of the application should identify, describe, and discuss the principal design characteristics of those structures, components, equipment, and systems important to special nuclear material control and accounting. A special nuclear material control and accounting section must be prepared for the license application. Pursuant to paragraph (f) of §70.21 of 10 CFR Part 70, this section is required to be submitted prior to the beginning of construction and it also would be required pursuant to provisions of a new 10 CFR Part 52. In general, the application submitted prior to construction should describe the preliminary design of the plant in sufficient detail to allow a definitive evaluation by the Regulatory staff as to whether the plant can be constructed with adequate provisions for the control and accounting of special nuclear material.

The design information provided should reflect the most advanced state of design at the time of submission. If certain information identified in the Standard Format is not yet available at the time of submission because the design has not progressed sufficiently at the time of writing, the application should include the bases and criteria being used to develop the required information, the concepts and alternatives under consideration, and the schedule for completion of the design and submission of the missing information.

The application should be modified prior to operation to describe in detail the final design of the plant, as well as operating procedures significant to the control and accounting of special nuclear material. Modifications of the design bases, criteria, or features included in the application submitted prior to construction, as well as any new or modified design bases, criteria, or features, should be identified in the application modifications submitted prior to operation. The safeguards significance of each such change should be addressed. The relation of the design bases to the design criteria should be described.

1.1 Design Bases, Criteria, and Features

In this section, discuss briefly the design bases, criteria, and features for the plant structures, systems, equipment, and components important to special nuclear material control and accounting. Identify and discuss, where appropriate, the relationships of special nuclear material control and accounting design characteristics with other design characteristics such as process control and health and safety. The design base should provide information which identifies the function to be performed by a structure, system, component, or pieces of equipment. Design criteria should establish design, fabrication, construction, testing, and performance requirements associated with the respective design bases. For each criterion, a summary should be provided to show how the principal design features meet the criterion. Any exceptions to the

criteria should be identified, and the justification for each exception should be discussed. In the discussion of each criterion, reference the sections of this report where more detailed information is presented. The discussion in this section should include at least the following:

1.1.1 Material Control Areas

Identify and explain the design characteristics that were used to establish the plant and internal control areas identified in Section 4.1.

1.1.1.1 Design Criteria for Subdivision of a Site to Improve Control. Present and discuss the design criteria related to special nuclear material control and accounting that were used to establish the plant and internal control areas, including such criteria as assurance of identifiable physical areas, capability to control special nuclear material by area, and capability to assign a measured value to special nuclear material entering or leaving an area.

1.1.1.2 Design Features. Identify and describe the plant and process design features that provide for establishment of internal control areas identified in compliance with the design criteria discussed in Section 1.1.1.1, including, for example, site and plant layout, building structures, and equipment arrangement.

1.1.2 Automated Special Nuclear Material Control and Accounting Capability

Identify those design characteristics that provide for the capability, if any, for automated special nuclear material control and accounting, including process design and layout to permit automated process control, automated measurement systems, and automated access controls.

1.1.2.1 Design Criteria. Present and discuss the design criteria that were used to establish the capability for automated special nuclear material control and accounting, if any, including such criteria as timely calculation of material balances for plants and control areas, maintenance of current knowledge of the identity, location, and quantity of special nuclear material in the areas, and limitation of personnel access to the material and material accounting data.

1.1.2.2 Design Features. Identify and describe the plant and process design features that provide for automated special nuclear material control, if any, in compliance with the criteria discussed in Section 1.1.2.1, including, for example, process layout, mechanization, and automation; storage and handling mechanization and automation; and in-line measurement systems.

1.1.3 Measurement Capability

Identify those design characteristics that provide: (1) the capability to measure the special nuclear material content of all receipts, shipments, and inventories and (2) systems to assure continued validity of previous measurements. Such characteristics could include capabilities for mixing, sampling, weighing, volume determination, and chemical and nondestructive analyses (see also Chapter 5, Section 5.2.2.3).

1.1.3.1 Design Bases. Design bases for a measurement system should show the function of the system to provide for measurement of special nuclear material and the limiting contribution that the system is permitted to make to the total material balance uncertainty. The design base for any specific measurement, i.e., the total measurement at a specific point or the individual components of such a measurement, e.g., weighing, sampling, or analyzing, should show the function the measurement performs and the limiting contribution which that measurement is permitted to make to the total measurement system uncertainty.

1.1.3.2 Design Criteria. Design criteria for a measurement system or any of its parts should show how measurements will be made and the limits of precision and accuracy that will permit the system and its parts to meet the design bases.

1.1.3.3 Design Features. Design features should describe those characteristics of the measurement system and its parts that will permit the system to meet the design criteria. For example, weight measurement design features needed to meet specified precision and accuracy limits might be a specific type of balance located in a glovebox with controlled temperature and humidity. There also could be design features that facilitate the measurement of in-process special nuclear material, including the design of process equipment, storage containers, transport vessels, filters, piping, and ductwork.

1.1.4 Waste Accountability

Identify those design characteristics that provide the capability for the measurement of the special nuclear material content of waste streams prior to discard, including storage capacity to hold such wastes, if necessary, until they have been measured.

1.1.4.1 Design Criteria. Present and discuss the design criteria that were used to establish the waste accountability systems for the site and the various plants or control areas within the site, including such criteria as assurance that the special nuclear material content of all waste would be measured before discard and the capability to assign the special nuclear material content of waste to specific plants or control areas.

1.1.4.2 Design Features. Identify and describe the plant and process design features that provide for special nuclear material waste accountability in compliance with the design criteria discussed in Section 1.1.4.1, including, for example, mechanisms for segregating, holding, or measuring waste from different plants or control areas and mechanisms for monitoring waste streams not normally containing special nuclear material.

1.1.5 Scrap Control

Identify those design characteristics that provide for control processing, and disposition of scrap that contains special nuclear material, including measurement, storage, and processing.

1.1.5.1 Design Criteria. Present and discuss the design criteria that were used to establish the scrap control systems for the site and the various plants or control areas within the site, including such criteria as the capability to measure the special nuclear material content of the scrap, the capability to assign the special nuclear material content to the appropriate generating area, and the capability for the recovery of the special nuclear material from the scrap.

1.1.5.2 Design Features. Identify and describe the plant and process design features that provide for scrap control, processing, and disposition in compliance with the design criteria discussed in Section 1.1.5.1, including, for example, mechanisms for classification and storage of scrap from various areas, techniques and mechanisms for measuring the special nuclear material content of scrap, and processes for recovery of the special nuclear material from the scrap.

1.1.6 Special Nuclear Material Storage and Handling

Identify those design characteristics that provide for storage and handling of special nuclear material so that the material is maintained under control at all times, including the expediting of the identification, inventory, and retrieval of items containing special nuclear material.

1.1.6.1 Design Criteria. Present and discuss the design criteria that were used to establish the special nuclear material storage and handling system, including such criteria as assurance that all special nuclear material will be under control at all times, assuring that current knowledge of the location and quantities of special nuclear material is maintained, and assurance that the handling and storage system will provide for maintenance of special nuclear material measurement integrity.

1.1.6.2 Design Features Identify and describe the site design features that provide for special nuclear material storage and handling in compliance with the design criteria identified in Section 1.1.5.1, including, for example, storage capacity sufficient for the special nuclear material to be used in each plant and control area and mechanisms for moving material from area to area and into or out of storage.

1.1.7 Design Relationships

The design descriptions in this chapter should show the hierarchical relationships whereby design features are selected to provide structures, components, equipment, and systems meeting the design criteria that have been established to conform to a specific design base for special nuclear material control and accounting.

