

## **11.0 MANAGEMENT MEASURES**

Management measures are functions that are applied to items relied on for safety (IROFS) to provide reasonable assurance that the IROFS are available and reliable to perform their functions when needed. The phrase “available and reliable,” as used in 10 *Code of Federal Regulations* (CFR) Part 70, means that, based on the analyzed, credible conditions in the Integrated Safety Analysis (ISA), IROFS will perform their intended safety function when needed to prevent accidents or mitigate the consequences of accidents to an acceptable level. Management measures are implemented to provide reasonable assurance of compliance with the performance requirements, considering factors such as necessary maintenance, operating limits, common-cause failures, and the likelihood and consequences of failure or degradation of the IROFS and the measures. This chapter addresses each of the management measures included in the 10 CFR Part 70 definition of management measures, i.e., configuration management (CM), maintenance, training and qualifications, procedures, audits and assessments, incident investigations, records management, and other quality assurance (QA) elements. Management measures are applied in a graded approach. The degree to which management measures are applied to the IROFS is a function of the item’s importance in terms of meeting the performance requirements as evaluated in the ISA.

### **11.1 Configuration Management**

The Configuration Management (CM) Program for the American Centrifuge Plant (ACP) is described in the following paragraphs.

#### **11.1.1 Configuration Management Policy**

In accordance with 10 CFR 70.72, a CM Program is implemented to ensure that changes from the plant baseline configuration are identified and controlled to help ensure safety through consistency among the plant design and operational requirements, the physical configuration, and the plant documentation. The CM Program includes:

- Identification and documentation of IROFS;
- Organizational descriptions of duties and responsibilities; and
- Administrative controls, procedures and policies, to implement and document activities that maintain the plant’s configuration.

The goal of the CM program is to ensure that the ACP has accurate, current documentation that matches the plant’s physical/functional configuration, while complying with applicable requirements.

#### **11.1.1.1 Program Overview**

The Engineering Manager has primary responsibility for the implementation of the CM Program for the ACP. The CM Program is applicable to the plant, structures, processes, systems, equipment, components, computer programs, and activities of personnel, regardless of the item's Quality Level (QL) classification.

CM Program procedures provide for a graded application of resources taking into consideration:

- QL (risk significance);
- Applicable regulations, industry codes, and standards;
- Complexity or uniqueness of an item or activity and the environment in which it has to function;
- Quality history of the item in service;
- Degree to which functional compliance can be demonstrated or assessed by test, inspection, or maintenance methods;
- Anticipated life span;
- Degree of standardization;
- Importance of data generated;
- Reproducibility of results; and
- Consequence of failure.

QLs are established in accordance with their importance to safety as follows:

#### **Level Criteria**

QL-1 A single IROFS that prevents or mitigates a high consequence event.

QL-2 Where two or more IROFS are credited to prevent or mitigate a high consequence event; or any single IROFS that prevents or mitigates an intermediate consequence event.

QL-3 Any item other than QL-1 and QL-2; QL-3 items are controlled in accordance with standardized commercial practices.

The CM Program implementing procedures provide a management system to evaluate, implement and track each change to the plant, structures, processes, systems, equipment, components, computer programs, and activities of personnel. Procedures are utilized to ensure that the following items are addressed, in accordance with 10 CFR 70.72(a)(1) through (6), prior to implementing any change:

- The technical basis for the change;
- Impact of the change on safety and health or control of licensed material;
- Revisions, if required, to existing operating procedures, including any necessary training or retraining before operation;
- Authorization requirements for the change;
- For temporary changes, the approved duration (i.e., expiration date) of the change; and
- The impacts or modifications to the ISA, ISA Summary, or other safety program information that is part of this application.

#### **11.1.1.2 Key Program Responsibilities**

The following responsibilities are identified by the responsible ACP manager and functional area:

##### **11.1.1.2.1 Engineering Manager**

###### **Engineering**

- Manages the CM Program.
- Is the plant Design Authority (DA) responsible for:
  - Establishing the design requirements;
  - Ensuring design output information (documents and data) appropriately and accurately reflects the design input; and
  - Maintaining the plant's ISA and ISA Summary.
- Performs design/modification processes that implement the design control and design change control requirements established in the Quality Assurance Program Description (QAPD) for the American Centrifuge Plant, which includes controls for design inputs, design verification (including analysis software), design changes, design interfaces and design documentation and records.

- Manages the Temporary Change Process.
- Identifies and defines IROFS as part of the ISA process.
- Performs reviews of facility changes in accordance with the requirements of 10 CFR 70.72.
- Establishes inspection and acceptance criteria for IROFS.
- Ensures that appropriate documents and procedures are updated to be consistent with modifications.
- Issues the documentation that defines boundaries for IROFS in the CM Program.
- Establishes and maintains a controlled database for IROFS information.
- Assists in work package preparation and identification of post-maintenance test requirements to assure that the critical design characteristics of IROFS are satisfied.

#### **Records Management and Document Control**

- Develops and operates a Records Management and Document Control (RMDC) program that controls and issues designated documents and acts as the repository with retrieval capabilities for controlled documents and records necessary to maintain the plant's design history.
- Maintains an index of documents and software that are required to be controlled.

RMDC is described in Section 11.7 of this license application.

#### **11.1.1.2.2 Procurement Manager**

- Develops procedures in accordance with the QAPD for procurement and control of items.
- Purchases IROFS and replacement parts only from authorized vendors and in accordance with the requirements and technical specifications as identified by the Engineering Organization.
- Ensures that only accepted IROFS are stored and issued for work.
- Maintains items in a manner that complies with Engineering issued requirements.

#### **11.1.1.2.3 Operations Manager**

- Ensures modifications are not made to a design or operational configuration without proper review and approval.

- Ensures pre-operational tests/checks, operational, post maintenance tests/checks and post-modification tests are performed and documented to assure IROFS are operating as intended.
- Ensures work requests or other authorizations are issued prior to maintenance, testing, or modification activities.
- Ensures the occurrence of tests, calibrations, and maintenance activities are recorded.
- Ensures approved procedures are used for operations involving the replacement or adjustment of IROFS.

#### **11.1.1.2.4 Maintenance Manager**

- Develops and implements procedures to execute a work control process which provides for:
  - Verification of data, performance or documentation where specified by the DA; and
  - Documentation of material used to ensure design specifications are met.
- Ensures maintenance personnel are knowledgeable of requirements for working on IROFS.
- Performs work on IROFS only after receiving issuance of an approved maintenance work package.
- Ensures modifications are not made to a design or operational configuration without proper review and approval.
- Identifies and transmits completed work packages for IROFS to RMDC in a timely manner.

Maintenance is described in Section 11.2 of this license application.

#### **11.1.1.2.5 Production Support Manager**

##### **Procedures**

The Procedures process is described in Section 11.4 of this license application. A procedures control program is utilized to ensure technical, operations, maintenance, and administrative procedures used to apply the CM Program processes are properly developed, reviewed, approved, revised, and controlled.

### **Training**

- Provides technical training support to plant personnel who are relied upon to operate, maintain, or modify IROFS.
- Provides training support to Engineering, Operations, and Maintenance personnel to ensure training is updated as a result of changes to the plant.

Training and Qualification is described in Section 11.3 of this license application.

#### **11.1.1.2.6 Quality Assurance Manager**

- Assists in the development and implementation of the acceptance process to assure that the critical design characteristics are satisfied for non-commercial grade IROFS.
- Assists in the acceptance process for commercial grade IROFS.
- Verifies that DA supplied acceptance criteria are met and that accepted items are appropriately identified.
- Establishes a program for in-process inspection of maintenance work packages in accordance with acceptance criteria contained in maintenance procedures or provided by the DA to assure that the critical design characteristics of IROFS are satisfied.
- Conducts audits and surveillances of processes that implement the CM Program, as specified by the QAPD.
- Audits vendors and suppliers in accordance with the QAPD.

#### **11.1.2 Design Requirements**

- Design requirements are developed to support safety functions, environmental impact-oriented functions, and mission-based functions.
  - IROFS are identified in the ISA Summary. Design requirements for IROFS or for other systems or components required to meet the baseline design criteria (BDC) as defined in 10 CFR 70.64 are developed in accordance with 10 CFR 70.64.
  - Other systems or components that support environmental impact-oriented functions and mission-based functions are identified in System Requirements Documents (SRDs).
- The design requirements to support the IROFS and other systems or components are developed by the Engineering Organization and documented in Design Criteria Documents for each plant/system. Prior to approval, these documents are reviewed to determine their adequacy, accuracy, and completeness.

- The DA approves Design Criteria Documents.
- After approval by the DA, the Design Criteria Documents and the ISA Summary, as well as Design Basis Documents, plant SRDs, and as-built drawings and specifications, provide the baseline configuration for the plant.
- Changes to any design basis or design requirements are modifications that are controlled by the change control process described in Section 11.1.4 of this license application.
- The Design Criteria Documents are controlled documents. When modifications result in changes to these documents, the changes are controlled in accordance with the RMDC requirements described in Section 11.7 of this license application.

### **11.1.3 Document Control**

Procedures, documents, and records control programs provide for centralized control and issuance of documents necessary for the maintenance of the ACP configuration and provide a repository for records to verify this maintenance. RMDC requirements are described in Section 11.7 of this license application.

#### **11.1.3.1 Procedures**

The procedure control program assures that procedures are generated, reviewed, approved, and distributed in a controlled manner. Section 11.4 of this license application describes the procedure control program.

#### **11.1.3.2 Records Management and Document Control**

A document control program ensures that changes to approved and controlled documents are:

- Issued in a timely manner;
- Distributed to controlled copy holders; and
- Maintained available to support daily work activities.

Controlled documents, in support of the CM Program, are identified in the procedures that require generation of the documents. RMDC personnel maintain an index of documents that are required to be controlled. The documents include, but are not limited to, such documents as:

- Procedures addressing activities affecting IROFS
- Design documents (e.g., drawings, analyses, and calculations)

- The IROFS database change records
- Engineering specification data sheets, which include the technical requirements, vendor data requirements, and the commercial grade dedication requirements
- The ISA Summary and other hazard analyses
- Procedures and plans addressing emergency operating and response plans
- Records to support maintenance and verification of the plant configuration such as:
  - Design modification packages
  - Acceptance records for receipt of material, shop and field inspection of work processes supporting maintenance, repair, and testing records
  - Maintenance, repair, and modification construction and installation work packages
  - Documentation used by Operations to record verification and test data

The RMDC Program is described in Section 11.7 of this license application.

#### **11.1.4 Change Control**

In accordance with 10 CFR 70.72, USEC Inc. (USEC) may make changes to the plant, structures, processes, systems, equipment, components, computer programs, and activities of personnel, without prior U.S. Nuclear Regulatory Commission (NRC) approval, if the change:

- Does not:
  - Create new types of accident sequences that, unless mitigated or prevented, would exceed the performance requirements of 10 CFR 70.61 and that have not previously been described in the ISA Summary; or
  - Use new processes, technologies, or control systems for which the licensee has no prior experience.
- Does not remove, without at least an equivalent replacement of the safety function, an IROFS that is listed in the ISA Summary;
- Does not alter any IROFS, listed in the ISA Summary, that is the sole item preventing or mitigating an accident sequence that exceeds the performance requirements of 10 CFR 70.61; and
- Is not otherwise prohibited by 10 CFR 70.72, a license condition, or an NRC order.



In accordance with the requirements of 10 CFR 70.72, the ACP implements change control processes for changes to the physical plant and for changes to procedures and controlled documents. These processes are described in Sections 11.1.4.1 and 11.1.4.2 of this license application, respectively. The Plant Safety Review Committee reviews appropriate changes to the ACP or to ACP operations, including tests and experiments, as specified in procedures. Procedures also specify the approval authority for the changes.

