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8.0 EMERGENCY MANAGEMENT

The plans for coping with emergencies at the National Enrichment Facility are presented in the facility Emergency Plan. The Emergency Plan has been developed in accordance with 10 CFR 70.22(i) (CFR, 2003a) and 10 CFR 40.31(j) (CFR, 2003b). The Emergency Plan conforms to the guidance presented in Regulatory Guide 3.67, Standard Format and Content for Emergency Plans for Fuel Cycle and Materials Facilities, (NRC, 1992). The facility Emergency Plan also addresses the specific acceptance criteria in NUREG-1520, Standard Review Plan for the Review of a License Application for a Fuel Cycle Facility, (NRC, 2002), Chapter 8, Emergency Management.

The Emergency Plan identifies the offsite organizations that reviewed the Emergency Plan pursuant to the requirement in 10 CFR 70.22(i)(4) (CFR, 2003a) and 10 CFR 40.31(j)(4) (CFR, 2003b). Memorandums of Understanding with the off-site organizations are provided in the Emergency Plan.

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8.1 REFERENCES

CFR, 2003a. Title 10, Code of Federal Regulations, Section 70.22, Contents of applications, 2003.

CFR, 2003b. Title 10, Code of Federal Regulations, Section 40.31, Application for specific licenses, 2003.

NRC, 1992. Standard Format and Content of Emergency Plans for Fuel Cycle and Materials Facilities, Regulatory Guide 3.67, U.S. Nuclear Regulatory Commission, January 1992.

NRC, 2002. Standard Review Plan for the Review of a License Application for a Fuel Cycle Facility, NUREG-1520, U.S. Nuclear Regulatory Commission, March 2002.

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9.0 ENVIRONMENTAL PROTECTION

Louisiana Energy Services (LES) has prepared documents to demonstrate that its proposed environmental protective measures are adequate to protect the environment and the health and safety of the public as well as comply with the regulatory requirements imposed in 10 CFR 20 (CFR, 2003a), 10 CFR 30 (CFR, 2003b), 10 CFR 40 (CFR, 2003c), 10 CFR 51 (CFR, 2003d), and 10 CFR 70 (CFR, 2003e). The Environmental Report (ER) from LES' previous application (LES, 1994) was reviewed and information that was unchanged and found acceptable by the Nuclear Regulatory Commission (NRC) in NUREG-1484 (NRC, 1994) has been noted in the present ER.

Summarized below are the chapter section, general information category, the corresponding regulatory requirement, and the NUREG-1520 (NRC, 2002) section identifying the NRC acceptance criteria.

Chapter Section	Information Category	10 CFR Citation	NUREG-1520 Reference
9.1	Environmental Report	70.21(h)	9.4.3.1.1
9.1.1	Date of Application	70.21(f)	9.4.3.1.1(1)
9.1.2	Environmental Considerations	51.45(b)	9.4.3.1.1(2)
9.1.3	Analysis of Effects of Proposed Action and Alternatives	51.45(c)	9.4.3.1.1(3)
9.1.4	Status of Compliance	51.45(d)	9.4.3.1.1(4)
9.1.5	Adverse Information	51.45(e)	9.4.3.1.1(5)
9.2	Environmental Protection Measures	70.22(a)(8)	9.4.3.2
9.2.1	Radiation Safety	20.1101(a)	9.4.3.2.1
	• ALARA Controls and Reports	20.1101(d)	9.4.3.2.1(1)-(3)
	• Waste Minimization	20.1406	9.4.3.2.1(4)
9.2.2	Effluent and Environmental Controls and Monitoring	70.59(a)(1)	9.4.3.2.2
9.2.2.1	Effluent Monitoring	20.1501(a)	9.4.3.2.2(1)
9.2.2.2	Environmental Monitoring	20.1501(a)	9.4.3.2.2(2)
9.2.2.3	ISA Summary	70.65(b)	9.4.3.2.2(3)

This Safety Analysis Report (SAR) Chapter documents the potential environmental impacts associated with construction and operation of the NEF and indicates that adverse impacts are small. These impacts are outweighed by the substantial socioeconomic benefits associated with plant construction and operation. Additionally, the NEF will meet the underlying need for additional reliable and economical uranium enrichment capacity in the United States, thereby serving important energy and national security policy objectives. Accordingly, because the impacts of the proposed NEF are minimal and acceptable, and the benefits are desirable, the no-action alternative may be rejected in favor of the proposed action.

9.1 ENVIRONMENTAL REPORT

LES has prepared an Environmental Report (ER) that meets the requirements contained in 10 CFR Part 51 (CFR, 2003d), Subpart A. In particular, the ER addresses the requirements in 10 CFR 51.45(b)-(e) (CFR, 2003f) and follows the general format of NUREG-1748 (NRC, 2003).