CHAPTER 2 QUALITY ASSURANCE

To provide assurance that the design, construction, and operation of the special nuclear material control and accounting system of a proposed plant are in conformance with applicable regulatory requirements and with the design basis and criteria specified in the license applications, the applicant should establish a Quality Assurance Program (QA Program). In this chapter of the preconstruction submission for a special nuclear material license, the applicant should provide a description of the QA Program to be established and executed for the material control and accounting system during the design and construction of the plant. In addition, prior to operation, the applicant should describe the QA Program to be established and executed for the operation of the system. The QA Program should be established at the earliest possible time consistent with the schedule for accomplishing the activity covered. Where some portions of the QA Program have not yet been established at the time of the preconstruction submission because the activity will be performed in the future, the description should provide a schedule for implementation. The QA Program should meet the requirements of Appendix B of 10 CFR Part 50 that are applicable and appropriate to a special nuclear material control and accounting system.

Where a portion of the Quality Assurance Program to be implemented will conform to a particular quality assurance standard, such as those adopted by the American National Standards Institute, the description, to the extent described in the standard, may consist of a statement that the particular standard will be followed. Where regulatory guides have been issued on acceptable methods of implementing portions of the Quality Assurance Program, the description should indicate specifically whether the Regulatory position of the regulatory guides will be followed.

2.1 Quality Assurance During Design and Construction

2.1.1 Organization

Organization charts for the project should be provided that denote the lines and areas of responsibility, authority, and communication within each of the major organizations involved, including those of the applicant, the architect-engineer, the system supplier, the constructor, and construction manager (if different from the constructor). In addition, a single overall organization chart should be included denoting how these companies interrelate for the specific project. These charts and attendant discussions should clearly indicate the organizational location of, organizational freedom of, and authority of the individual or groups assigned the responsibility for checking, auditing, inspecting, or otherwise verifying that an activity has been correctly performed. The charts and discussions should indicate the degree of involvement on the part of the applicant to verify the adequacy of implementation of the QA programs implemented by the applicant's contractors and suppliers, even for those cases where the applicant has delegated to other organizations the work of establishing and implementing the Quality Assurance Program or any part thereof.

2.1.2 Quality Assurance Program

The structures, systems, and components to be covered by the QA Program should be identified, along with the major organizations participating in the program and the designated functions of these organizations. The written policies, procedures, or instructions which implement or will implement the QA Program should be described. Where these written policies, procedures, or instructions are not yet effective, a schedule for their implementation should be provided.

2.1.3 Design Control

A description of the design control measures should be provided. Included should be measures to assure that appropriate quality standards are specified in design documents and that deviations from such standards are controlled; measures for the selection and review of suitability of application of materials, parts, equipment, and processes; measures for the identification and control of design interfaces and for coordination among participating organizations; measures for verifying or checking adequacy of design such as by design reviews, alternative or simplified calculational methods, or suitable testing programs; and measures to assure that design changes, including field changes, will be subject to design control measures commensurate with those applied to the original design and will be reflected in accurate "as built" drawings and specifications.

2.1.4 Procurement Document Control

A description of the procurement document control measures should be provided. Included should be measures to assure that applicable Regulatory requirements, design bases, and other requirements such as QA Program requirements which are necessary to obtain adequate quality are included or referenced in procurement documents.

2.1.5 Instructions, Procedures, Drawings

A description should be provided of the measures to assure that activities affecting quality will be prescribed by documented instructions, procedures, or drawings and will be accomplished in accordance with these instructions, procedures, or drawings.

2.1.6 Document Control

A description of document control measures should be provided. Included should be measures to assure that documents, including changes, are reviewed for adequacy and approved for release by authorized personnel and are distributed to and used at the location where the prescribed activity is performed.

2.1.7 Control of Purchased Material, Equipment, and Services

A description of the measures for the control of purchased material, equipment, and services should be provided. Included should be measures for source evaluation and selection; for assessing the adequacy by means of objective

evidence of quality furnished by the contractor; for inspection at the contractor source; and for examination of products upon delivery. A description also should be provided of the measures taken to assure that documentary evidence that the material and equipment conform to the procurement requirements is available at the plant site prior to installation or use of such material or equipment.

2.1.8 Identification and Control of Materials, Parts, and Components

A description of the measures for the identification and control of materials, parts, and components should be provided to assure that incorrect or defective items will not be used.

2.1.9 Control of Special Processes

A description of the measures for the control and accomplishment of special processes, if any, should be provided. Included should be a listing of any such special processes. The measures to assure that such special processes are controlled and accomplished by qualified personnel using qualified procedures should also be included.

2.1.10 Inspection

A description of the program for the inspection of activities affecting quality should be provided indicating specifically the items and activities to be covered. Included should be an organizational description of the individuals or groups performing inspections, indicating the independence of the inspection group from the group performing the activity being inspected, and a description of how the inspection program for the involved organizations has been or will be established.

2.1.11 Test Control

A description should be provided of the test program to assure that all testing required to demonstrate that structures, systems, and components will perform satisfactorily in service. Included should be an outline of the test program; procedures to be developed; means for documenting and evaluating test results of the item tested; and designation of the responsibility for performing the various phases of the program. Where a test program is used to verify the adequacy of a specific design feature, a description of the qualification testing of a prototype unit should be included.

2.1.12 Control of Measuring and Test Equipment

A description of the measures to assure that tools, gages, instruments, and other measuring and testing devices are properly controlled, calibrated, and adjusted at specified periods to maintain accuracy within necessary limits should be provided. This section does not refer to those devices used to measure or test the special nuclear material in the completed system but rather to those devices used to test or calibrate the system devices during installations and preoperational testing.

2.1.13 Handling, Storage, and Shipping

A description of the measures employed to control handling, storage, shipping, cleaning, and preservation of items in accordance with work and inspection instructions to prevent damage or deterioration should be provided.

2.1.14 Inspection, Test, and Operating Status

A description of the measures to indicate the inspection and test status of items which prevent inadvertent bypassing of such inspections and tests should be provided. A description should also be provided of the measures for indicating the operating status of the structures, systems, and components.

2.1.15 Nonconforming Materials, Parts, or Components

A description of the measures to control nonconforming materials, parts, or components to prevent their inadvertent use or installation should be provided. Included should be the means for identification, documentation, segregation, and disposition of nonconforming material and notification to affected organizations.

2.1.16 Corrective Action

A description of the corrective action measures established to assure that conditions adverse to quality are identified and corrected and that the cause of significant conditions adverse to quality is determined and corrective action taken to preclude repetition should be provided.

2.1.17 Quality Assurance Records

A description of the program for the maintenance of records to furnish evidence of activities affecting quality should be provided. Included should be means for identifying the records, retention requirements for the records (including duration, location, and assigned responsibility), and means for retrieving the records when needed.

2.1.18 Audits

A description of the system of audits to verify compliance with all aspects of the QA Program and to determine the effectiveness of the QA Program should be provided. Included should be means for documenting responsibilities and procedures for auditing, required frequency of audits, audit results, and the designation of management levels to which audit results are reported.

2.2 Quality Assurance Program for System Operation

The applicant should provide a description of the proposed QA Program that will govern the quality of the special nuclear material control and accounting system during operation. In addition to the measurement control program discussed in Chapter 6 of this format and the preoperational testing discussed in Chapter 5 of this format for each measurement system, these activities also

include operating, maintaining, repairing, and modifying the system. The description of the proposed QA Program should include each of the QA criteria (Appendix B of 10 CFR Part 50), as outlined in Section 2.1 above.