#### **11.1.4.1 Control of Changes to the Physical Plant**

The ACP has implemented a change control process using written procedures to control changes to the physical plant. This change control process meets the requirements established in 10 CFR 70.72 and in the QAPD. Key elements of the change control process are described in the following paragraphs:

- Requests for engineering assistance, after initiator's management approval, are forwarded to the DA for:
  - Review to determine if the proposed change is acceptable based upon scope, applicability, justification, and/or technical merit;
  - Engineering approval; and
  - Disposition and assignment to the appropriate Engineering discipline.
- Construction Project requests for plant modifications, additions, or changes have a 10 CFR 70.72 review performed to determine if the change can be made without prior NRC approval. Information utilized in the 10 CFR 70.72 review includes the following, as appropriate:
  - SRDs;
  - Conceptual design descriptions;
  - Drawings/specifications; and
  - Other documentation providing a project description.
- Modifications (permanent and temporary) are evaluated, as appropriate, for any required changes or additions to the plant's procedures, personnel training, testing programs, or the ISA Summary. Modifications are also evaluated, as appropriate, for potential radiation exposure, nuclear criticality safety (NCS), and worker safety requirements and/or restrictions. Other areas of consideration in evaluating modifications may include: modification costs, similar completed modifications, QA aspects, potential equipment availability or maintainability concerns, constructability concerns, environmental considerations, and human factors.

- Critical repair parts for IROFS are identified during the design process.
- Proposed plant changes receive an independent, technical review that considers the technical feasibility and merit of the proposed change and the identification of appropriate interfaces for inclusion in the change package (e.g., procedures, training, safety).

A final review prior to release for operation is conducted which verifies that:

- The safety analysis documentation is complete and approved
- Operational procedure changes, if required, are completed and other supporting procedure changes have been initiated
- Operational training and qualification changes, if required, have been completed
- Design changes are completed and any as-built changes are identified and approved
- Document changes, if required, are completed
- For temporary changes, the change duration is documented and the modified equipment tagged
- Post-modification testing has been successfully completed
- Appropriate approvals have been obtained

#### **11.1.4.2 Control of Changes to Procedures and Controlled Documents**

Changes to procedures and controlled documents are controlled in accordance with the programs described in Sections 11.4 and 11.7 of this license application, respectively.

#### **11.1.5 Assessments**

The CM Assessment Program systematically evaluates the development and effective implementation of the CM Program processes. It assesses the adequacy of the implementation of administrative requirements, the configuration of items, and their documentation. The CM Assessment Program includes both initial and periodic assessments. Both document assessments and physical assessments (system walk downs) are conducted periodically to confirm the adequacy of the CM function.

Initial assessments of the CM program are performed during readiness reviews of the ACP. The initial assessment provides for field verification of design requirements and design documentation, verification of procedures, and verification of training.

Periodic assessments of the CM Program are performed as part of the commitments contained in Section 11.5 of this license application and the QAPD.

Any deficiencies or recommendations for programmatic improvements are identified, documented, and addressed in accordance with the requirements established in the ACP's Corrective Action Program, described in Section 11.6 of this license application.

#### **11.1.6 Design Verification**

Many of the structures for the ACP were built by the U.S. Department of Energy (DOE) for the Gas Centrifuge Enrichment Plant program and are leased by USEC. Where the ACP uses existing structures, systems, or components (SSCs), the plant verifies that the design and construction of the existing SSCs meet the system design requirements for the plant.

The verification process includes:

- An assessment of the SSC is conducted to compare the configuration of the SSC with original drawings, construction specifications, and procedures to the extent possible and to determine the current condition of the SSCs to the extent possible. Where appropriate, system walk-downs are performed as part of the assessment.
- The assessment results are evaluated to determine if the existing SSC fulfills the requirements established by the SRD.
- If it is determined that the existing SSC does not fulfill the requirements established by the SRD, appropriate design changes are made so that the SSC meets design requirements.
- When it is verified that the SSC, or modified SSC, meets the requirements of the SRD, the SSC is incorporated into the Plant and baseline configuration information for the SSC is incorporated into the plant baseline configuration.

### **11.2 Maintenance**

The Maintenance Organization provides reliable and cost-effective maintenance of the ACP equipment. Maintenance programs related to corrective and preventive maintenance are established to provide a level of inspection, calibration, repair, replacement, and testing that ensures each IROFS will be available and reliable to perform its intended function.

### **11.2.1 Maintenance Organization and Administration**

The Maintenance Organization has policies, procedures, and programs that establish requirements and standards related to maintenance of plant equipment. These policies, procedures, and programs address:

- Personnel qualification and training
- Design/work control
- Corrective maintenance
- Preventive maintenance
- Surveillance/monitoring
- Post-maintenance testing
- Control of measuring and test equipment
- Equipment/work history

These requirements and standards are established for compliance with the QA and configuration management programs. Effective implementation and control of maintenance activities are achieved through application of these standards that are periodically reviewed and assessed for compliance.

The Maintenance Manager is responsible for the overall coordination and management of the organization to provide safe and efficient performance during maintenance of plant equipment.

Maintenance Supervisors are responsible for execution of maintenance on equipment. These responsibilities include:

- Supervision of craft personnel
- Coordination with support groups
- Ensuring that maintenance activities are appropriately planned in accordance with the work control process
- Qualification of personnel assigned to perform maintenance on equipment
- Review of work practices by craft for compliance with maintenance and plant safety procedures

Craft personnel are responsible for:

- Compliance with safety procedures while performing maintenance
- Compliance with maintenance procedures while performing maintenance
- Completion of documentation related to the maintenance activity

### **11.2.2 Personnel Qualification and Training**

The selection and qualification of personnel in the Maintenance Organization is documented and implemented through procedures. Qualification requirements are established for craft maintenance positions.

Qualification requirements for craft positions are established specific to each classification. Entrance examinations are administered to establish the level of knowledge of each candidate in the related field. Employees are required to successfully complete classroom and on-the-job training programs. An analysis of the responsibilities of each classification is performed to establish the content and type of training required for the position. This review considers each of the activities performed by each classification and the importance of that activity to safe operation of the ACP and maintenance of IROFS. Consideration is also given to the complexity of the activity, frequency performed by maintenance personnel, and the consequences if an error is made during the evolution. Skill-of-the-craft and availability of procedures or other approved technical documents that direct performance of the maintenance activity is also considered as part of this task analysis.

Contractors that work on or are performing activities that could affect IROFS follow the same maintenance guidelines as maintenance personnel. In addition, a member of the ACP organization provides oversight of contractor activities.

### **11.2.3 Design/Work Control**

Maintenance of ACP equipment is performed in a manner that maintains the documented configuration of plant systems. Prior to modification of systems, it is necessary to complete actions required by Section 11.1 of this license application. A work control process establishes the necessary control, review, and approval process to maintain the documented configuration of ACP systems.

The need for maintenance is identified when an equipment owner initiates a request for work or by the generation of preventive maintenance (PM) tasks or surveillances. The activity described by the request is evaluated to determine the class of work specified for the item requiring maintenance. The Engineering Organization classifies plant equipment to a specific QL. QLs are established in accordance with the equipment's relation to safety as determined by the ISA. Additional information regarding the graded approach taken to determine the QL of an item is found in Section 11.1 of this license application and in Section 2.0 of the QAPD.

The QL of an item requiring maintenance establishes the level of planning, extent of reviews, and approval required to perform the maintenance task. A work package is developed to direct and document maintenance activities involving QL-1 and QL-2 items. Work packages contain, as a minimum, a task description, approved work instructions or procedure, post-maintenance tests and equipment history documentation. The package contents may also include equipment drawings, vendor manuals, and safety permits. Compensatory actions are established prior to an IROFS being removed from service for maintenance.

Minor maintenance is defined as maintenance actions for simple deficiencies on electrical, instrument, and mechanical components or parts where several conditions are met:

- The work does not affect the safety-related function of the component.
- Material substitution will not be involved.
- Disassembly, which impairs the function of the component or part, will not be required.
- Welding will not be performed on equipment.
- A safety tag (lock-out/tag-out) will not be required.
- The work performed is of such a minor nature that written procedures or instructions are not required. However, if a procedure or instruction does exist, it may be used for reference.
- The work performed does not require post-maintenance testing.
- The work performed is of a simple nature such that detailed planning is not required.

Minor maintenance may be performed on equipment classified as QL-3. Such activities can normally be considered within the skill and training of the craft. These minor maintenance activities do not require work instructions, procedures, or development of a work package. A QL-3 work package is required when the maintenance activity would result in a change to or creation of a quality record or a change to the configuration of the system or for a complex evolution, even though working on a non-safety system.

The planning process addresses support required of other ACP organizations. The repair and/or replacement of IROFS are performed with like-for-like parts or substitute parts approved by the Engineering Organization. Modifications to ACP systems may only be performed following evaluation and approval of the Engineering Organization.

The work package to perform the maintenance activity is reviewed and approved by the appropriate disciplines. Appropriate technical and safety reviews and approvals are performed. At a minimum, review and approval of a representative from maintenance and the equipment

owner is required before a work package can be used to perform maintenance on ACP equipment. The Engineering Organization is required to review and approve work packages created for maintenance of QL-1 and QL-2 items and packages developed for modification of ACP systems.

Maintenance activities are scheduled through an established work control process. The equipment owner establishes priorities for maintenance in his/her area of responsibility. A schedule is created and published which establishes a date for execution of the maintenance activity. The work is scheduled in advance to accommodate completion of the planning process. The process accommodates emergent, high priority work. Operations authorizes the performance of maintenance and removal of an IROFS from service. Operations is also responsible for ensuring safe operations during removal of IROFS from service, including establishing any necessary compensatory measures. Operations is notified upon completion of maintenance activities.

The work control process provides configuration control of ACP equipment. This process requires an evaluation for availability of:

- Qualified personnel to perform the maintenance;
- Approved work instructions and/or procedures;
- Approved parts or substitutes;
- Drawings; and
- Safety permits.

Other documentation related to the maintenance activity may be included in the package.

#### **11.2.4 Corrective Maintenance**

Corrective Maintenance is the action to check, troubleshoot, and repair equipment that has degraded or failed. The identification, prioritization, planning, and scheduling of corrective maintenance activities are accomplished following the work control process described in Section 11.2.3 of this license application. Corrective actions are performed to remediate unacceptable performance deficiencies in an IROFS and to eliminate or minimize the recurrence of these deficiencies.

#### **11.2.5 Preventive Maintenance**

Preventive Maintenance (PM) is the activity performed on a periodic basis to prevent failures, facilitate performance, and maintain or extend the life of equipment. PMs help ensure that QL items are available to perform their function and are reliable. The bases for PM tasks are developed through a review of manufacturer recommendations, available industry standards, and historical operating information, where available. The rationale for any deviations from industry



standards or manufacturer's recommendations is documented. PMs are included in the work control process to facilitate planning, scheduling, and execution of these tasks. The identification, prioritization, planning, and scheduling of preventive maintenance activities are accomplished following the work control process described in Section 11.2.3 of this license application.

Establishment of a PM task is coordinated by engineering and maintenance and requires input from various disciplines within the Engineering Organization, as well as operations and maintenance personnel, as appropriate. The formal documented bases for the tasks are developed, evaluated, and approved by the Engineering Organization. PM tasks may be changed, new tasks added or deleted, and recommendations made by operations, maintenance, or engineering personnel. Changes to tasks may be warranted as a result of a review of a system's performance. Feedback from PM, corrective maintenance, and incident investigations is used, as appropriate, to modify the frequency or scope of a PM activity. Specifically, preventive measures to alleviate premature failure may be added to the PM activity, or a reduction in frequency of a particular PM due to as-found conditions indicating that the PM is occurring more often than necessary, may be initiated.

#### **11.2.6 Surveillance/Monitoring**

Surveillances and monitoring at specified intervals are performed to verify the proper operation of IROFS and to measure the degree to which IROFS meet performance specifications. These surveillances are in the form of performance checks, calibrations, tests, and/or inspections. The ISA Summary identifies the IROFS that are credited to be available and reliable to perform their design function for mitigation of credible events. The Surveillance Program provides a periodic check of the ability of these IROFS to perform their design safety function when called upon to do so. The Surveillance Program design adheres to the 10 CFR 70.64, *Inspection, Testing, and Maintenance Baseline Design Criteria*.