The ER presents the proposed action, purpose of the proposed action, and applicable regulatory requirements (Chapter 1), discusses alternatives (Chapter 2), describes the facility and the affected environment (Chapter 3), and potential impacts of the proposed action (Chapter 4). Mitigation measures are described in Chapter 5, environmental measurements and monitoring programs in Chapter 6, a cost-benefit analysis in Chapter 7, and a summary of environmental consequences in Chapter 8. References and preparers are listed in Chapters 9 and 10, respectively.

9.1.1 Date of Application

The effective date of the ER is December 16, 2003. As required by 10 CFR 70.21(f) (CFR, 2003g), this date is at least nine months before facility construction is scheduled to begin in 2006.

9.1.2 Environmental Considerations

Applicant's ER adequately addresses the requirements of 10 CFR 51.45(b) (CFR, 2003f) as follows:

9.1.2.1 Description of the Proposed Action

The proposed action, described in ER Section 1.1, Proposed Action, is the issuance of an NRC specific license under 10 CFR 30 (CFR, 2003b), 10 CFR 40 (CFR, 2003c) and 10 CFR 70 (CFR, 2003e) to possess and use byproduct material, source material and special nuclear material (SNM) and to construct and operate a uranium enrichment facility in Lea County, New Mexico. The enriched uranium is intended for use in domestic commercial nuclear power plants.

Significant characteristics of the facility are described in ER Chapters 1, Introduction of the Environmental Report and Chapter 3, Description of Affected Environment. Major site features, along with plant design and operating parameters are included. A discussion of how the special nuclear material (SNM), in this case uranium hexafluoride (UF₆), will be processed to produce enriched uranium-235 (²³⁵U) is described in ER Section 1.2, Proposed Action, which also includes the proposed project schedule.

9.1.2.2 Purpose of Proposed Action

ER Section 1.2, Purpose and Need for the Proposed Action, demonstrates the need for the facility. The demonstration provides the

- Quantities of SNM used for domestic benefit

- A projection of domestic and foreign requirements for services
- Alternative sources of supply for LES' proposed services.

ER Section 1.2, Purpose and Need for the Proposed Action, also discusses if delay of the facility occurs, the effects to the nation's energy program or LES's business such as loss of contracts.

9.1.2.3 Description of the Affected Environment

Chapter 3 of the ER contains detailed descriptions of the affected environment. The chapter provides a baseline characterization of the site and its environs prior to any disturbances associated with construction or operation of the facility. The following topics and corresponding ER chapter section include:

- Site location (including longitude and latitude) and facility layout (2.1)
- Regional demography (3.10) and land use (3.1)
- Socioeconomic information, including low-income and minority populations within 80 km (50 mi) as directed by NUREG-1748 (3.10)
- Regional historic (3.8), archeological (3.8), architectural (3.9), scenic (3.9), cultural (3.8), and natural landmarks (3.9)
- Local meteorology and air quality (3.6)
- Local surface water and ground water hydrology (3.4)
- Regional geology and seismology (3.3)
- Local terrestrial and aquatic ecology (3.5).

The baseline descriptions presented are from the most current information available. It was gathered from Federal, State, and County sources along with existing on-site data. Therefore, the information represents both seasonal and long-term environmental trends.

9.1.2.4 Discussion of Considerations

Three ER chapters discuss the potential environmental impacts relating to the proposed action. Chapter 4 details environmental and socioeconomic effects due to site preparation and facility construction and operation. Chapter 2 describes alternatives to the proposed action, including siting and designs. Chapter 7 provides a discussion of the costs and benefits for each alternative as well as the relationship between short-term use and long-term productivity of the environment, and resources committed. In addition, Chapter 8 provides a summary of environmental consequences from all actions. The associated regulatory criteria and corresponding ER section are as follows.

A. Impact of the Proposed Action on the Environment

- Effects of site preparation and construction on land (4.1) and water use (4.4)
- Effects of facility operation on human population (including consideration of occupation and public radiation exposure) and important biota (4.10, 4.11, and 4.12)

- Any irreversible commitments of resources because of site preparation and facility construction and operation, such as destruction of wildlife habitat, removal of land from agriculture, and diversion of electrical power (4.1, 7.0, and 8.2)
- Plans and policies regarding decommissioning and dismantling at the end of the facility's life (8.9)
- Environmental effects of the transportation of radioactive materials to and from the site (4.2)
- Environmental effects of accidents (4.12)
- Impacts on air (4.6) and water quality (4.4)
- Impacts on cultural and historic resources (4.8).

B. Adverse Environmental Effects

Three chapters in the ER discuss adverse environmental effects. Refer to Section 9.1.5 below for additional detail on the associated ER chapters and topics.