CHAPTER 3 ORGANIZATION

In this chapter, describe in detail the management structure and the functional allocation of tasks for special nuclear material control and accounting. Set forth clearly the relationship of special nuclear material control and accounting functions to others in the licensee organization to denote appropriate separation of functions. Describe minimum qualifications for principal positions having special nuclear material control and accounting responsibilities to demonstrate that the positions will be staffed by personnel with training and experience commensurate with job requirements.

3.1 Organization Structure

In this section, describe the applicant's overall management structure. The organization as it will function through plant construction, plant calibration, and preoperational testing should be described in the license application submitted at the preconstruction stage. The organization as it will function through startup and operation also should be described.

3.1.1 Corporate Organization

Identify any corporate organization positions which have responsibilities related to special nuclear material control and accounting at the site which is the subject of the application.

3.1.1.1 Functional Descriptions. Describe the corporate level functions, responsibilities, and authorities for program development, quality assurance, calibration, testing, operations, audits, and other applicable activities affecting special nuclear material control and accounting.

3.1.1.2 Staffing. Provide a description of the applicant's corporate management and technical support staffing, and in-house organizational relationships established to cover the functions identified in Section 3.1.1.1.

3.1.1.3 Organization Charts. Furnish corporate organization charts showing units responsible for the functions identified in Section 3.1.1.1. Identify lines and areas of responsibility, authority, and communication, the size of each unit, and the degree of subdivision or layers of management.

3.1.1.4 Job Descriptions. Provide job descriptions for the management positions and senior staff having responsibilities for special nuclear material control and accounting functions, showing responsibilities and authority for the development, revision, implementation, audit, and enforcement of special nuclear material control and accounting programs and procedures.

3.1.2 Site Organization

Describe the management structure for the site, emphasizing special nuclear material control and accounting.

3.1.2.1 Internal Organization. By means of comprehensive organization charts, show the management structure of the applicant's facility, including the identification of all the following units, which have responsibilities associated with special nuclear material;

1. Overall special nuclear material control and accounting program direction,
2. Special nuclear material custodians,
3. Design review and control,
4. Receiving and shipping,
5. Physical inventory,
6. Measurements,
7. Statistics,
8. Construction quality assurance,
9. Production quality assurance,
10. Measurement quality assurance,
11. Special nuclear material accounting,
12. Analytical laboratories, and
13. Audits.

Show the various layers of management and the size of each unit; identify lines and areas of responsibility, authority, and communication.

3.1.2.2 Separation of Functions. Describe the criteria established for the separation of special nuclear material custodial, measurement, accounting, and audit functions at the site so that the activities of one organizational unit or individual serve as controls over and checks on the activities of other organizational units or individuals. Explain how the proposed organization provides for the required separation of functions. Demonstrate that the control functions are organizationally separated from operational functions.

3.1.2.3 Outside Support. Technical services in support of the applicant's special nuclear material control and accounting program may be provided by the use of outside consultants and technical services contractors. If such arrangements are to be utilized, describe the specific areas of responsibility and functional working arrangements of the support groups.

3.2 Responsibilities and Authorities

Utilization of special nuclear material generally results in involvement of numerous organizational units, each of which has specific duties, responsibilities, and authority. Describe the management system establishing, maintaining, and providing for these assignments. Describe the assigned duties, responsibilities, and authority of organization units responsible for the custody or control of special nuclear material. Indicate the signature authority of each organizational position for approving procedures and reports, including source data documents, for the custody, measurement, control, and accounting of special nuclear material.

3.2.1 Principal Special Nuclear Material Control Positions

Describe in detail the principal organizational positions responsible for special nuclear material control and accounting.

3.2.1.1 Identification of Positions. Identify the following positions by position titles, and reference them to the organization charts provided in Section 3.1.2.1:

1. Overall Program Management. The authority and responsibility for the overall planning, coordination, and administration of the special nuclear material control and accounting functions are required by paragraph (b)(1) of §70.58 of 10 CFR Part 70 to be assigned to a single individual at an organizational level sufficient to ensure independence of action and objectivity of decisions.

2. Measurement Control Management. Proposed amendments to 10 CFR Part 70 would require that the overall planning, development, coordination, and administration of the applicant's measurement control program be assigned to a single individual in the organization who has no direct responsibilities for the operation of an analytical laboratory or for the processing of material. The position would be required to be at an organizational level sufficient to permit independence of action and objectivity of decision, and with authority to obtain all of the information required to monitor and evaluate measurement quality.

3. Accounting Management. Management of the centralized special nuclear material accounting system should be assigned to a single individual independent of all positions which have responsibilities for the custody of special nuclear material or for the generation of special nuclear material source data.

3.2.1.2 Job Descriptions. Provide job descriptions for the positions identified in Section 3.2.1.1 defining the duties, authority, and responsibilities of each position. Indicate the minimum qualification requirements of each.

3.2.1.3 Functional Relationships. Explain in detail the functional relationships of the above positions to others having responsibilities related to the custody, measurement, or control of special nuclear material.

3.2.1.4 Independence of Action. Discuss the independence of action provided in the above positions and demonstrate that there is sufficient independence provided to permit objective performance of each position.

3.2.2 Special Nuclear Material Custodial Units

Specify the organizational units which, in the course of their functions, would exercise custody over special nuclear material.

3.2.2.1 Special Nuclear Material Custodians. Designate by position title, for each material balance area and item control area, a single individual as material custodian responsible for all special nuclear material within that area. Identify and explain the duties, responsibilities, and authority of such custodians. Submit position descriptions, including statements of minimum qualification requirements.

3.2.3 Special Nuclear Material Control and Accounting Units

Define the duties, responsibilities, and authority of the organizational units identified in Section 3.1.2.1, items 3 through 12. To the extent appropriate, descriptions of positions should be submitted.

3.2.4 Audits and Reviews

Define the duties, responsibilities, and authority of the organizational units which contain responsibilities for the following functions:

1. Review of the overall special nuclear material control and accounting program,

2. Audit of special nuclear material records,

3. Management and engineering reviews of the adequacy of the measurement control program,

4. Audit of compliance with the measurement control program, and

5. Review and audit of contractors' measurement control programs, if applicable.

3.2.5 Delegation of Authority

Describe the program established for the written delegation of authority and responsibility for the special nuclear material control and accounting function.

3.3 Training Programs

Implementation of the applicant's special nuclear material control and accounting program requires the assignment of personnel having experience and training consistent with the duties, authorities, and responsibilities of their respective positions. Describe the training programs to be established to provide the original cadre of qualified personnel and to provide for the

maintenance of the qualifications of personnel assigned to special nuclear material control and accounting functions. Affirm that training procedures and qualification criteria will be established.

CHAPTER 4 MATERIAL CONTROL AREAS

In this chapter, describe the division of a site and plants within a site into material balance areas (MBAs) and item control areas (ICAs). The division of a large complex site into smaller material control areas can improve special nuclear material control and accounting in several ways. A number of plant and internal control areas within plants may be required to facilitate the assignment of responsibility and accountability, to effect an internal control system of checks and balances, to lower thresholds for detecting losses, and to localize material losses. Regulatory Guide 5.26, "Selection of Material Balance Areas and Item Control Areas," discusses the advantages of such subdivision and describes bases for the selection of the MBAs and ICAs.

4.1 Identification of Control Areas

In this section, identify and describe the subdivision of the site into plants, material balance areas, and item control areas.