Surveillances are included in the work control process to permit timely planning, scheduling, establishment of system or plant conditions, execution of the activity, and creation of documentation that identifies the results of the surveillance. The established frequencies are determined by the IROFS degree of safety importance. The results of surveillance activities are trended to support the determination of performance trends for IROFS. When indicated by potential performance degradation, preventive maintenance frequencies are adjusted or other corrective actions taken as appropriate.

#### **11.2.7 Functional Testing**

A post-maintenance testing (PMT) program is established to provide assurance QL items that require a work package will perform their intended function following maintenance activities. This test confirms that the maintenance performed was satisfactory, the identified deficiency has been corrected, and the maintenance activity did not adversely affect the reliability of the QL item. This test is performed with acceptable results prior to return of the equipment for service.



PMT requirements are developed and included in work packages during the work planning process. The Engineering Organization may provide support to the Operations and Maintenance Organizations in identifying PMT requirements. The PMT meets applicable codes and technical requirements and specifies acceptance criteria. The results of the PMT are documented and retained in the work package with other documentation generated during the maintenance evolution.

### **11.2.8 Control of Measuring and Test Equipment**

Maintenance programs include control of measuring and test equipment (M&TE) used during maintenance of ACP equipment. These programs require M&TE to be properly controlled, calibrated and adjusted, if necessary, at specified periods. The following are elements of the M&TE Control Program:

- M&TE is assigned a unique identifier
- Calibration intervals are defined
- M&TE is labeled to identify calibration/certification status
- An M&TE inventory is maintained
- M&TE determined to be out of tolerance during calibration is identified and an investigation conducted of equipment use since the previous calibration
- Calibration records are retained
- Control and storage requirements are defined for M&TE

Standards used for calibration of M&TE have the required accuracy, range and stability for the application. These standards are certified and traceable to the National Institute of Standards and Technology. If no national standard exists, the bases for calibration is documented and approved by the Engineering Organization.

Additional requirements and standards are established as necessary to ensure compliance with Section 12.0 of the QAPD.

### **11.2.9 Equipment/Work History**

Maintenance programs include data collection in the work control process. Maintenance on an IROFS requires the preparation of a work package that contains an equipment history form. This form is used to collect information from the craft personnel that are performing PM and corrective maintenance activities on an IROFS. The work package also contains a work-in-progress log used to document actions taken during the maintenance activity. This documentation provides information regarding the as-found condition of an IROFS. This data is used to identify the need for modifications and improvements for the maintenance program, to

improve the reliability of an IROFS, and to ensure maintenance personnel are devoting their efforts to activities important to safety.

The information obtained from work packages is retained in a database for historical reference. The Engineering Organization may use this database to evaluate the reliability of IROFS. This data, in addition to other indicators (e.g., results of incident investigations, the review of failure records required by 10 CFR 70.62(a)(3), and identified root causes) of item performance allow for a thorough review to determine if modifications to a system or a change in the maintenance program is necessary to ensure that IROFS are reliable and available when called upon. The actual documentation generated at the time of the maintenance evolution is retained in the work package and is controlled according to RMDC program practices.

### **11.3 Training and Qualification**

The Training and Qualification program is designed to ensure that those personnel who perform activities relied on for safety have the applicable knowledge and skills necessary to design, operate, and maintain the plant in a safe manner. The Performance Based Training (PBT) methodology is used for those tasks associated with the design, modification, operation, or maintenance of PBT identified in the ISA Summary. Personnel are trained and tested as necessary to ensure that they are qualified on practices important to public and worker safety, safeguarding of licensed material, and protection of the environment.

#### **11.3.1 Organization and Management of the Training Function**

The Training Manager is responsible for establishing procedures governing the application of the PBT methodology for the analysis, design, development, implementation and evaluation of the training programs. The Training Manager reports to the Production Support Manager. Training personnel are assigned by the Training Manager to interface with line managers for training development and implementation.

Instructors and subcontractors hired to develop training materials have ready access to designated subject matter experts (SMEs) who assist them when developing training materials. Training program materials are reviewed and approved by SMEs, training, and line management prior to implementation.

The functional organization managers are responsible for defining the job-specific training needs and ensuring completion of training and qualification for personnel within their organization. Training attendance is tracked by training and line management. The training group notifies line management of personnel who have not successfully completed initial training or who are past due for identified continuing training. Line management is responsible for placing work restrictions or removing employees from duty where training is deficient.

Workers relied upon to design, operate, or maintain IROFS are trained and evaluated for qualifications prior to assignment of these duties. Initial training contains the classroom and on-the-job training (OJT) necessary to provide an understanding of the fundamentals, basic

principles, systems, procedures, and emergency responses involved in an employee's work assignments. Initial task or duty area qualification is granted by line management based on successful evaluation of the employee's mastery of the learning objectives presented during the training. Maintenance of qualification is contingent upon successful completion of continuing training and/or through satisfactory OJT evaluations.

Personnel may be exempted from training as defined in training procedures. New hires or position incumbents may be considered for exemption from segments of classroom training and OJT. Exemptions are based on one of the following methods:

- Management review of an individual's prior training records and/or job performance history provides information demonstrating that the individual has achieved the necessary required skills; or
- Employee demonstrates minimum knowledge requirements by passing module examination in lieu of training (test-out); or
- Employee demonstrates minimum skills/proficiency requirements by successfully completing task performance evaluations in lieu of OJT.

Training materials are linked to the CM system to provide reasonable assurance that design changes and modifications are accounted for in the training. The training materials are matrixed to procedures such that design changes or plant modifications are analyzed by line and training personnel for impact on training.

Training attendance records, examinations, employee qualification records, and program needs are maintained in an accurate, auditable manner to document each employee's training. The programmatic and individual training and qualification records are maintained in accordance with RMDC guidelines.

Plant functional organization managers develop and maintain a description of each individual's training requirements within their organization. These requirements are identified in individual Training Requirement Matrices (TRMs) approved by the line and training management. The TRMs include training required by regulatory and or corporate requirements in addition to the applicable Performance Based Training Requirements. Plant personnel, contractors, and visitors receive the following training as applicable to their position or function:

- **General Employee Training** for persons who require unescorted access (Section 11.3.1.1).
- **Security Education** is provided to personnel requiring plant access (Section 11.3.1.2).
- **Radiation Worker Training** for personnel whose job requires them to have unescorted access to radiological restricted areas (Section 11.3.1.3).

- **Nuclear Criticality Safety Training** for personnel who handle or manage the handling of fissile material and work within Fissile Material Operations Areas (Section 11.3.1.4).
- **Environmental, Safety, and Health Training** for those persons who have training requirements defined by laws and regulations (as defined in Section 11.3.1.5).
- **Operations and Maintenance Personnel Training** for those persons relied upon to operate or maintain IROFS. This training includes the operations and maintenance first line supervisors. (Section 11.3.1.6).
- **Operations Analysis Engineer Training** for those persons who make operational decisions, review process equipment operational parameters, and establish equipment settings (Section 11.3.1.7).
- **System Engineer Training** for those persons who review design modifications to IROFS (Section 11.3.1.8).
- **Nuclear Criticality Safety Engineer/Specialist Training** for those persons who perform the Nuclear Criticality Analyst functions described in Chapter 5.0, Nuclear Criticality Safety, of this license application (Section 11.3.1.9).
- **Health Physics Technician Training** for those persons responsible for the evaluation of radiological conditions in the plant and the implementation of the necessary radiological safety measures identified in Chapter 4.0, Radiation Protection, of this license application (Section 11.3.1.10).
- **Laboratory Technician Training** for those persons who work in the laboratory technician classification (Section 11.3.1.11).
- **Fire Protection and Emergency Management Training** for those persons identified in the Emergency Plan for the American Centrifuge Plant (Section 11.3.1.12).
- **Visitor Site Access Orientation** is provided for plant visitors who are escorted. It utilizes self-study of an orientation handbook and covers the following general information:
  - Driving Rules
  - Compliance with postings and signs
  - Use of eye, head, hearing, and respiratory protection
  - Emergency Phone Numbers
  - Radiological protection concerns
  - Emergency Preparedness
  - Security requirements and limitation of access and items prohibited

### **11.3.1.1 General Employee Training**

General Employee Training (GET) provides awareness level training on the hazards and proper response to alarms that a person may encounter. It is required for personnel having unescorted access to the plant. GET includes the following subject areas:

- General Employee Radiological Safety
- NCS
- General Topics
- Hazard Communication
- Emergency Preparedness

#### **11.3.1.1.1 General Employee Radiological Safety**

General Employee Radiological Training covers the individual's responsibilities for maintaining exposures to radiation and radioactive materials in accordance with the as low as reasonably achievable (ALARA) philosophy. This training reviews natural background and manmade sources of radiation, the whole body radiation dose limit for non-radiological workers, the potential biological effects from chronic radiation doses, embryo and fetus protection, ALARA concepts and practices, and methods used to control radiological materials and contamination. If a person requires unescorted access to a radiological restricted area, additional radiological safety training is provided as discussed in Section 11.3.1.3 of this license application.

#### **11.3.1.1.2 Nuclear Criticality Safety**

An overview of the NCS program is provided. The training emphasizes the prevention of accidental nuclear criticality, describes the hazards and risks of a nuclear criticality accident, explains NCS responsibilities, and teaches the proper response to a nuclear criticality alarm.

Additional NCS training based on American National Standards Institute (ANSI)/American Nuclear Society (ANS) ANSI/ANS-8.20-1991, *American National Standard for Nuclear Criticality Safety Training*, is provided for personnel who handle or manage the handling of fissile material and work within Fissile Material Operations Areas.

#### **11.3.1.1.3 General Topics**

General Topics include a general overview of: (1) health and safety awareness programs; (2) the employee's rights and responsibilities and the employer's duties as defined by laws and regulations; and (3) use of procedures and conduct of operations.

#### **11.3.1.1.4 Hazard Communication**

The purpose of this awareness-level training is to inform personnel that hazardous chemicals are present in the work place and to help them understand the function of warning labels and signs, Material Safety Data Sheets, and the written Hazard Communication Program.

Additional chemical safety training is provided to those personnel who handle or supervise the handling of hazardous chemicals identified in Chapter 6.0, Chemical Process Safety, of this license application.

#### **11.3.1.1.5 Emergency Preparedness**

This training introduces personnel to basic Emergency Plan elements including: (1) emergency plan safety objectives and priorities; (2) ways to report emergencies; (3) recognition and correct responses to plant alarm signals; (4) evacuation guidelines for radiological and non-radiological emergencies; (5) personnel accountability procedures; (6) fire extinguisher familiarization; and (7) personnel responsibilities during emergencies.

#### **11.3.1.2 Security Education**

Security Education briefings are described in the Security Program for the American Centrifuge Plant. These include Initial Briefings, Refresher Briefings, Termination Debriefings, and Foreign Travel Briefings.

#### **11.3.1.3 Radiation Worker Training**

Radiation Worker Training is a biennial training requirement for personnel whose job requires them to have unescorted access to radiological restricted areas. The training includes a comprehensive curriculum consisting of the following, as appropriate:

- Fundamentals of atomic structure, radiological definitions, types of ionizing radiation, units of measurement, dose, and dose rate calculations
- Biological effects of ionizing radiation including cell sensitivity and chronic and acute exposure
- Radiation work permit applications and use
- Radiation limits for occupational and non occupational workers as well as the general public
- ALARA practices for protection from exposure to radiation or radioactive materials
- Personnel Monitoring Programs in place to monitor the worker's exposure to radiation

- Radioactive Contamination Control to minimize and control the spread of contamination
- Radiological Postings and Controls for familiarization with the signs and postings in the work area
- Emergencies involving radiological material and the correct response
- Chemical Toxicity of Soluble Uranium Compounds

This training includes knowledge examinations and practical factor examinations of the personal protective equipment, personnel monitoring, and radiation measurements, if needed. Radiation Worker Training is reviewed and approved by the Radiation Protection Manager. The extent of the course material is commensurate with the potential for exposure. The training program is reviewed and evaluated every two years.