C. Alternatives to the Proposed Action

ER Chapter 2 provides a complete description of alternatives to the proposed action. Included is the no action alternative as well as the siting criteria and technical design requirements in sufficient detail to allow a fair and reasonable comparison between the alternatives.

D. Relationship between Short- and Long-term Productivity

ER Chapter 7, the cost-benefit analysis, included the consideration of the short-term uses and productivity of the site during the active life of the facility. No adverse impacts on the long-term productivity of the environment after decommissioning of the facility have been identified. The European experience at the Almelo enrichment plant demonstrates that a centrifuge technology site can be returned to a greenfield site for use without restriction.

E. Irreversible and Irretrievable Commitments of Resources

Irreversible environmental commitments and irretrievable material resources also are included in the cost-benefit analysis in ER Chapter 7. They are part of the capital costs associated with the land and facility and operating and maintenance costs. No significant commitments are involved with the proposed action. The site should be available for unrestricted use following decommissioning. Some components may be reused or sold as scrap during the plant life or following decommissioning.

9.1.3 Analysis of Effects of Proposed Action and Alternatives

ER Chapter 2 discusses the analysis of effects of the proposed action and alternatives in accordance with 10 CFR 51.45(c) (CFR, 2003f). The analysis considers and balances the

environmental effects of the proposed action and alternatives available to reduce or avoid both environmental and socioeconomic effects and other benefits of the proposed action.

9.1.4 Status of Compliance

ER Section 1.3 summarizes, as required in 10 CFR 51.45(d) (CFR, 2003f), the applicability of environmental regulatory requirements, permits, licenses, or approvals as well as the current status of each on the effective date of the ER.

Many federal laws and regulations apply to the facility during site assessment, construction, and operation. Some of these laws require permits from, consultations with, or approvals by, other governing or regulatory agencies. Some apply only during certain phases of facility development, rather than the entire life of the facility. Federal statutes and regulations (non-nuclear) have been reviewed to determine their applicability to the facility site assessment, construction, and operation.

9.1.5 Adverse Information

In accordance with 10 CFR 51.45(e) (CFR, 2003f), various sections throughout the ER discuss adverse environmental effects. In particular, Chapter 4 details environmental and socioeconomic effects due to site preparation and facility construction and operation. Chapter 2 compares potential impacts from alternatives. Lastly, Chapter 8 provides a summary of environmental consequences from all actions.

9.2 ENVIRONMENTAL PROTECTION MEASURES

LES is committed to protecting the public, plant workers, and the environment from the harmful effects of ionizing radiation due to plant operation. Accordingly, LES is firmly committed to the "As Low As Reasonably Achievable," (ALARA) philosophy for all operations involving source, byproduct, and special nuclear material. This commitment is reflected in written procedures and instructions for operations involving potential exposures of personnel to radiation (both internal and external hazards) and the facility design.

Part of LES's environmental protective measures are described in the ER. In particular, Chapter 4 discusses the anticipated results of the radiation protection program with regard to ALARA goals and waste minimization. Chapter 6 discusses the environmental controls and monitoring program.

A detailed description of LES' radiation protection program is included separately in this License Application as Safety Analysis Report (SAR) Chapter 4. Similarly, LES's provisions for a qualified and trained staff, which also is part of the environmental protection measures required, are described separately in the SAR as part of Chapter 11.

9.2.1 Radiation Safety

The four acceptance criteria that describe the facility radiation safety program are divided between two License Application documents. SAR Chapter 4 describes:

- Radiological (ALARA) Goals for Effluent Control
- ALARA Reviews and Reports to Management.

ER Chapter 4, Environmental Impacts, addresses:

- Effluents controls to maintain public doses ALARA, and
- Waste Minimization.

In particular, ER Section 4.12 describes public and occupational health effects from both non-radiological and radiological sources. This section specifically addresses calculated total effective dose equivalent to an average member of critical groups or calculated average annual concentration of radioactive material in gaseous and liquid effluent to maintain compliance with 10 CFR 20 (CFR, 2003a).

ER Section 4.13 contains a discussion on facility waste minimization that identifies process features and systems to reduce or eliminate waste. It also describes methods to minimize the volume of waste.

9.2.2 Effluent and Environmental Controls and Monitoring

LES has designed an environmental monitoring program to provide comprehensive data to monitor the facility's impact on the environment. The preoperational program will focus on collecting data to establish baseline information useful in evaluating changes in potential environmental conditions caused by facility operation. The preoperational program will be initiated at least two years prior to facility operation.

The operational program will monitor to ensure facility emissions are maintained ALARA. Monitoring will be of appropriate pathways up to a 2-mile radius beyond the site boundary.

ER Chapter 6 describes environmental measurement and monitoring programs as they apply to preoperation (baseline), operation, and decommissioning conditions for both the proposed action and each alternative.