4.1.1 Plant Areas

By reference to the site description and the process flow diagrams provided in Appendix A, and by other suitable means, identify the title, location, and boundaries of each designated plant. For special nuclear material control and accounting purposes, a plant is defined as a set of processes or operations coordinated into a single manufacturing, R&D, or testing effort. A small site may contain only a single plant in this context. A scrap recovery operation servicing offsite customers or more than one plant should be treated as a separate plant. Discuss the principal parameters that were considered in the selection of plant areas, including physical, technical, process, and administrative considerations.

4.1.2 Internal Control Areas

By reference to the site description and the process flow diagrams provided in Appendix A and other suitable means, identify the designation, location, and boundaries of each MBA and ICA. Care must be taken to assure that there is no overlap.

4.1.2.1 Process Boundaries. Describe the process boundaries, including identification of the processes and unit operations that are included in each control area. Identify all process flows entering and leaving the control areas, including main process, scrap, waste, and recycle flows and intermediate storage.

4.1.2.2 Physical Boundaries. Describe the physical boundaries, including identification of the actual physical barriers that exist around and between control areas. Such barrier identification could be a building name or number, room numbers within a building, or diagrams showing walls or grids dividing a process area or room into control areas. Identify access points in the physical boundaries for all material flows.

4.1.2.3 Selection Criteria. Discuss the principal parameters that were considered in the selection of each control area. Present an analysis of the loss or theft detection capability of each MBA, along with analyses to show how the selected control areas provide for localization of losses or thefts of special nuclear material and for identification of the mechanism for any such loss or theft.

CHAPTER 5 MEASUREMENTS

In this chapter, identify and describe the various measurements that are to be used in special nuclear material control and accounting. Describe the measurement procedures and equipment involved in each measurement, including an explanation of how the equipment is used to make the measurement. Include statements of the measurement uncertainties expected for the various measurements.

5.1 General Description

In this section, provide a general description of the measurement system for each plant.

5.1.1 Measurement Points

On a plant basis, identify each point where measurements are made for purposes of special nuclear material control and accounting. Refer to the flow diagrams provided in Appendix A, as appropriate.

5.1.2 Materials and Measurements

Characterize the materials and measurements for each measurement point. One suitable means of presentation would be a coded chart showing the types of materials and the components of measurement involved at each measurement point (weight, volume, sampling, analytical assay, or nondestructive assay).

5.2 through 5.6 Detailed Measurement Systems

In Sections 5.2 through 5.6, describe in detail each of the measurements and measurement systems to be used at the site for special nuclear material control and accounting. A separate section should be devoted to each type of measurement system as follows:

5.2 Mass Measurements

5.3 Volume Measurements

5.4 Sampling Systems

5.5 Analytical Measurements

5.6 Nondestructive Assay Measurements

5.n Others, as appropriate

Each of these sections should be structured to present information using the following subsections.

5.2*.1 Systems Identification

Identify all of the measurement systems of a specific type to be used at the site for special nuclear material control and accounting. Relate each measurement system to the measurement points identified in Section 5.1.

5.2*.2 Measurement Systems

Discuss each measurement system of the specific type identified in Subsection 5.2*.1 above in sequential order (e.g., 5.2.1, 5.2.2, 5.2.3, 5.2.4, etc.) using the following subtopics.

5.2*.2.1 General Characteristics. Describe each measurement system, including descriptions of the principal equipment involved and sampling or measurement methods and techniques used. Refer to drawings, diagrams, and documents, as appropriate.

5.2*.2.2 Rationale. Discuss the rationale for selection of the described measurement system.

5.2*.2.3 Design. Describe the design bases, criteria, and features of each system that ensure the ability to provide reliable, precise, and accurate measurements. Identification and discussion of design considerations for the various types of measurements systems should include the assumptions made in developing design bases and criteria, including statements of the expected random and systematic errors used as design criteria. Discussion of design features should include information regarding such items as environmental controls required for specific measurements or measurement systems, modifications to standard designs that might have been made, and assumptions or criteria regarding linear operating regions for volume measurement systems or nondestructive assay systems (see also Chapter 1, Section 1.1.3).

5.2*.2.4 Preoperational Testing. Discuss the preoperational tests and evaluations that will be performed before each measurement system is committed to special nuclear material measurements. List the criteria that will be used for qualifying each system.

The completed presentation for Sections 5.2 through 5.6 should follow the following format:

5.2 Mass Measurements

5.2.1 Mass Measurement Systems Identification
5.2.2 Mass Measurement No. 1
- 5.2.2.1 General Characteristics
- 5.2.2.2 Rationale
- 5.2.2.3 Design
- 5.2.2.4 Preoperational Testing

*Numbered 2 through 6 for the respective types of measurement systems.

5.2.3 Mass Measurement No. 2
- 5.2.3.1 General Characteristics
- 5.2.3.2 Rationale
- 5.2.3.3 Design
- 5.2.3.4 Preoperational Testing

5.2.4 Mass Measurement No. 3
etc. for each mass measurement.

5.3 Volume Measurements

5.3.1 Volume Measurement Systems Identification
5.3.2 Volume Measurement No. 1
- 5.3.2.1 General Characteristics
- 5.3.2.2 Rationale
- 5.3.2.3 Design
- 5.3.2.4 Preoperational Testing

5.3.3 etc. for each volume measurement.

5.4 Sampling Systems

5.5 Analytical Measurements

5.6 Nondestructive Assay Measurements

Additional sections may be added, as appropriate.

5.7 Measurement Uncertainties

In this section, list, by plant, the expected measurement uncertainties of the described measurement systems. For each measurement point and type of material identified in Section 5.1, state the expected random and systematic errors of each component of measurement (weight, volume, sampling, analytical assay, or nondestructive assay) on the basis of a single determination. The confidence levels at which, and units in which, the errors are expressed should be identified clearly.

5.8 Measurement Procedures

Affirm that a special nuclear material measurements procedures manual will be established and maintained. Identify the organizational units responsible for the preparation, modification, and approval of measurement procedures and the periodic review of the procedures manual.

CHAPTER 6 MEASUREMENT CONTROL PROGRAM

An ongoing quality assurance program for special nuclear material measurements is required by paragraph (f) of §70.58 of 10 CFR Part 70 to control measurement performance and to provide current data for the determination of measurement uncertainties. In this chapter, provide a detailed description of the measurement Quality Assurance Program. If contractors are to be used to provide measurement services, their measurement Quality Assurance Programs should be described and assurance provided that an acceptable level of measurement control will be maintained.

6.1 Organization and Management

This section should describe the organizational relationship, showing in particular how the special nuclear material measurement quality assurance function is assigned so that it is independent of the analytical laboratory and operating departments and is at a level to assure objectivity and independence of action.

6.1.1 Functional Assignment

In this section, show how the position assigned responsibility for the measurement Quality Assurance Program is related to the positions responsible for the analytical laboratory or other functions responsible for processing and measuring special nuclear material. Show the relative management level at which the measurement quality assurance function is assigned. Personnel qualifications for the measurement quality assurance function also should be set forth.

6.1.2 Procedures

Affirm that a special nuclear material measurements quality assurance manual will be established and maintained. Identify the organizational units responsible for the preparation, modification, and approval of measurement quality assurance procedures and the periodic review of the manual.

6.1.3 Management Review

Describe the program established for the conduct of an annual management review of the measurement quality assurance program.

6.1.4 Internal Audits

Describe the auditing program established to determine compliance with the measurement quality assurance procedures. Indicate the frequency for conducting program audits.

6.1.5 Contractor Program Audit

If measurement services are provided by an outside contractor or another company laboratory, describe the audit program established to monitor such offsite performance. Specify the frequency of such audits.