#### **11.3.1.4 Nuclear Criticality Safety Training**

NCS training based on ANSI/ANS-8.20-1991 is provided for personnel who handle or manage the handling of fissile material and work within Fissile Material Operations Areas. This training is reviewed and approved by the NCS technical staff and includes a discussion of the following:

- The fission process
- Controllable factors and examples of their application at this plant
- NCS postings
- NCS emergency procedures
- Consequences of historical criticality accidents

Personnel are trained to report defective or anomalous NCS conditions and to perform actions only in accordance with written, approved procedures. Personnel are trained that unless a specific procedure deals with the situation, they will take no action until the NCS personnel have evaluated the situation and provided recovery guidance. NCS refresher training is required every two years.

Managers of personnel described above receive additional training on the managerial responsibilities relating to NCS.

#### **11.3.1.5 Environmental, Safety, and Health Training**

This training covers environmental, worker safety, and health subject areas required by applicable local, state and federal regulations. It is provided to personnel commensurate with

their job assignments. Specific modules identified as required compliance training for plant employees are contained in each individual's training requirement matrix. Some of the areas include:

- Radiological Worker Safety
- NCS
- Respiratory Training
- Hearing Conservation
- Occupational Safety and Health Administration (OSHA) Hazard Communication
- Hoisting and Rigging
- Mobile Equipment Operations
- Lockout/Tagout Work Permits
- Safety and Health Work Permits
- *Resource Conservation and Recovery Act* for Hazardous Waste Generators
- OSHA Hazardous Waste Operations and Emergency Response Standard
- Personal Safety
- Spill Prevention Control and Countermeasure Plan

#### **11.3.1.6 Operations and Maintenance Personnel Training**

Training is designed, developed, and implemented to assist plant employees in gaining an understanding of applicable fundamentals, procedures, and practices specific to the plant. It is also used to develop the skills necessary to perform assigned work in a safe manner. If a task is identified to operate or maintain an IROFS, then the PBT methodology is used. Initial and continuing training is provided for the following operations and maintenance job categories relied on to operate and/or maintain IROFS.

##### **11.3.1.6.1 Operations Technician**

This program is designed for personnel who monitor and operate centrifuge feed, withdrawal, product, equipment and supporting systems. They operate systems necessary to support the plant, perform integrated system testing, execute valving orders, adjust equipment settings, start-up, and shutdown equipment. The Operations Technician also assemble, transfer,



install, repair, and test centrifuge machines. The Operations Technician training and qualification program is separated into three sequential phases:

- **Phase I** provides classroom training on basic fundamentals and consists of the following: Centrifuge Operations Orientation; Uranium Enrichment Technology; Operating Principles and Theory of Centrifuge Equipment; Process Control; and Process Support Systems.
- **Phase II** provides classroom and OJT on the design, assembly, transport, and repair of centrifuge machines.
- **Phase III** provides classroom and OJT on the IROFS identified in the ISA Summary; NCS limits and controls; equipment operations; support systems; and normal, off-normal, and emergency operating procedures for the plant.

#### **11.3.1.6.2 American Centrifuge Plant Operations Supervisor**

This program is designed for personnel who supervise the Operations Technician and make operational decisions during normal, off normal, and emergency operations. The Operations Supervisor is the senior person on shift and directs equipment start-up, shutdown, and changes in system alignments. The Operations Supervisor training and qualification program is separated into four sequential phases:

- **Phase I** provides classroom training on basic fundamentals and consists of the following: Centrifuge Operations Orientation; Uranium Enrichment Technology; Operating Principles and Theory of Centrifuge Equipment; Process Control; and Process Support Systems.
- **Phase II** provides classroom and OJT on the design, assembly, transport, and repair of centrifuge machines.
- **Phase III** provides classroom and OJT on the IROFS identified in the ISA Summary; NCS limits and controls; operations; support systems; and normal, off-normal, and emergency operating procedures for the plant.
- **Phase IV** provides classroom and OJT on the supervisory roles and responsibilities for the safe operation of the plant.

#### **11.3.1.6.3 Centrifuge Support Mechanic**

This program is designed for maintenance personnel who service and repair computers, programmable controllers, and electrical, electronic, and pneumatic support systems and components. The Centrifuge Support Mechanic training and qualification program is separated into three sequential phases:

- **Phase I** provides classroom training on Centrifuge Operations Orientation and Operating Principles and Theory of Centrifuge Equipment.
- **Phase II** provides classroom and OJT on the plant electrical, instrument, and electronic control systems and components.
- **Phase III** provides classroom and OJT on maintenance procedures, programs, and practices.

#### **11.3.1.6.4 Centrifuge Maintenance Mechanic**

This program is designed for maintenance personnel who install, remove, repair, and service mechanical equipment and systems in the field and in shop locations. The Centrifuge Maintenance Mechanic training and qualification program is separated into three sequential phases:

- **Phase I** provides classroom training on Centrifuge Operations Orientation and Operating Principles and Theory of Centrifuge Equipment.
- **Phase II** provides classroom and OJT on the plant mechanical systems and components.
- **Phase III** provides classroom and OJT on maintenance procedures, programs, and practices.

#### **11.3.1.6.5 Centrifuge Maintenance Supervisor**

This program is designed for the supervisors of the Centrifuge Maintenance and Support Mechanics. The Centrifuge Cascade Maintenance Supervisor training and qualification program is separated into four sequential phases:

- **Phase I** provides classroom training on Centrifuge Operations Orientation and Operating Principles and Theory of Centrifuge Equipment.
- **Phase II** provides classroom and OJT on the plant mechanical, electrical, instrument, and electronic control systems and components.
- **Phase III** provides classroom and OJT on maintenance procedures, programs, and practices.
- **Phase IV** provides classroom and OJT on the supervisory roles and responsibilities for the safe operation of the plant.

#### **11.3.1.7 Operations Analysis Engineer Training**

Operations Analysis Engineer training is provided to those persons, who review process equipment operational parameters, analyze the data and determine equipment settings. The Operations Analysis Engineer is an advisor to the Operations Supervisor concerning plant operational decisions. The Operations Analysis Engineer has as a minimum a bachelor's degree in engineering or the physical sciences or equivalent technical experience, and three years of nuclear experience. The training is based on a review of job analysis data, training requirements for specific systems, and existing training materials.

#### **11.3.1.8 System Engineer Training**

System Engineer training is provided to those persons who provide engineering support and review of the design and modifications of IROFS. System Engineers are responsible for reviewing design proposals and modifications; ensuring that the appropriate documents and procedures are updated to be consistent with modifications; and assisting in work control preparation and identification of post-maintenance test requirements for IROFS. The System Engineer has as a minimum a bachelor's degree in engineering or the physical sciences or equivalent technical experience, and three years of nuclear experience. The training is based on a review of job analysis data, training requirements for specific systems, and existing training materials.

#### **11.3.1.9 Nuclear Criticality Safety Engineer Training**

NCS personnel administer Nuclear Criticality Analyst training and qualification. Training is based on ANSI/ANS-8.20-1991 and ANSI/ANS-8.19-1996, *Administrative Practices for Nuclear Criticality Safety*. NCS procedures define educational and experience prerequisites, along with required training courses and OJT activities to be completed prior to qualification.

#### **11.3.1.10 Health Physics Technician Training**

Health Physics support training and qualification is administered in accordance with guidelines provided in the Training Development and Administrative Guide (TDAG) for Health Physics Technicians. It utilizes the performance based training methodology and applies to those individuals, both plant and contractor, who are engaged in the evaluation of radiological conditions in the plant and the implementation of the necessary radiological safety measures as they apply to nuclear plant workers and members of the general public.

#### **11.3.1.11 Laboratory Technician Training**

Laboratory support training and qualification is administered in accordance with the guidelines set down in the TDAG for the Laboratory and Technician Training Program. The training utilizes the performance based training methodology. Training is provided in the areas of Laboratory Controls and Standards, Mass Spectrometry, Process Services, Chemical Technology, Uranium Sampling, and Uranium Analysis.

### **11.3.1.12 Fire Protection and Emergency Management Training**

#### **11.3.1.12.1 Fire Protection Training**

State certification requirements provide the basis for firefighter training programs. Emergency medical response personnel meet requirements for state certification as emergency medical technician (these are usually also firefighters). Qualified instructors provide a range of classroom and hands-on training to maintain standards of performance for response personnel. Training needs are reviewed annually and the training program modified to meet identified needs. Drills are conducted quarterly, as part of the Emergency Plan training.

#### **11.3.1.12.2 Emergency Management Training**

Training is conducted in the areas of:

- General Emergency Plan training
- Specialized Emergency Plan training for the Emergency Response Organization
- Off-site Emergency Management training

Emergency Management drills and exercises are conducted to develop, maintain, and test the response capabilities of personnel, facilities, equipment, and training.

### **11.3.2 Analysis and Identification of Functional Areas Requiring Training**

A needs/job analysis is used to identify the tasks affecting worker or public safety, safeguards of regulated material, or protection of the environment as identified in the ISA Summary. The analysis is conducted with applicable program area SMEs and training personnel. The training programs for the following plant job positions/worker classifications are based on a needs/job analysis:

- Operations Technician
- Operations Supervisor
- Centrifuge Maintenance Mechanic
- Centrifuge Support Mechanic
- Centrifuge Maintenance Supervisor
- Operations Analysis Engineer
- System Engineer

- NCS Engineer
- Health Physics Technicians
- Laboratory Technicians

The plant-specific task list is developed for each of the above positions/classifications. The task lists are analyzed based on input from line management and SMEs, rating each task on degree of difficulty, importance of the task, and frequency of task performance. From this analysis, the tasks are selected for training based on their rating. The ratings are:

- **Overtrain** - requires initial and continuing training;
- **Train** - requires initial training;
- **Pre-train** or **just-in-time** - requires training but is not taught until that specific knowledge or skill is needed; or
- **No train** - formal training is not required.

The tasks selected for training are matrixed to the associated procedures and training materials. The matrices are reviewed and updated in conjunction with the periodic review of the associated procedures.

Procedure changes, equipment changes, job scope changes, plant modifications and other changes affecting task performance are monitored and evaluated for their impact on the development or modification of initial and continuing training programs. The affected training materials are modified or new materials developed, based on the significance of the change, and modifications are documented in the program files. The training materials are updated prior to conducting training.

### **11.3.3 Position Training Requirements**

Plant procedures and individual TRMs delineate initial and continuing training requirements for employees. The training program requirements for those positions relied on for safety or personnel who perform actions that prevent or mitigate accident sequences described in the ISA Summary, are defined in TDAGs. The TDAGs include:

- Organization and Administration Responsibilities
- Trainee Selection Criteria, including the minimum educational, technical, experience, and physical requirements
- Course Loading for Initial and Continuing Training
- Test/Evaluation Guidelines

- Training and Evaluation Documentation Guidelines
- Training Courses or Modules for Specific Qualification Areas

#### **11.3.4 Development of the Basis for Training, Including Objectives**

Learning objectives are established to identify the training content and to define satisfactory trainee performance for the task or group of tasks selected for training from the job analysis. Learning objectives state the requisite knowledge, skills, and abilities the trainee must demonstrate. The conditions under which the required actions take place and the standards of performance required of the trainee are also determined in development of the learning objectives. Learning objectives are sequenced within training materials based on their relationship to one another.

Learning objectives are documented in lesson plans and training guides and are revised as necessary based on changes in procedures, plant systems/equipment, or job scope.