6.2 Calibration and Standards

Accurate measurement of special nuclear material requires a system of standards and calibrations for the determination of bias and systematic errors for all special nuclear materials measurements, including mass, volume, analytical, and nondestructive measurements.

6.2.1 Reference Standards

Identify and describe the use and control of each type of reference standard used in this measurement calibration program.

6.2.1.1 Listing. Provide a list of all the standards to be used in this measurement program, including mass, volume, analytical, and nondestructive testing standards.

6.2.1.2 Certification. Identify the source of and describe the certification plan for each standard, including the frequency of certification and recertification. Discuss the bases for selection of the recertification intervals.

6.2.1.3 Traceability. Indicate the traceability of each standard to the national system of measurements and standards or to a natural physical constant.

6.2.1.4 Representativeness. Discuss the representativeness of each standard with respect to the measurement system in which it will be used.

6.2.1.5 Controls. Explain the controls to be employed to ensure continued validity of the standard values, e.g., environmental controls such as storage in controlled atmosphere or use controls such as use only by designated personnel.

6.2.2 Standard Measurements

Describe the program for standard measurements to be made during a material balance interval for each measurement system. The description should include:

1. The minimum number of standard measurements for each material balance interval,
2. The schedule for the standard measurements,
3. The basis for the schedule,
4. The approximate number of technicians associated with the standard measurements, and
5. Explanation of how the standard measurements will be performed so that they will be representative of routine measurement performance.

6.2.3 Calibration Systems

Describe the calibration method to be used for each measurement system.

The descriptions should include:

1. The minimum number of calibration runs for the initial calibration,

2. The range of the calibration, its adequacy and basis for selection,

3. Identification of the standards to be used, with references to Section 6.2.1, as appropriate,

4. The schedule for recalibration, including the minimum frequency, and

5. The criteria to be used to determine the need for recalibration.

6.2.4 Statistics

Discuss how the standard measurements data and calibration data will be used to determine measurement biases and systematic errors, and the measurement errors of calibration. Describe the procedures to be used to make bias corrections. Describe the basic statistical methodology and techniques to be used.

6.3 Sampling Accuracy

Establishment of accurate and representative sampling procedures requires that process and engineering studies be performed to establish procedures for mixing and sampling bulk materials and for maintaining sample integrity during transport and storage. In this section, describe such process and engineering studies for each measurement system, as appropriate, including procedures for monitoring the continued accuracy of the systems. Refer to preoperational testing procedures given in Section 5.4.2.4, as appropriate.

Any use of standards in such studies also should be discussed. Describe how the results of such studies will be used to determine sampling accuracy, including the statistical methodology and techniques used.

6.4 Measurement Precision

The determination of random errors in sampling and measurements requires that the measurement quality assurance program include a system of control measurements that provide current data on which to base the determination.

6.4.1 Program Description

Describe the program or replicate sampling and measurements to be used for the determination of random errors for each measurement system. The descriptions should include:

1. Procedures for replicate sampling and analysis of process materials.

2. Procedures for replicate weight and volume measurements,

3. The minimum number of replicate samples and replicate measurements to be performed during a material balance interval,

4. The predetermined schedules on which the replications will be performed,

5. The basis for the schedules, including an analysis of their adequacy in relation to the limit of error requirements in §70.51 of 10 CFR Part 70, and

6. Description of how the program will provide for the determination of between-operator, between-equipment, and between-shift variances, as appropriate.

6.4.2 Statistics

Describe how the replicate data will be used to determine random errors of sampling and measurements, including the basic statistical methodology and techniques used.

6.5 Control Program

A reliable measurement system requires that a system of statistical tests or control charts be established and maintained to control measurement biases and errors within predetermined limits.

6.5.1 Basic Program

Describe the basic program to be established to monitor and control sampling and measurement performance. Identify and explain the system of statistical tests or control charts to be employed.

6.5.2 Control Limits

Explain how control limits for the statistical tests or control charts described above will be established and periodically updated, including the frequency with which current control data will be evaluated for updating control limits. Discuss the rationale and statistical bases for the system to be used. By position titles listed in Section 3.1.1, indicate the persons who have the authority for approving control limits.

6.5.3 Control Response

Describe the plan of action to be implemented when sampling or measurement performance falls outside of control limits, including procedures to assure that out-of-control measurement systems will not be used to generate materials accounting source data.

6.6 Records and Reports

In this section, provide a detailed description of the records and reports that will be established for the measurements quality assurance program, including records of measurement data generated in measurement calibration and testing programs, summaries of error data used in the limit of error calculations performed for each material balance period, statistical control records, and reports of corrective action taken as a result of system deficiencies.

CHAPTER 7 LIMITS OF ERROR

Section 70.51 of 10 CFR Part 70 requires establishment and maintenance of a system of measurements such that the limits of error for any MUF (LEMUF) do not exceed the values specified in paragraph 70.51(e)(5) of 10 CFR Part 70 or other limits authorized by the Commission pursuant to paragraph 70.51(e)(6), 10 CFR Part 70. In this chapter, summarize the capabilities of each measurement system to achieve the specified control limits. If the applicant cannot meet the specified limits for a plant, he should request higher limits in accordance with the provisions of paragraph 70.51(e)(6), 10 CFR Part 70.

7.1 LEMUF Models

In this section, submit error models for each individual material balance area and for each plant material balance to demonstrate the capability for obtaining an acceptable LEMUF. For each enrichment category of enriched uranium, separate models should be prepared for the element and for U-235; models for plutonium should be for the element only. These models should be submitted as an appendix to the application so that the models do not become license conditions. The application should include a summary statement based on the models showing how the respective plants will be operated in compliance with the LEMUF requirements in the regulations.

7.1.1 Material Quantities

Provide, on a plant basis, a listing of the typical flow quantities for special nuclear material during a material balance period, including the batch size and number of batches for each type of material. Refer to Section 5.1.2, as appropriate.

7.1.2 Samples and Analyses

State the typical number of samples that will be taken and the typical number of replicate analyses per sample that will be performed for each batch and type of material, as applicable. Refer to Sections 5.4 and 5.5, as appropriate.

7.1.3 Error Propagation

Describe the statistical methodology and techniques used for combining random and systematic error for material flow and inventory quantities to obtain limits of error for material balances, i.e., LEMUF. Discuss specifically how measurement covariances are treated and accounted for.

7.1.4 Modeling

The random and systematic errors from Section 5.7, the inventory quantities from Section 8.2, the material flow quantities from Section 8.2, the material flow quantities from Section 7.1.1, and the sample and analysis data from Section 7.1.2 should be combined, using the formula given in Section 7.1.3 to produce the required LEMUF models. Show all assumptions and calculations.

7.2 Requests for Higher LEMUF Limits

This section should be used to request higher limits for plant LEMUF values than those specified in paragraph 70.51(e)(5), 10 CFR Part 70. Pursuant to paragraph 70.51(e)(6), 10 CFR Part 70, the applicant is required to justify requests for higher limits for LEMUF and describe the program of improvement that will be initiated to meet the plant LEMUF limits of paragraph 70.51(e)(5), 10 CFR Part 70, at a later date.

7.2.1 Request

The applicant should state the requested higher limits for LEMUF and should provide the appropriate justification in this section.

7.2.1.1 Higher Limits. Submit the request for higher LEMUF limits on an individual plant basis.

7.2.1.2 Limitations. Identify and discuss the limitations that prevent attainment of the plant LEMUF limits specified in paragraph 70.51(e)(5), 10 CFR Part 70.

7.2.1.3 Rationale. Describe the rationale for selecting the LEMUF limits stated in Section 7.2.1.1 above.

7.2.2 Bases for Consideration

The applicant should use this section to provide information that will be useful in the consideration of the requested higher LEMUF limits.