#### **11.3.5 Organization of Instruction, Using Lesson Plans and Other Training Guides**

Learning objectives derived from the rated task lists are analyzed to determine the appropriate training setting. Classroom lesson plans, OJT guides, or other instructional materials are procured or developed based on this instructional analysis and design. Lesson plans and other training guides provide the guidance and structure necessary to ensure consistent delivery of training material from trainer to trainer and class to class. The lesson plans and other training guides provide the evaluation tools necessary to ensure mastery of the learning objectives.

Classroom lessons are used primarily to provide cognitive learning on the fundamentals, theory, basic operating and maintenance principles, individual systems, system inter-relations, safety requirements, and processes used in the plant.

Other forms of instructional materials, such as video, computer-based training and self-study may be used as alternatives or supplements to classroom instruction.

Classroom lesson plans, OJT guides, and other instructional materials receive technical reviews by designated SMEs and instructional reviews by training management as part of the approval process. The responsible line and training managers approve training materials before issuance.

Designated SMEs or technical trainers provide classroom training and/or OJT evaluations. These personnel receive training and are qualified on the instructional methods and techniques applicable to the training setting.

### **11.3.6 Evaluation of Trainee Learning**

Within the job position/worker classification, training programs are logical instructional blocks or “modules” presented in such a manner that specific learning objectives are accomplished. Trainee progress is evaluated by line and training management through a variety of performance demonstrations such as written examinations, oral examinations, and practical tests to ensure mastery of the job performance requirements or learning objectives contained in these modules. Comprehensive qualification programs contain periodic evaluations of trainee performance. Remediation is provided as appropriate.

### **11.3.7 Conduct of On-The-Job Training**

OJT is a systematic method of providing training on job-related skills and knowledge for a position. This training is conducted in the work environment and demonstrates actual task performance whenever practical. When the actual task cannot be performed, the conditions are documented and the task may be simulated. Applicable tasks and related procedures for each technical area provide the input for the OJT that is designed to supplement and complement training received through formal classroom or laboratory training and to ensure personnel are qualified to perform their assigned tasks.

### **11.3.8 Evaluation of Training Effectiveness**

Systematic evaluations of training effectiveness and its relation to on-the-job performance are used to ensure that the training program conveys required skills and knowledge and to revise the training, where necessary, based on the performance of trained personnel in the job setting. The student feedback of the training received and the line manager’s evaluation of the student’s performance on the job after training is completed are utilized to determine the training effectiveness and areas for refinement. Student feedback occurs at several points in the training program. At the completion of training, the student evaluates the instructor and course. Post training evaluations of the effectiveness of training is requested from students and supervisors after completion of training. Each of these evaluations is specified in plant training procedures.

Plant design changes, modifications, or changes in task performance are analyzed by line and training personnel for impact on training. Corrective actions involving training are assigned, scheduled and tracked to completion. Lessons learned, which have an impact on initial training, are factored into training materials prior to the delivery of the next training session.

Line and training management conduct self-assessments and evaluations of the individual training programs. QA auditors provide additional assessments through the audit program. These assessments and evaluations are used to determine training program strengths and weaknesses for continuous improvement of the training.

### **11.3.9 Personnel Qualification**

Personnel are selected for entry into the training and qualification programs in conformance with the established general employment policies. The minimum education,



experience, and qualification requirements for managers, engineers, and technical professional staff, supervisors, technicians, and maintenance personnel are described below. Additional details are provided in Chapter 2.0, Organization and Administration, of this license application.

ACP managers have, as a minimum, a bachelor's degree in engineering or the physical sciences or equivalent technical experience, and four years of nuclear experience.

Engineers and other technical professional staff, who affect the design, modification, operation, or maintenance of IROFS identified in the ISA Summary, have, as a minimum, a bachelor's degree in engineering or the physical sciences or equivalent technical experience, and three years of nuclear experience. Other technical professional staff, whose actions are not relied upon for safety, have, as a minimum, a bachelor's degree in engineering or the physical sciences or equivalent technical experience, and one year of nuclear experience.

Supervisors of technicians, maintenance personnel, and other staff whose actions are relied upon for safety have, as a minimum, a bachelor's degree in engineering or the physical sciences or equivalent technical experience, and three years of industrial/chemical/nuclear plant operations, maintenance, engineering, or support experience. Supervisors must have one-year supervisory experience or completion of a supervisory training course.

Plant maintenance personnel and technicians have, as a minimum, an associates degree in engineering or the physical sciences or equivalent technical experience, and three years of industrial/chemical/nuclear plant operations, maintenance, engineering, or support experience.

Construction personnel, plant technicians, maintenance personnel, and other staff whose actions are relied upon for safety complete the applicable training programs or have equivalent experience or training.

#### **11.3.10 Provisions for Continuing Assurance**

Continuing training and periodic requalification is provided for employees in the interest of promoting safety, safeguards and security, and environmental protection awareness. Continuing training is also provided as a means to maintain and improve job-related knowledge and skills and is based on the following factors:

- Frequency required by regulatory agencies and national standards
- Overtrain tasks identified in PBT-based programs
- Training needs as determined by line management. This includes, but is not limited to, nuclear criticality safety assessments, plant or system changes, component changes, procedure changes, lessons learned (including industry and in-house operating experiences, and event reports), and emergency response procedures.



### 11.3.11 References

1. ANSI/ANS-8.20-1991, *American National Standard for Nuclear Criticality Safety Training*
2. ANSI/ANS-8.19-1996, *Administrative Practices for Nuclear Criticality Safety*

## 11.4 Procedures

USEC is committed to the use of approved and controlled written procedures to conduct nuclear safety, safeguards, and security activities for the protection of the public, plant employees, and the environment. Procedures are used to ensure safe work practices and apply to workers, visitors, contractors, and vendors. A balanced combination of written guidance, craftsman skills, and work site supervision is utilized. The procedure process utilizes a graded approach to provide the necessary rigor for safe plant operation, assure USEC's commitments to meeting regulations and standards, and assure a balance of effective safety with practical efficiency in plant operations. Activities involving nuclear material and/or IROFS are conducted in accordance with approved procedures.

A management controls program for procedures includes the basic elements of identification, development, verification, review and comment resolution, approval, validation, issuance, and change control, and periodic review. These elements are outlined in a procedures management writer's guide and described in implementing procedures.

### 11.4.1 Types of Procedures

Procedures are intended to prescribe those essential actions or steps needed to safely and consistently perform operations and maintenance activities. Procedures that are related to the operation of IROFS where human actions are important and for the management measures supporting those IROFS are governed by the requirements of this section. The two general types of procedures used at the ACP are Operating and Administrative.

#### 11.4.1.1 Operating Procedures

Operating procedures are used to directly control process operations at the workstation and include direction for normal operations, off-normal operations, maintenance, alarm response, and emergency operations caused by failure of an IROFS or human error. These procedures provide reasonable assurance of NCS, chemical safety, fire safety, emergency planning, and environmental protection. Operating procedures contain the following elements, as applicable:

- Purpose of the activity
- Regulations, policies, and guidelines governing the procedure
- Type of procedure

- Steps for each operating process phase
- Initial start-up
- Normal operations
- Temporary operations
- Emergency shutdown
- Emergency operations
- Normal shutdown
- Start-up following an emergency or extended downtime
- Hazards and safety considerations
- Operating limits
- Precautions necessary to prevent exposure to hazardous chemicals (resulting from operations with special nuclear material) or to licensed special nuclear material
- Measures to be taken if contact or exposure occurs
- IROFS associated with the process and their functions
- The timeframe for which the procedure is valid

Maintenance procedures involving IROFS for corrective and preventative maintenance, functional testing after maintenance, and surveillance maintenance activities describe:

- Qualifications of personnel authorized to perform the maintenance or surveillance
- Controls on and specification of any replacement components or materials to be used
- Post-maintenance testing to verify operability of the equipment
- Tracking and records management of maintenance activities
- Safe work practices (e.g., lockout/tagout; confined space entry; moderation control or exclusion area; radiation or hot work permits; and criticality, fire, chemical, and environmental issues)

- Pre-maintenance activities require reviews of the work to be performed, including procedure reviews for accuracy and completeness
- Steps that require notification of affected parties (technicians and supervisors) before performing work and on completion of maintenance work. The discussion includes potential degradation of IROFS during the planned maintenance.

Alarm Response Procedures provide information that identifies the symptoms of the alarm, possible causes, automatic actions, the immediate operator action to be taken, and the required supplementary actions.

Off-Normal Procedures describe actions to be taken during unusual or out-of-the ordinary situations.

Emergency Operating Procedures direct actions necessary to mitigate potential events or events in progress that involve needed protection of on-site personnel; public health and safety; and the environment.

#### **11.4.1.2 Administrative or Management Control Procedures**

Administrative procedures or “management control procedures” are used for activities that support the process operations. These procedures are used to manage activities such as configuration management, radiation protection, maintenance, QA, training and qualification, audits and assessments, incident investigations, record keeping, and reporting. Administrative procedures direct the following activities:

- Design
- Configuration Management
- Procurement
- Construction
- Radiation safety
- Maintenance
- QA elements
- Training and qualification
- Audits and assessments
- Incident investigations

- Records management
- Criticality safety
- Fire safety
- Chemical process safety and reporting requirements

#### **11.4.2 Procedure Process**

Procedures are developed or modified through a formal process incorporating the change controls described in Section 11.1 of this license application. The procedure process ensures that:

- Procedures are identified and developed as needed;
- Procedures are provided for those operations of IROFS where human actions are necessary and for the Management Measures described in this chapter;
- Essential elements that are generic are included as applicable. These include: nuclear criticality; chemical process and fire safety; warnings and cautions; notes or reminders of pertinent information regarding specific hazards or concerns; Material Safety Data Sheet availability; special precautions; radiation and explosive hazards; and special personal protective equipment;
- Procedures are approved under the guidelines of the configuration management program by personnel responsible and accountable for the operation;
- Procedures are verified and validated through field tests by workers and technicians during procedure development to provide assurance that they are usable and accurate;
- Procedures are periodically reviewed and re-verified and validated;
- Current procedures are available to personnel and that users are qualified on the latest version;
- Operating limits and IROFS are specified in the procedure;
- Safety limits and IROFS will be clearly identified, as such, in the procedure for operations;
- Procedures include required actions for off-normal conditions of operation, as well as normal operations;

- If needed, hold points or safety checkpoints are identified at appropriate steps in the procedure;
- A mechanism is specified for revising and reissuing procedures in a controlled manner;
- Current procedures are available and used at work locations; and
- The plant Training Program trains the required persons in the use of the latest procedures available.

The procedure process utilizes nine basic elements to accomplish procedure development, review, approval, and control: Identification; Development; Verification; Validation; Review and Comment Resolution; Approval; Issuance; Change Control; and Periodic Review. These elements are discussed in the following sections.

#### **11.4.2.1 Identification**

ACP organization managers have the responsibility for identifying which tasks will be proceduralized within their areas of control.

As a minimum, a procedure is required for:

- The operation of IROFS and the management measures supporting those IROFS as identified in the ISA Summary
- Operator actions necessary to prevent or mitigate the consequences of accidents described in the ISA Summary

A detailed procedure is normally not needed if the task analysis determines that:

- The work is not complex or only involves a few actions (unless failure to properly conduct those actions could result in significant consequences)
- The task requires those skills normally possessed by a qualified person (otherwise known as “skill-of-the-craft”)
- The consequences of an error would be minimal

Maintenance activities can be addressed by written procedures, documented work instructions, or drawings appropriate to the circumstances as discussed in Appendix A.6, paragraph (a), of ANSI/ANS 3.2-1994, *Administrative Controls and Quality Assurance for the Operational Phase of Nuclear Power Plants*.