7.2.2.1 Alternatives. Discuss process and measurement alternatives for minimizing each plant LEMUF limit within current measurement capabilities. Provide a cost/benefit analysis, as appropriate.

7.2.2.2 Improvement Program. Describe the program of improvement that will be implemented pursuant to paragraph 70.51(e)(6), 10 CFR Part 70. Delineate and discuss the specific actions that will be taken in the improvement program. Provide time schedules for implementation of the improvement program.

CHAPTER 8 PHYSICAL INVENTORY

Physical inventories are performed periodically to calculate a material balance for a given accounting interval and to adjust the accounting records to the physical inventory quantities. Section 70.51 of 10 CFR Part 70 requires that physical inventories be based on measurements and specifies intervals for various material types. Regulatory Guide 5.13, "Conduct of Nuclear Material Physical Inventories," discusses acceptable methods and techniques for conducting special nuclear material inventories. In this chapter, describe the physical inventory program for special nuclear material.

8.1 General Description

In this section, provide a general description of how a physical inventory is planned and conducted.

8.1.1 Basic Approach

Explain the basic inventory approach utilized at each of the plants. The information should include the types of physical inventories typically planned for material in process, including the extent of plant or process shutdown and cleanout. Should the applicant plan to perform portions of the physical inventory while process material is in a dynamic state, the information should include the extent to which the inventory would use such techniques as Process Blank, Tracer or Step Function, Counter-Current, or Process Parameter techniques as described in Regulatory Guide 5.13.

Cleanout inventories normally are required for the authorization of higher LEMUF limits granted pursuant to paragraph 70.51(e)(6), 10 CFR Part 70. The applicant should provide inventory details based on cleanout for those plants for which a higher limit is requested.

8.1.2 Schedules

Specify the physical inventory schedule for each plant. Discuss, as supporting information, any special considerations which affect the selection of inventory schedules.

8.1.3 Organization

Explain the makeup and duties of the typical physical inventory organization. Identify who would have the responsibility for the coordination of the physical inventory effort.

8.1.4 Procedures

Indicate how the preparation and modification of inventory procedures are to be controlled. Identify, by positions in the organization, the personnel who would have responsibility for the preparation and modification of inventory procedures. Affirm that specific inventory instructions will be prepared for each physical inventory.

8.1.5 Source Data

Describe how source data will be originated and retained on record to ensure that all items on inventory can be traced to measurements.

8.1.6 Forms Control

Discuss the controls to be exercised over the distribution and use of inventory forms.

8.2 Typical Inventory Composition

In this section, submit information describing a typical physical inventory for each material control area and plant. The information should include listings of typical quantities (including batch size) and types of materials expected to be in each MBA, in process, under tamper-indicating procedures, and as unopened receipts or as ultimate product. The listings should show the magnitude of the random and systematic errors expected to be associated with each line item.

8.3 Inventory Preparation

In this section, describe the detailed preparations that will be made for the taking of physical inventories.

8.3.1 Prelisting of Inventory

Describe programs, if any, that would provide for the prelisting of inventory, including practices for locating, identifying, and listing all items on inventory, including sealed sources.

8.3.2 Inventory Tags

Describe the use of inventory tags or other mechanism to facilitate accurate listing of inventory.

8.3.3 Cutoff Procedures

Describe the cutoff procedures to be used for processing and transferring special nuclear material and for the material records to ensure an accurate recording of material transactions and inventory items. Explain the controls to be exercised over the movement of material into and out of material control areas during the time of inventory.

8.3.4 Special Processing

Identify and discuss plans for the processing of material to specific physical forms and measurement locations preferred for inventory taking.

8.3.5 Inventory Reduction

Explain any plans for the reduction of plant inventories at times of physical inventory.

8.3.6 Cleanout

Describe in detail any plans for the draindown or cleanout of inventory from processing areas in preparation for physical inventories.

8.4 Conduct of Inventory

In this section, discuss the detailed plans for conducting a physical inventory.

8.4.1 Item Inventories

Provide details on how items are to be inventoried, including procedures for assuring that no item is listed more than once and none are omitted. Indicate whether items are to be inventoried by identification or piece counting. Describe the use of tamper-safing, as appropriate, for the inventory of the special nuclear material content of items.

8.4.2 Current Measurements

Provide a detailed listing of typical measurement points for a physical inventory and descriptions or references to the measurement methods to be used, including the use of calibrated vessels and equipment and nondestructive assay methods, as appropriate.

8.4.3 Prior Measurements

Indicate the bases for acceptance of prior measurements for physical inventory, including a description of the application of tamper-safing techiques. Provide a detailed listing of locations where, typically, material will be inventoried on a prior measurement basis.

8.4.4 Use of Factors

State the bases for the use of inventory factors. Explain how the factors are to be developed and controlled on the basis of measurements.

8.4.5 Residual Holdup

Characterize the residual holdup of material in processing lines, tank heels, equipment, hoods, and ventilation ducts. Describe how these materials are to be inventoried or determined to be insignificant.

8.4.6 Post-Inventory Inspection

Describe procedures that are to be used for the followup inspection of inventory areas to assure that all materials in the area have been inventoried, including cutoff verification and list and tag checks.

CHAPTER 9 MATERIAL ACCOUNTING SYSTEM

Paragraph (k) of §70.58 of 10 CFR Part 70 requires licensees to maintain a system of records and reports that will provide information sufficient to locate special nuclear material and to calculate a measured material balance around each material balance area and the total plant. To meet the material balance requirements of §70.51 of 10 CFR Part 70, the accounting for uranium must be on the basis of element and fissile isotope, with separate accounts for each enrichment category. Accounting for plutonium is required for the element only. In this chapter, describe the special nuclear material accounting system, including the associated reporting system.

9.1 System Description

In this section, describe the details of the basic special nuclear material accounting system. A centralized accounting system employing double-entry bookkeeping must be established and maintained. Subsidiary accounts must be established for each material balance area and item control area.

9.1.1 Account Structure

Describe the double-entry records system in terms of the general and subsidiary ledgers and journals, together with a chart of accounts. Identify and describe the records which will be maintained of additions to and removals from the process and of the quantities of material in unopened receipts and ultimate product maintained under tamper-safing or in the form of sealed sources.

9.1.1.1 Accounting Forms. Identify and describe the basic accounting forms that will be used for recording and transmitting accounting data, including source data.

9.1.1.2 Flow Chart. Provide a flow chart of the records and documents used for special nuclear material accounting, including: (1) the physical flow of documents, (2) the posting points, and (3) the data retention points.

9.1.2 Accounting Procedures

Affirm that an accounting procedure manual will be established and maintained. Identify, by position titles, those individuals who have responsibility for the initial preparation and the periodic updating of the manual. Indicate what approvals are required.

9.1.3 Source Data

Define the specific source data that will be used as the basis of original entry to the accounting records. Such information should cover external receipts and shipments, internal transfers between MBAs and ICAs, waste or scrap transfers or removal, inventories, and adjustments to any of these.

9.1.4 Adjustments to Records

Describe the methods whereby adjustments to prior recorded values are made, including the forms or records used and the approvals necessary.

9.1.4.1 Bias Adjustments. Explain how bias adjustments for measurements are incorporated into the accounting system.

9.1.5 Inventory Reconciliation

Describe the accounting methods for reconciling the accounting records to physical inventory quantities, including the records used and the approvals required. Provide a flow chart of the adjustment proceedings.