### **11.4.2.2 Development**

Procedure development and quality is the user organization's responsibility. Procedure development is accomplished in accordance with procedural guidance. A general description follows:

- A system is in place to track and document the procedure process.
- Interviews with procedure users and process walk downs are utilized to ensure procedures are usable; reflect as-built conditions and process operations; and maintain management controls for nuclear safety, safeguards, and security.
- The procedure use category is determined. This determination documents the designation of a procedure as In-Hand (Continuous Use), Reference Use, or Information Use. The designation is based on the administrative or non-administrative use of the procedure, and the safety or financial consequences of failing to adhere to procedural requirements. Procedure use is discussed in Section 11.4.7 of this license application.
- As the procedure is drafted, attributes that enhance procedural use are included, such as standard style organization, format, cautions, and warnings.
- Input and review by affected parties is required. Other selected reviews are obtained, such as QA to ensure that QA requirements are identified and included in operating procedures.
- The approval process for the procedure is described in Section 11.4.2.6 of this license application.

### **11.4.2.3 Verification**

Verification is a process that ensures the technical accuracy of the procedure and that it can be performed as written. Procedures are verified by the procedure owner/user during the procedure development/change process. There are two basic attributes of the verification process. The first attribute relates to the technical accuracy of the procedure. It ensures that technical information including formulas, set points, and acceptance criteria are correctly identified in the procedure. The second attribute is administrative, in that it verifies the procedure format and style and that it is consistent with the procedure-writing guide. Verification consists of a walk-down of the procedure in the field or a tabletop walk-through. A standard checklist is used to ensure required attributes are included.

### **11.4.2.4 Validation**

The purpose of procedure validation is to ensure that no technical errors or human factor issues were inadvertently introduced during the procedure review process. Validation is required for new procedures or for intent changes to the procedure. Validation is performed in the field

by qualified personnel, and may be accomplished by detailed scrutiny of the procedure as part of a walk-through exercise or as part of a walk-through drill (particularly for emergency or off-normal procedures). If the particular system or process is not available for a walk-through validation, talk-through may be performed in the particular shop or training environment. Performance of procedure validation is documented.

#### **11.4.2.5 Review**

Drafts of new procedures and procedure changes are distributed for technical reviews, safety discipline reviews (e.g., nuclear criticality, fire, radiation, industrial, and chemical process safety), and cross-discipline reviews, as needed.

Functional area and cross-discipline reviews are performed for the new procedure or procedure change. Comments/questions generated during the review process are resolved with the originating organizations. 10 CFR 70.72 and intent/non-intent screenings are performed for new and changed procedures (except minor administrative changes that are processed according to the procedure process).

Any new or revised NRC requirements that are promulgated are evaluated to determine the impact on existing implementing procedures or to identify the need for new implementing procedures. Procedures are reviewed following unusual incidents; such as an accident, unexpected transient, significant operator error, or equipment malfunction to determine if changes are appropriate based on the cause and corrective action determination for the particular incident. Procedure changes that are necessary because of a system modification are addressed in Section 11.1 of this license application, as part of the modification control process.

In addition, the Plant Safety Review Committee will review:

- Each new procedure required by Section 11.4.2.1 for this license application
- Each proposed change to procedures required by Section 11.4.2.1 of this license application, if the proposed change constitutes an intent change (i.e., a change in scope, method, or acceptance criteria that has safety significance)

#### **11.4.2.6 Approval**

Following the resolution of review comments, procedures are approved. Approval authority rests with the applicable ACP organization manager responsible for the activity.

Managers ensure that appropriate training is completed on new and revised procedures.

#### **11.4.2.7 Issuance and Distribution**

Procedures are issued and controlled in accordance with the RMDC program procedures. Copies of current approved procedures are available to users via electronic and/or hard copy distribution in the work areas.

### **11.4.3 Procedure Hierarchy**

The procedure hierarchy is established in four levels. The levels are:

- **Level 1** - Policy statements issued by executive management that apply to ACP personnel
- **Level 2** - Standard Practice Procedures that apply to more than one organization
- **Level 3** - Procedures issued at the organization level that apply to more than one group within a larger group or specific organization
- **Level 4** - Procedures issued within a group or sub-function

### **11.4.4 Temporary Changes**

Temporary changes to procedures required by Section 11.4.2.1 of this license application can be made, provided:

- The temporary change does not result in a change to the ISA as determined by the 10 CFR 70.72 review
- The temporary change does not constitute an intent change (i.e., a change in scope, method or acceptance criteria that has safety significance)
- The change is documented

These temporary changes to procedures may be used for a period of time, which should not exceed 30 days or a period for which the temporary condition exists whichever is greater. Temporary changes that need to exceed this period are assessed to ensure it is appropriate to extend the use of the temporary change or to process a permanent change. Temporary changes may be made permanent once the change is reviewed and approved as required by Section 11.4.2.4 of this license application.

### **11.4.5 Temporary Procedures**

Temporary procedures may be issued only when permanent procedures do not exist to:

- Direct operations during testing, maintenance, and modifications
- Provide guidance in unusual situations not within the scope of permanent procedures
- Ensure orderly and uniform operations for short periods when the building, a system, or component of a system is performing in a manner not covered by existing



permanent procedures, or has been modified or extended in such a manner that portions of existing procedures do not apply

These temporary procedures may be used for a period of time, which should not exceed 60 days or a period for which the temporary condition must exist, whichever is greater. Temporary procedures that need to exceed this period are assessed to ensure it is appropriate to extend the use of the temporary procedure or to develop a permanent procedure. These temporary procedures are subject to the same level of review and approval as required for permanent procedures.

#### **11.4.6 Periodic Review**

Approved procedures are periodically reviewed to ensure their continued accuracy and usefulness. Procedures are periodically reviewed according to established criteria. The periodicity of these reviews is based on procedure content as follows:

<u>Periodic Review Cycle</u>	<u>Procedures to Be Reviewed</u>
1 year	Emergency Operating, Alarm Response and procedures dealing with highly hazardous chemicals as defined by the chemical safety program
5 years	Procedures not included as part of the one-year review cycle

When conducting the periodic review, the procedure owner or SME performs a complete administrative and technical (requirements and references) review ensuring information is complete and accurate and that the procedure is usable as written.

#### **11.4.7 Use and Control of Procedures**

In-Hand (Continuous Use) procedures are followed step-by-step and are present in the work area while the task is being performed. In-Hand procedures, approved equipment alignment check sheets (e.g., valve lineups or electrical switching orders), or approved operator aids (e.g., process flow-charts or component identification tables) are developed for IROFS that have:

- Extensive or complex tasks;
- Tasks which are infrequently performed; or
- Tasks in which operations must be performed in a specified sequence.

Reference Use procedures are provided for routine procedural actions that are frequently repeated or of minimal complexity, and can be performed from memory. Reference Use procedures are not required to be present in the work area.

Information Use procedures are followed to implement administrative or programmatic requirements.

Hard copy controlled copies of procedures are marked “Controlled Copy.” Working copies of procedures are marked “Working Copy,” and verified as the latest version prior to use. Information Only copies of In-Hand (Continuous Use) or Reference Use procedures are marked “Information Only” to indicate they are not controlled copies and are not used to perform work. Procedures may be accessed and used directly from the electronic document management system.

If a step of a procedure cannot be performed as written, work is stopped, the system is immediately placed in a safe condition, and corrective actions are initiated in accordance with plant procedures.

ACP organization managers ensure personnel are trained on the use of procedures and are appropriately trained and qualified on the current version of the procedure as described in Section 11.3 of this license application.

#### **11.4.8 Records**

Records generated during procedure use are identified in the governing procedure and controlled according to the ACP RMDC program practices as described in Section 11.7 of this license application.

#### **11.4.9 Topics to be Covered in Procedures**

Activities defined by Section 11.4.2.1 of this license application are the minimum activities that are to be covered by written procedures. In addition, any activity described in Section 11.4.2.1 of this license application and listed below is covered by a written procedure (except for the maintenance activities listed below which may be covered by written procedures, documented work instructions, or drawings appropriate to the circumstances). This list is not intended to be all-inclusive, because many other activities carried out during plant operations may be covered by procedures not included in this list. Similarly, this listing is not intended to imply that procedures need to be developed with the same titles as those in the list. This listing provides guidance on topics to be covered rather than specific procedures.

- **ADMINISTRATIVE PROCEDURES**

- Training
- Audits and inspections

- Investigations and reporting
- RMDC
- Changes in facilities and equipment
- Modification design control
- QA
- Equipment control (lockout/tagout)
- Shift turnover
- Work control
- Management control
- Procedures management
- NCS
- Fire safety
- Radiation protection
- Radioactive waste management
- Maintenance
- Environmental protection
- Chemical process safety
- Operations
- IROFS surveillances
- Calibration control
- Preventive maintenance
- Procurement

- **SYSTEM PROCEDURES THAT ADDRESS START-UP, OPERATION, AND SHUTDOWN**

- Electrical power
- Ventilation
- Shift routines, shift turnover, and operating practices
- Sampling
- UF<sub>6</sub> cylinder handling
- UF<sub>6</sub> material handling equipment
- Decontamination operations
- Plant air
- Plant nitrogen
- Cooling water
- Sanitary water
- Plant water
- Temporary changes in operating procedures
- Purge and evacuation vacuum systems
- Installation and removal of centrifuge machines

- **ABNORMAL OPERATION/ALARM RESPONSE**

- Loss of cooling
- Loss of instrument air
- Loss of electrical power
- Fires
- Chemical process releases
- Loss of feed capacity

- Loss of withdrawal capacity
- Loss of purge vacuum
- **MAINTENANCE ACTIVITIES THAT ADDRESS SYSTEM REPAIR, CALIBRATION, INSPECTION, AND TESTING**
  - Repairs and preventive repairs of IROFS
  - Calibration of IROFS
  - Functional testing of IROFS
  - High-efficiency particulate air filter maintenance
  - Safety system relief valve replacement
  - Surveillance/monitoring
  - Piping integrity testing
  - Containment device testing
  - Repair of UF<sub>6</sub> valves
  - Testing of cranes
  - UF<sub>6</sub> cylinder inspection and testing
  - Centrifuge assembly/installation
- **EMERGENCY PROCEDURES**
  - Toxic chemical releases (including UF<sub>6</sub>)

#### **11.4.10 References**

1. ANSI/ANS 3.2-1994, *Administrative Controls and Quality Assurance for the Operational Phase of Nuclear Power Plants*

#### **11.5 Audits and Assessments**

The ACP implements a system of audits and assessments to help ensure that the health, safety, and environmental programs, as described in this license application are adequate and effectively implemented. The system is designed to ensure comprehensive program oversight at least once every three years. The system is comprised of two distinct levels of activities. These are audits and assessments.

### **11.5.1 Audits**

Audits are conducted by the QA Organization in accordance with written procedures or checklists by qualified auditors. The auditing organizations are independent from operations of the plant. Audits verify the effectiveness of health, safety, and environmental programs and their implementation and determine the effectiveness of the process being assessed. Audits further verify that the plant operations are being conducted safely in accordance with regulatory requirements and license application commitments.

These audits and their associated frequencies are conducted in accordance with Section 18.0 of the QAPD and use written procedures or checklists. Audits are performed under the direction of a Lead Auditor, qualified in accordance with the American Society of Mechanical Engineers (ASME) NQA-1, Supplement 2S-3. Lead Auditors and staff auditors are functionally and organizationally independent of the programs and activities that are examined. Where appropriate, audit teams are supplemented with plant and/or external technical specialists.

In addition to periodically evaluating aspects of the QAPD, audits are conducted for the areas of radiation safety; NCS; chemical safety; fire safety; environmental protection; emergency management; QA; CM, maintenance; training and qualification; procedures; incident investigation; and records management.

Audit results are documented and reported to the plant senior management as specified in plant procedures. Provisions are made for reporting and corrective action, where warranted. The plant Corrective Action Program, described in Section 11.6 of this license application, is administered by the Regulatory Organization to ensure proper control of corrective actions as defined in Section 16.0 of the QAPD.

### **11.5.2 Assessments**

Management responsible for implementing portions of the QAPD performs assessments to verify the adequacy of the part of the QAPD for which they are responsible and to assure its effective implementation. Personnel from the area being assessed may perform the assessment, provided that they do not have direct responsibility for the specific activity being assessed. Results of assessments are documented. The responsible organization manager resolves any observations from these programmatic assessments.

Organization managers maintain an assessment process within their organization to assess the adequacy of, and effectiveness of, the implementation of the programs under their cognizance. As a minimum, these assessments are conducted for the areas of radiation safety; NCS; chemical safety; fire safety; environmental protection; emergency management; QA; CM; maintenance; training and qualification; procedures; incident investigation; and records management.

Assessment results are documented and reported as specified in the plant procedures. Provisions are made for reporting and corrective action, where warranted, in accordance with the plant's Corrective Action Program.

## **11.6 Incident Investigations**

This section encompasses the identification, reporting, and investigation of abnormal events or conditions, including precursor events that may occur during operation of the ACP. This includes identification and categorization of the incident, as well as an analysis to determine the specific or generic causes, as well as generic implications.

The ACP is required by 10 CFR 70.50 and 70.74 to notify the NRC of certain events and conditions and to determine the root cause of the event, including all factors that contributed to the event and the manufacturer and model number (if applicable) of any equipment that failed or malfunctioned. Corrective actions taken or planned to prevent occurrence of similar or identical events in the future and the results of any evaluations or assessments must also be provided.

The ACP satisfies these requirements by following administrative procedures relating to incident identification and reporting. These procedures work together to ensure that abnormal events and conditions occurring at the ACP are promptly reported to appropriate personnel, assessed, and when required, reported to the NRC Operations Center or designated NRC office.

### **11.6.1 Incident Identification, Categorization, and Notification**

In accordance with procedures, plant personnel are required to report to their line manager or directly to the Operations Supervisor abnormal events or conditions that may have the potential to harm the safety, health, or security of on-site personnel, the general public, or the environment, including precursor events. These conditions may require an emergency response.

The Operations Supervisor, in accordance with procedures, assesses and categorizes abnormal events or conditions using the notification and reporting criteria set forth in 10 CFR 70.50 and 70.74 and other applicable regulations. In making the assessment, the Operations Supervisor may consult with ACP senior management or other personnel possessing expertise or knowledge concerning the type of event or condition being assessed.

If an event or condition within the plant is categorized as a reportable event, the Operations Supervisor makes initial notification to the NRC Operations Center or designated NRC office and provides, to the extent known at the time of notification, the information specified in 10 CFR 70.50(c)(1). Notification is made as soon as possible, but not later than the time period stated in the regulations. Notification time periods vary between 30 minutes and 24 hours. Verbal and/or written communication involving classified information is conducted in accordance with Chapter 2.0 of the Security Program for the American Centrifuge Plant.

### **11.6.2 Conduct of Incident Investigations**

The level of investigation of abnormal events and precursor events is based on a graded approach relative to the severity of the incident. Each reportable event where a follow-up written report to the NRC is required is investigated to determine the cause and corrective actions necessary to prevent recurrence. This investigation is conducted and documented in accordance with procedures. Other events not requiring a written report are evaluated using the Corrective Action Program to determine actions to be taken.

The investigation process includes a prompt risk-based evaluation and, depending on the complexity and severity of the event, one individual may suffice to conduct the evaluation or an event investigation team may be warranted. Investigations will begin within 48 hours of the abnormal event, or sooner, depending on the safety significance of the event and commensurate with the safety of the investigators. The investigator(s) are independent from the line function involved with the incident under investigation. A procedure provides a documented plan for investigating abnormal events and includes the functions, responsibilities, and scope of authority of investigators. This plan is separate from any required Emergency Plan or emergency response. A reasonable, systematic, structured approach is used to determine the specific or generic root causes and generic implications of abnormal events, such as the TapRoot<sup>®</sup> methodology. The record of IROFS failures required by 10 CFR 70.62(a)(3) for IROFS is reviewed as part of the investigation and updated in accordance with regulatory requirements.

For each event or condition that requires a follow-up written report to the NRC, the incident investigation report includes a description, contributing factors, a root cause analysis, and findings and recommendations. Auditable records and documentation related to abnormal events, investigations, and root cause analyses are maintained. Documentation relating to the investigation is retained for two years or for the life of the operation, whichever is longer. The original investigation reports are available to the NRC upon request.

The investigator(s) have the authority to obtain all the information considered necessary during the course of the investigation and participants of an investigation team are assured of no retaliation for participation in an investigation. Line management cooperates fully with the investigators. The individual leading the investigation is trained and qualified in root cause analysis techniques. This individual is responsible for ensuring the conduct of the investigation is in accordance with procedures and that the outcome of the investigation is properly documented and reported to appropriate levels of management with responsibility for the abnormal event. If a team is used, it includes at least one process expert in addition to the trained root cause investigator. An individual is chosen to lead the incident investigation based on experience and knowledge of the particular area involved with the event or condition.

### **11.6.3 Follow-up Written Report**

When required by regulations, a report summarizing the results of the event investigation is prepared in accordance with procedures. The report contains, at a minimum, the information specified in 10 CFR 70.50(c)(2). The written report is forwarded to the NRC within the time



limit specified in the applicable NRC regulations, with the exception that the follow-up written reports required by 10 CFR 70.50(c)(2) are submitted within 60 days.

The 10 CFR 70.50(c)(2) reporting criteria require that the ACP submit a written follow-up report within 30 days of the initial report required by 10 CFR 70.50 (a) or (b) or by 10 CFR 70.74 and Appendix A of Part 70. In lieu of the 30-day requirement described in 10 CFR 70.50(c)(2), NRC approval to submit the required written reports within 60 days of the initial notifications is hereby requested. This exemption request is provided in Section 1.2.5 of this license application.

#### **11.6.4 Corrective Actions**

For each significant condition adverse to quality or reportable event where a follow-up written report to the NRC is required, corrective actions to prevent recurrence are developed by responsible management, tracked in a database, and monitored through completion in accordance with the Corrective Action Program. Corrective actions are taken within a reasonable period, commensurate with the safety significance of the event. Evidence files used to support action closure are maintained in accordance with approved records management procedures.

Documentation is maintained so that “lessons learned” may be applied to future operations of the ACP. Details of the event sequence are compared with accident sequences already considered in the ISA. Should it be necessary, the ISA Summary is modified to include evaluation of the risk associated with accidents of the type actually experienced. Relevant findings from incident investigations are reviewed with affected ACP personnel.

### **11.7 Records Management and Document Control**

RMDC programs are established to ensure records and documents required by the QAPD are appropriately managed and controlled. These programs are designed to meet the specific record keeping and document control requirements set forth in 10 CFR Part 70 and the applicable provisions of other parts of 10 CFR. These programs provide administrative controls that establish standard methods and requirements for collecting, maintaining, and disposing of records. These programs also ensure that documents are controlled and distributed in accordance with identified written requirements and authorizations. The administrative controls for the generation and revision of records and documents are contained in implementing procedures. The principal elements of each of the RMDC programs and a brief description of the manner in which the functions associated with each element are performed are provided below, along with a list of the types of records that are retained for the duration of the licensed activities.

#### **11.7.1 Records Management Program**

The Records Management program provides direction for the handling, transmittal, storage, and retrievability of records. Records Management design provides for adequate assurance that the appropriate records of IROFS are maintained in accordance with the BDC contained in 10 CFR 70.64(a) and the defense in depth requirements of 10 CFR 70.64(b).

Records maintained pursuant to 10 CFR Part 70 may be the original, a reproduced copy, electronic media, or microform, if such reproduced copy, electronic media, or microform is duly authenticated by authorized personnel and is capable of producing clear, complete, accurate and legible copies through storage for the period specified by regulation. Records such as letters, drawings, and specifications must include pertinent information such as stamps, initials, and signatures. Initials and signatures may be authenticated electronic reproductions. Records are categorized and handled in accordance with their relative importance to safety and storage needs. Special provisions are made for handling contaminated records and ensuring their inclusion in the program. This program is implemented through procedures that provide guidance for the following program elements.

#### **11.7.1.1 Legibility, Accuracy, and Completeness**

Documents designated to become records must be legible, accurate, complete, and contain an appropriate level of detail commensurate with the work being performed and the information required for that type of record.

#### **11.7.1.2 Identification of Items and Activities**

Records clearly and specifically identify the items or activities to which they apply.

#### **11.7.1.3 Authentication**

Records are authenticated or validated by the manager of the organization that originates the record, or his designee, as specified in the procedure, which controls the generation and revision of these records.

#### **11.7.1.4 Indexing and Filing**

Methods are specified for indexing, filing, and locating records within the record system to ensure the records can be retrieved in a timely manner.

#### **11.7.1.5 Retention and Disposition**

Records retention times are specified in a retention schedule, developed by the manager of the organization that originates the record, or the designee. The process for disposition of records that have reached the end of their retention lifetime is specified by procedures and conforms to applicable requirements.

#### **11.7.1.6 Corrections**

Corrections to records are approved by the organization that created the record unless other organizations are specifically designated. Changes are made by clearly indicating the correction, the date of the correction and the identification of the individual making the correction.

### **11.7.1.7 Protection of Records**

Controls are established for protection of records from deterioration, loss, damage, theft, tampering, and/or unauthorized access for the life of the record. Requirements include instructions on protection of records by the record originator until they are transferred to Records Management. Instructions for the protection of special record media such as radiographs, photographs, negatives, microform and magnetic media are provided to prevent damage from excessive light, stacking, electromagnetic fields, temperature, humidity, or any other condition adverse to the preservation of those records. Records, which cannot be duplicated, are stored in a fashion that minimizes deterioration.

### **11.7.1.8 Storage Requirements**

Records encompassed by the QAPD are stored in authorized facilities or containers providing protection from fire hazards, natural disasters, environmental conditions, and infestations of insects, mold, or rodents. Storage facilities are maintained to ensure continuous protection of the records. Requirements are specified for both permanent and temporary storage of records.

- **Permanent Storage**

Records are permanently stored in facilities satisfying the following requirements:

- Storage in 2-hour-rated containers meeting National Fire Protection Association (NFPA) 232-2000 with the clarification that if the NFPA 232 method of storage in 2-hour-rated containers is used, any exceptions to this standard will be documented and justified by the authority having jurisdiction; or
- Storage of duplicate copies in separate facilities that are sufficiently remote from each other to eliminate the possibility of exposure to simultaneous hazards; or
- Storage in facilities that have the following: doors, structures, frames, and hardware that comply with a minimum 2-hour fire rating; a fire protection system; 2-hour fire rated dampers on boundary penetrations; sealed floor surface to minimize concrete dust; adequate access and aisle ways; and a prohibition on eating, drinking, or smoking and performing work other than that associated with records storage or retrieval.

- **Temporary Storage**

The RMDC process requires that those completed records documenting nuclear safety or safeguards and security matters, which are being held temporarily by originating organizations, be properly protected by maintaining them in 1-hour, fire-rated containers. If 1-hour fire-rated containers are used they either bear an Underwriters Laboratory label (or equivalent) certifying 1-hour fire protection, or the containers are certified for 1-hour fire protection by an authorized individual competent in the field

of fire protection. Procedural requirements are used to limit the length of time during which records may be maintained in temporary storage, based on the significance of the record.

#### **11.7.1.9 Receipt of Records**

A record transmittal process is used to formally transmit records to Records Management. The process includes a receipt acknowledgment that notifies the sending organization that the records have been received and accepted.

#### **11.7.1.10 Access to Records and Accountability for Removed Records**

Requirements for controlling access to records and maintaining accountability for records are provided to ensure that only authorized personnel have access to records and to prevent loss, damage, or inadvertent destruction of records.