9.1.6 Account Reconciliation

Describe the procedures for and frequency of reconciliation of subsidiary accounts with control accounts, including the approvals required for adjustments and responsibilities for making the reconciliations and adjustments. Should the chart of accounts be set up by project, or any designation other than by MBA/ICA, discuss how the project accounts will be closed to MBA/ICA and plant accounts.

9.1.7 Location and Identity Records

Describe the records and reports used to provide information relative to the identity and location of special nuclear material items. Explain the interface of this system with the material accounting system, if any. Identify by position titles those individuals responsible for the various parts of this system.

9.1.8 Electronic Data Processing

Define the extent, if any, to which special nuclear material reports, accounts, or inventory data are processed by electronic data processing systems. As appropriate, describe the design bases and features covering the installation of electronic data processing capabilities. Outline the preoperational testing that will be performed.

9.2 Records and Reports

In this section, identify and describe the reports that will be generated by the accounting system for the reporting and control of special nuclear material. The short-term and long-term storage of records and reports also should be discussed.

9.2.1 Accounting Reports

Provide a listing and description of the reports that will be generated by the special nuclear material accounting system. Explain the data bases for the preparation of each report.

9.2.1.1 Material Balance Reports. Affirm that material balance reports containing all the information required in paragraph 70.51(e)(4), 10 CFR Part 70, shall be completed within 30 calendar days after the start of each ending inventory required by paragraph 70.51(e)(3), 10 CFR Part 70.

9.2.1.2 Material Status Reports. Affirm that material status reports will be submitted in accordance with the requirements of §70.53, 10 CFR Part 70.

9.2.2 Accounting Records

Identify by title the accounting documents that will be retained as a part of the accounting record, including source data documents.

9.2.3 Short-Term Storage

Describe the short-term disposition and storage of all special nuclear material accounting documents, forms, and reports, including source data documents. Explain the physical and administrative controls that will be implemented to limit access to and protect the integrity of these records.

9.2.4 Long-Term Storage

In this section, describe the storage system that will be utilized for the long-term retention of the records required by paragraphs (e)(4) (iii), (iv), and (v) of §70.51, 10 CFR Part 70. Specify the physical form in which the material balance records will be kept. Describe the file system for the stored documents. Discuss the system of access control.

9.3 Audits

In this section, describe the auditing program for the special nuclear material accounting system. Specify the frequency for regular audits and describe the documentation that will be prepared and kept available at the site for inspection for a period of five years.

CHAPTER 10 INTERNAL CONTROL

In this chapter, discuss the internal control practices for special nuclear material. Procedures used in receiving, storing, transferring, and shipping of special nuclear material should be described.

10.1 Material Receipt

In this section, describe the control procedures established for the receipt and verification of offsite shipments of special nuclear material.

10.1.1 Receiving Procedure

Present a summary description of how materials are received, stored, and measured. Discuss the technical justification for each sampling plan.

10.1.2 Shipper-Receiver Comparisons

Identify and describe the shipper-receiver comparisons that are made to verify the identification and the quantity of special nuclear material received, including packaging, labeling, item count, measurement, and document checks.

10.1.3 Acceptance Criteria

List the criteria for accepting special nuclear material on both an item or batch, and total shipment basis, including the statistical technique used for evaluating shipper-receiver differences by individual shipment, shipment series, and individual lot or container.

10.1.4 Conditions for Transfer

Describe the conditions for releasing special nuclear material to operating components.

10.1.5 Records

Discuss the records that are kept of shipper-receiver comparisons, evaluations, and investigations. Affirm that shipper-receiver records are kept on file for a period of at least five years.

10.2 Internal Transfers

In this section, provide a general description of the internal control procedures for the transfer of special nuclear material within the site. Describe the documentation and signature requirements.

10.2.1 Timeliness

Describe the controls exercised to assure that original source data documents are executed at the time special nuclear material passes to or from an MBA or an ICA, and that such data are entered promptly and accurately into the records system.

10.3 Storage and Item Control

Discuss the system of storage and internal handling controls established to provide current knowledge of the identity, quantity, and location of all special nuclear material contained within a site in discrete items and containers.

10.3.1 Program Coverage

Identify all of the types of items and containers that will be covered by this program. Explain any exclusions.

10.3.2 Identification

Explain how the controlled items are to be uniquely identified.

10.3.3 Quantity Determination

For each type of item, explain how the quantity determination will be made.

10.3.4 Records

Describe the inventory records that will be utilized for recording the identity, location, and quantity of special nuclear material on inventory. Explain what records will be employed for recording the source and disposition of all items.

10.4 Tamper-Safing Program

If applicable, describe in this section the program to be followed for establishing and maintaining tamper-indicating devices applicable to containers and vaults containing special nuclear materials.

10.4.1 Types of Devices

Provide a listing and description of the types of devices used for vaults and for the various types of containers. Design information should be submitted, as appropriate. For pressure-sensitive seals, the criteria listed in Regulatory Guide 5.10 should be addressed. Submit two samples of each type of seal with the application.

10.4.2 Indicating Features

Describe the tamper-indicating features of the devices listed in Section 10.4.1 above.

10.4.3 Application

Indicate how each type of device is to be applied to assure the protection of the various types of containers and vaults.

10.4.4 Identification

Describe the identification system to be used for the tamper-indicating devices.

10.4.5 Access

Discuss the plan to be used for limiting personnel access to the devices prior to issuance.

10.4.6 Control

Describe the procedures to be used in the issuance, application, and disposal of the tamper-indicating devices. Discuss how the control officer assures that the devices are properly applied, including the recording of time and location.

10.4.7 Records System

Describe the records system to be used for the control and application of the tamper-indicating devices.

10.4.8 Monitoring Program

Explain the monitoring program for periodically verifying the presence and integrity of tamper-indicating devices in use.

10.4.9 Response

State the plan of action to be followed when it has been determined that the integrity of a tamper-indicating device has been compromised.

10.5 Scrap and Waste Control

In this section, discuss the program for the control, processing, and disposition of scrap and waste.

10.5.1 Location

Identify the scrap and waste quantities of contained special nuclear material with respect to source, storage, and disposition. Refer to process flow charts and plant operations descriptions. Identify storage areas and capacities for scrap and waste.

10.5.2 Processing and Storage

Estimate the rate of generation of scrap and waste for each plant under startup and normal processing conditions. Estimate the rate of recovery of scrap, and indicate the average amount of special nuclear material in the form of scrap expected to be in storage at any given time. Describe any programs for offsite shipment and recovery of scrap, as appropriate. Describe procedures for the control and discard of wastes containing special nuclear material, including procedures and capabilities for storage prior to discard.

10.5.3 Measurement

Describe the procedures for determining the special nuclear material content of scrap and waste, including the criteria and procedures for segregation, identification, and classification of various kinds of scrap to facilitate measurement and procedures used to monitor waste streams not normally expected to contain special nuclear material. Identify quantities of scrap that will have measurement uncertainty of greater than ±10% (limit of error). Refer to the appropriate parts of Chapter 5.

10.5.4 Inventory Control

Describe the control program that will be implemented to limit the accumulation of scrap so that no item of scrap generated in the licensee's plant measured with an uncertainty of greater than ±10 percent remains on inventory longer than six months when such scrap contains plutonium (except plutonium containing 80 percent or more by weight of the isotope Pu-238), U-233, or uranium enriched 20 percent or more in the isotope U-235 or longer than twelve months when such scrap contains uranium enriched less than 20 percent in the isotope U-235 or plutonium containing 80 percent or more by weight of the isotope Pu-238.

10.6 Shipping

In this section, describe the control procedures established for the offsite shipment of special nuclear material.