#### **11.7.1.11 Records Requirements for Procured Goods or Services**

Records management requirements for goods or services procured from outside suppliers are specified in the applicable procurement documents. These requirements cover:

- Supplier methods for collection, storage, and maintenance of records
- Identification of required records and applicable retention periods
- Records submittal plans or indexes
- Availability, accessibility, and if applicable, disposition criteria for records retained by the supplier
- Accessibility of the supplier's records prior to the final transfer to the purchaser

#### **11.7.1.12 Control of Sensitive Records**

Control, accountability, protection, and disposition of classified and sensitive records are in accordance with Chapter 2.0 of the Security Program for the American Centrifuge Plant and any other applicable security and privacy requirements. Control of contaminated records is in accordance with applicable radiological control requirements.

#### **11.7.1.13 Types of Records**

The requirements for records management vary according to the nature of the plant and the hazards and risks posed by it. Examples of the records required by 10 CFR Parts 19, 20, 21, 25, and 70 are identified in Section 11.7.5 of this license application. The records are listed under the chapter headings of the Standard Review Plan (SRP). The list is not intended to be

exhaustive or prescriptive. Different or additional records may be required in certain circumstances.

#### **11.7.1.14 Usage and Control of Computer Codes and Data**

Computer programs used in the Records Management program are controlled and maintained in accordance with procedures. These requirements and practices provide for virus protection as well as access control to the Records Management program database and ensure continuing usability of the codes as hardware and software technology change. Routine backups of the Records Management database are performed by application administrators. Precautions are taken to ensure that computer data that constitute a record are stored in a format that is readily retrievable even as hardware and software technology evolve. The storage format of computer data is reviewed as required to determine threats to future retrievability, and if necessary, the data are translated to an updated format and verified acceptable.

#### **11.7.1.15 Items Relied On For Safety Failures**

Records of IROFS failures are kept and updated in accordance with 10 CFR 70.62 (a)(3). Record revisions necessitated by post-failure investigation conclusions will be made promptly in accordance with 10 CFR 70.62(a)(3) based on the nature of the record, extent of revision necessary, and potential safety significance. Necessary record revisions will be made within 30 days of the completion of the investigation, unless specifically approved by ACP management

#### **11.7.1.16 Assessment**

The overall effectiveness of the Records Management program is evaluated through the audit program described in the Section 18 of the QAPD. Deficiencies identified are corrected in a timely manner in accordance with the procedures described in Section 11.6 of this license application.

### **11.7.2 Document Control Program**

The Document Control program provides direction for the handling, distribution, and transmittal of documents important to nuclear safety and safeguards and security that specify quality requirements or prescribe activities affecting quality, such as procedures, drawings, and calculations. This program is implemented through procedures that provide guidance on the following program elements.

#### **11.7.2.1 Unique Identifier**

A unique identification number is assigned or obtained by the generator for each document requiring controlled distribution. Document Control concurs with the numbering scheme for each document type.

### **11.7.2.2 Approval and Release of Documents**

For documents and changes to documents required by the QAPD, requirements are established for approval and release of those documents for distribution. Organizations that are authorized to approve controlled documents are identified in the plant procedures. Changes to controlled documents are approved. After approval, the documents are forwarded to Document Control for control and distribution pursuant to the personnel on the approved distribution list.

### **11.7.2.3 Master Copy**

A master copy of approved controlled documents is maintained by Document Control to ensure the document is available for controlled copy issuance.

### **11.7.2.4 Controlled Document Index and Distribution Lists**

Creation and maintenance of a controlled document index and controlled distribution list(s) for each document or document type are required. The controlled document index is used to maintain a list of controlled documents and to track the current (latest) approved revision levels of those documents. The index is available to users to verify current document revision levels. The controlled document index and the distribution lists are maintained and updated by Document Control.

### **11.7.2.5 Copies of Controlled Documents**

Each controlled copy is stamped, marked, or otherwise identified. A method is established in procedures for duplicating and marking controlled documents so that duplicates are distinguishable from the controlled version. Copies of controlled documents that are not marked or otherwise identified in accordance with procedural requirements are considered information only.

### **11.7.2.6 Distribution**

Controlled documents are distributed in accordance with controlled distribution lists to ensure that they are available in a timely manner at locations where work is being performed. Specific time requirements are established for controlled document distribution and receipt acknowledgment. Document Control uses a transmittal form to distribute controlled documents to copyholders. Copyholders sign, date, and return the transmittal form to confirm that they have received the documents. Document Control tracks the issuance and receipt of transmittals.

### **11.7.2.7 Voided, Canceled, or Superseded Documents**

When notified by the generator of a controlled document that the document has been voided, canceled, or superseded, Document Control removes the document from distribution and notifies copyholders of the changed status.

The approved revised document is distributed at the time that the original document is superseded. The Document Control database is updated to identify the latest approved revision of the document. Distribution of revised documents is described in the Document Control Program procedure and using a Transmittal Form distributed by either interoffice mail or hand delivery. The holder of the Controlled Copy is required to acknowledge receipt by returning a signed Transmittal Form to Document Control. Document distribution is completed in accordance with the safety significance of the document being distributed.

#### **11.7.2.8 Marking Sensitive Documents**

Proper marking and handling of documents designated as classified or sensitive documents is accomplished in accordance with Chapter 2.0 of the Security Program for the American Centrifuge Plant and any other applicable security and privacy requirements.

#### **11.7.2.9 Change Documents**

Change documents are documents that are used to modify controlled documents. Controls are also applied to the change documents to provide revision approval and distribution controls equivalent to the original document until completion of installation, at which time the original document is revised. Documents showing the current configuration are not changed until the modifications are completed.

#### **11.7.2.10 Revision Identification**

The controlled document revision level is clearly identified on the document.

#### **11.7.2.11 Document User Responsibilities**

Responsibilities of the end user and copyholders are defined. Responsibilities include requirements for the use of controlled documents and working copies. Copyholders of controlled documents update their controlled documents each time a revision or change is sent out, and promptly return the transmittal form acknowledging receipt.

#### **11.7.2.12 Usage and Control of Computer Codes and Data**

Computer programs used in the Document Control program are controlled and maintained in accordance with the "Computing and Telecommunications Security Manual" and Information Systems procedures. These requirements provide for virus protection as well as access control to the Document Control program database and ensure continuing usability of the codes and data as hardware and software technology change. For example, procedures allow older forms of information and codes for older computing equipment to be transferred to contemporary computing media and equipment. Routine backups of the Document Control database are performed by application administrators.



### **11.7.2.13 Assessment**

The overall effectiveness of the Document Control program is evaluated through the audit program described in Section 18 of the QAPD. Deficiencies identified are corrected in a timely manner in accordance with the requirements described in Section 11.6 of this license application.

### **11.7.2.14 Archiving Documents**

The record copy of revisions of controlled documents is transmitted to Records Management in accordance with the requirements of the Records Management program.

## **11.7.3 Organization and Administration**

### **11.7.3.1 Responsibilities**

The Engineering Manager is responsible for the RMDC program. These responsibilities include:

- Directing the activities and personnel of the RMDC programs
- Directing the development, implementation, and maintenance of methods and procedures encompassing a records management program
- Directing the development, implementation, and maintenance of methods and procedures encompassing a document control program
- Assuring that the laws, codes, standards, regulations, and company procedures pertaining to record keeping and document control requirements are met

### **11.7.3.2 Training and Qualifications**

Appropriately trained and qualified personnel manage the RMDC programs. No specific experience related to the control of documents or management of records is required, although previous technical or RMDC experience is recommended.

## **11.7.4 Employee Training**

General training in RMDC is provided to employees as part of the general topics covered in GET, as described in Section 11.3 of this license application.



### **11.7.5 Examples of Records**

The following are examples of the types of records maintained by RMDC.

- **Chapter 1.0 - General Information**

- Construction records
- Plant and equipment descriptions and drawings
- Design criteria, requirements, and bases for IROFS as specified by the ACP CM function
- Records of plant changes and associated integrated safety analyses, as specified by the ACP CM function
- Safety analyses, reports, and assessments
- Records of site characterization measurements and data
- Records pertaining to on-site disposal of radioactive or mixed wastes in surface landfills
- Procurement records, including specifications for IROFS

- **Chapter 2.0 - Organization and Administration**

- Administrative procedures with safety implications
- Change control records for nuclear material control and accounting program
- Organization charts, position descriptions, and qualification records
- Safety and health compliance records, medical records, personnel exposure records, etc.
- QA records
- Safety inspections, audits, assessments, and investigations
- Safety statistics and trends

- **Chapter 3.0 - Integrated Safety Analysis**

- **Chapter 4.0 - Radiation Safety**

- Bioassay data
- Exposure records
- Radiation protection (and contamination control) records
- Radiation training records
- Radiation work permits

- **Chapter 5.0 - Nuclear Criticality Safety**

- Nuclear criticality control written procedures and statistics
- NCS evaluations
- Records pertaining to nuclear criticality inspections, audits, investigations, and assessments
- Records pertaining to nuclear criticality incidents, unusual occurrences, or accidents
- Records pertaining to NCS evaluations

- **Chapter 6.0 - Chemical Safety**

- Chemical process safety procedures and plans
- Records pertaining to chemical process inspections, audits, investigations, and assessments
- Chemical process diagrams, charts, and drawings
- Records pertaining to chemical process incidents, unusual occurrences, or accidents
- Chemical process safety reports and analyses
- Chemical process safety training

- **Chapter 7.0 - Fire Safety**

- Fire Hazard Analysis
- Fire prevention measures, including hot-work permits and fire watch records

- Records pertaining to inspection, maintenance, and testing of fire protection equipment
- Records pertaining to fire protection training and retraining of response teams
- Pre-fire emergency plans
- **Chapter 8.0 - Emergency Management**
  - Emergency plan(s) and procedures
  - Comments on emergency plan from outside emergency response organizations
  - Emergency drill records
  - Memoranda of understanding with outside emergency response organizations
  - Records of actual events
  - Records pertaining to the training and retraining of personnel involved in emergency preparedness functions
  - Records pertaining to the inspection and maintenance of emergency response equipment and supplies
- **Chapter 9.0 - Environmental Protection**
  - Environmental release and monitoring records
  - Environmental report and supplements to the environmental report, as applicable
- **Chapter 10.0 - Decommissioning**
  - Decommissioning records
  - Financial assurance documents
  - Decommissioning cost estimates
  - Site characterization data
  - Final survey data
  - Decommissioning procedures

▪ **Chapter 11.0 - Management Measures**

➤ Section 11.1 - Configuration Management

- ❖ Safety analyses, reports, and assessments that support the physical configuration of process designs, and changes to those designs
- ❖ Validation records for computer software used for safety analysis or nuclear material control and accounting
- ❖ ISA documents, including process descriptions, plant drawings and specifications, purchase specifications for IROFS
- ❖ Approved, current operating procedures and emergency operating procedures

➤ Section 11.2 - Maintenance

- ❖ Record of IROFS failures (required by 10 CFR 70.62)
- ❖ PM records, including trending and root cause analysis
- ❖ Calibration and testing data for IROFS
- ❖ Corrective maintenance records

➤ Section 11.3 - Training and Qualification

- ❖ Personnel training and qualification records
- ❖ Training procedures
- ❖ Training modules

➤ Section 11.4 - Procedures

- ❖ Standard operating procedures
- ❖ Functional test procedures

➤ Section 11.5 - Audits and Assessments

- ❖ Audits and assessments of safety and environmental activities

➤ Section 11.6 - Incident Investigations

- ❖ Investigation reports

- ❖ Changes recommended by investigation reports, how and when implemented
- ❖ Summary of reportable events for the term of the license
- ❖ Incident investigation policy
- Section 11.7 - Records Management
  - ❖ Policy
  - ❖ Material storage records
  - ❖ Records of receipt, transfer, and disposal of radioactive material
- Section 11.8 - Other QA Elements
  - ❖ Inspection records
  - ❖ Test records
  - ❖ Corrective action records

## **11.8 Other Quality Assurance Elements**

The plant has developed QA principles that apply to the design, fabrication, refurbishment, modification, testing, operation, and maintenance of the plant. These principles are described in the QAPD, submitted as document NR-3605-0003 Quality Assurance Program Description for the American Centrifuge Plant.

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