10.6.1 Internal Transfer

Indicate the type of measurement data and tamper-safing information provided to the group responsible for making special nuclear material shipments.

10.6.2 Overchecks

Describe the type of overchecks, including any measurements, that are made by the shipping group.

10.6.3 Records

Discuss the types of records maintained by the shipping group.

CHAPTER 11 MANAGEMENT

Paragraph (c) of §70.58 of 10 CFR Part 70 requires that licensees establish, maintain, and follow a management system to provide for the development, revision, implementation, and enforcement of special nuclear material accounting procedures. In this chapter, describe the management system to be used to comply with this requirement.

11.1 Procedures

In this section, describe the management system which provides for written approval of special nuclear material control and accounting procedures and any revisions thereto, including identification, by position title, of the individuals responsible for preparing and approving such procedures.

11.2 Enforcement

In this section, describe the management systems used to assure compliance with the approved facility procedures and government regulations.

11.2.1 Management Review

Describe the scope, extent, and frequency of the management review of the conduct of the special nuclear material control and accounting program, including identification, by position title, of the individuals who will be responsible for such review. A regulatory guide on management review of nuclear material control and accounting programs (now in preparation) will provide guidance on the conduct of such reviews.

11.2.1.1 Report. Indicate, by position title, the individuals who receive reports of the results of the management review.

11.2.1.2 Action. Discuss the procedures used to assure that the recommendations are reviewed by management and appropriate action is taken.

11.2.2 Measurement Controls

Describe the plan of action to be followed when measurement performance exceeds established control limits. By position titles listed in Section 3.1.1, indicate assignments of responsibilities and authorities for action in response to out-of-control indications. The description should include identification of specific actions to be taken, organizational positions to be notified, circumstances under which site management and the AEC would be notified, and the reports to be made.

11.2.3 Shipper-Receiver Differences

Describe the plan of action to be followed when a significant shipper-receiver difference has been discovered for an individual shipment, a series of shipments, or an individual lot or container. The description should include identification, by position titles, of individuals responsible for action, individuals to be notified, specific actions to be taken, and reports to be made. Refer to Sections 10.1.2 and 10.1.3, as appropriate.

11.2.4 Material Balance Discrepancies

Describe the plan of action to be followed when MUF exceeds LEMUF, including identification, by position title, of individuals responsible for action, individuals to be notified, specific actions to be taken, and reports to be made. Refer to Chapter 7, as appropriate.

11.2.5 Item Discrepancies

Describe the plan of action to be followed when an item or container of special nuclear material is reported to be missing, including identification, by position title, of individuals responsible for action, individuals to be notified, specific action to be taken, and reports to be made.

CHAPTER 12 PRODUCTION DOCUMENTATION AND VERIFICATION
(Supplement for Uranium Enrichment Facilities)

An application for a license to possess special nuclear material at a uranium enrichment facility licensed pursuant to 10 CFR Part 50* should be supplemented with the additional information identified in this chapter. Uranium enrichment facilities are designed specifically to produce special nuclear material. Consequently, in addition to implementing measures to assure that special nuclear material in his possession is not stolen, a licensee operating a uranium enrichment facility should also provide information which provides assurance that measures can be implemented to protect against surreptitious production of special nuclear material. Such assurance requires a material balance on the material in process and an accounting for the separative work, supplemented by appropriate confirmatory data.

12.1 Material Balances For Material In Process

In this section, describe the procedures that will be used for measuring, calculating, and statistically analyzing the amount of material in process on a monthly basis.

12.1.1 In-Process Inventory

List the nominal design amounts of uranium and U-235 in process equipment, connecting piping, and support equipment such as traps, pump oils, etc. List the amounts separately for each type and size of equipment. Describe how these quantities will be measured at inventory time. Refer to the flow diagrams provided in Appendix A, as appropriate.

12.1.2 Feed and Withdrawal Cutoff

Describe the procedures that will be used to measure and record the quantities of uranium and U-235 at the time of inventory cutoff in each feed and withdrawal cylinder connected to the cascade.

12.1.3 Calculation of Material Balance

Affirm that a material balance for the in-process material shall be calculated monthly. (Note that the inventory and material balance requirements for the total plant, which are contained in paragraph 70.51(e) of 10 CFR Part 70, must also be met.)

12.1.4 Analysis of Data on Material Unaccounted For

Describe the method that will be used for analysis of the historical, cumulative, and current data on the uranium and U-235 material unaccounted for (MUF) in the process to demonstrate normal (as licensed) operation. Explain how the short-term perturbations caused by the periodic recovery of material from equipment will be treated in the analysis.

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*Part 52, currently in preparation, would, if adopted, contain requirements specific for the licensing of uranium enrichment facilities.

12.2 Separative Work

In this section, describe the procedures that will be used for calculating the separative work done by the process.

12.2.1 Value Function

Define mathematically the value function that will be used for calculation of separative work, and state the reason(s) for the selection of the value function chosen.

12.2.2 Calculation of Separative Work

Describe the procedures and records that will be used to account for separative work, including that in the material unaccounted for calculated from the in-process material balances done in accordance with Section 12.1.

12.3 Parametric Correlations

In this section, indicate the provisions that will be made for acquiring the prescribed confirmatory data.

12.3.1 Consumption of Electricity by Process

Describe the means that will be used for measuring electrical consumption by the process. Include a schematic description of the electrical distribution in the process building(s), with voltages, showing the points where electrical consumption of the process is measured. Estimate the quantity of electricity included in this measurement that is not used in the process (e.g., that used in lighting, ventilation, etc.)

12.3.2 Power Utilization Index

Estimate the power utilization index (PUI), defined as separative work units/megawatt-day. Describe the basis for that estimate and the procedures planned to verify the estimate. Affirm that the PUI will be determined weekly during initial operation of the plant.

12.3.3 Time-Line Analysis

Describe the procedures that will be used to identify and record the time when feed is commenced and terminated from each feed cylinder and when withdrawals are commenced and terminated in each product and tails cylinder. Also, describe the procedures that will be used to identify the feed or withdrawal point for each such cylinder.

12.3.4 Measurement of Minor Isotopes

Describe the provisions that will be made for measuring and recording the content of minor isotopes (U-234 and U-236) for each feed and product or tails withdrawal.

12.4 Records and Evaluation

In this section, describe the records that will be kept in connection with the measurements and calculations provided for in this chapter and the use to be made by management of such data.

12.4.1 Records Retention

Indicate the length of time that records discussed in this chapter will be retained.

12.4.2 Records Availability

Describe the procedures that will be used to ensure that records discussed in this chapter will be available for inspection by Commission inspectors.

12.4.3 Control Limits

Describe the procedures that will be used to set control limits on current in-process material unaccounted for (uranium and U-235), cumulative material unaccounted for, and power utilization index, and the management action that will be taken when any control limit is exceeded.

APPENDIX A SITE DESCRIPTION

General Description

In this section, provide a general description and physical layout of the site and its operations. The various plants and support functions should be identified. Provide drawings and narrative as necessary to convey the overall involvement with special nuclear material. Explain the typical distribution of special nuclear material within the site, taking into consideration the various operations and storage areas.

Plant Operations

In this section, provide a detailed description of plant operations, manufacturing processes, chemical flowsheets, and material flows. Present the description of each of the processes in narrative and flow diagram form. Describe each process in terms of feed materials, intermediate and final products, recycle, scrap, and waste materials. Identify gaseous, liquid, and solid effluents which could but do not normally contain special nuclear material. Identify and describe points in each of the processes where chemical and physical changes or blending of enrichment categories of special nuclear material occur.