9.2.2.1 Effluent Monitoring

ER Section 6.1 presents information relating to the facility radiological monitoring program. This section describes the location and characteristics of radiation sources and radioactive effluent (liquid and gaseous). It also describes the various elements of the monitoring program, including:

- Number and location of sample collection points
- Measuring devices used
- Pathway sampled or measured
- Sample size, collection frequency and duration
- Method and frequency of analysis, including lower limits of detection.

Lastly, this section justifies the choice of sample locations, analyses, frequencies, durations, sizes, and lower limits of detection.

9.2.2.2 Environmental Monitoring

ER Section 6.1 also includes information relating to the facility environmental monitoring program. The information presented is the same as that included in the effluent monitoring program, i.e., number and location of sample collection points, etc.

9.2.3 Integrated Safety Analysis

LES has prepared an integrated safety analysis (ISA) in accordance with 10 CFR 70.60 (CFR, 2003h). Refer to this SAR, Chapter 3 for a summary of the ISA. As noted, the ISA

- Provides a complete list of the accident sequences that if uncontrolled could result in radiological and non-radiological releases to the environment with intermediate or high consequences
- Provides reasonable estimates for the likelihood and consequences of each accident identified

- Applies acceptable methods to estimate environmental effects that may result from accidental releases.

The ISA also

- Identifies adequate engineering and/or administrative controls for each accident sequence of environmental significance
- Assures adequate levels are afforded so those items relied on for safety (IROFS) will satisfactorily perform their safety functions.

The ISA demonstrates that the facility and its operations have adequate engineering and/or administrative controls in place to prevent or mitigate high and intermediate consequences from the accident sequences identified and analyzed.

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9.3 REFERENCES

CFR, 2003a. Title 10, Code of Federal Regulations, Part 20, Standards for Protection Against Radiation, 2003.

CFR, 2003b. Title 10, Code of Federal Regulations, Part 30, Rules of General Applicability to Domestic Licensing of Byproduct Material, 2003.

CFR, 2003c. Title 10, Code of Federal Regulations, Part 40, Domestic Licensing of Source Material, 2003.

CFR, 2003d. Title 10, Code of Federal Regulations, Part 51, Environmental Protection Regulations for Domestic Licensing and Related Regulatory Functions, 2003.

CFR, 2003e. Title 10, Code of Federal Regulations, Part 70, Domestic Licensing of Special Nuclear Material, 2003.

CFR, 2003f. Title 10, Code of Federal Regulations, Section 51.45, Environmental report, 2003.

CFR, 2003g. Title 10, Code of Federal Regulations, Section 70.21, Filing, 2003.

CFR, 2003h. Title 10, Code of Federal Regulations, Section 70.60, Applicability, 2003.

LES , 1994. Claiborne Enrichment Center Environmental Report, Louisiana Energy Services, April 1994.

NRC , 1994. Final Environmental Impact Statement for the Construction and Operation of Claiborne Enrichment Center, Homer, Louisiana, NUREG-1484, Volume 1, U.S. Nuclear Regulatory Commission, August 1994.

NRC, 2003. Environmental Review Guidance for Licensing Actions Associated with NMSS Programs, Final Report , NUREG-1748, U.S. Nuclear Regulatory Commission, August 2003.

NRC, 2002. Standard Review Plan for the Review of a License Application for A Fuel Cycle Facility, NUREG-1520, U.S. Nuclear Regulatory Commission, March 2002.

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10.0 DECOMMISSIONING

This chapter presents the National Enrichment Facility (NEF) Decommissioning Funding Plan. The Decommissioning Funding Plan has been developed following the guidance provided in NUREG-1727 (NRC, 2000). This Decommissioning Funding Plan is similar to the decommissioning funding plan for the Claiborne Enrichment Center (CEC) approved by the NRC in NUREG-1491 (NRC, 1994).

Louisiana Energy Services (LES) commits to decontaminate and decommission the enrichment facility and the site at the end of its operation so that the facility and grounds can be released for unrestricted use. The Decommissioning Funding Plan will be reviewed and updated as necessary at least once every three years starting from the time of issuance of the license. Prior to facility decommissioning, a Decommissioning Plan will be prepared in accordance with 10 CFR 70.38 (CFR, 2003a) and submitted to the NRC for approval.

This chapter fulfills the applicable provisions of NUREG-1727 (NRC, 2000) through submittal of information in tabular form as suggested by the NUREG. Therefore a matrix showing compliance requirements and commitments is not provided herein.

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10.1 SITE-SPECIFIC COST ESTIMATE

10.1.1 Cost Estimate Structure

The decommissioning cost estimate is comprised of three basic parts that include:

- A facility description
- The estimated costs (including labor costs, non-labor costs, and a contingency factor)
- Key assumptions.

10.1.2 Facility Description

The NEF is fully described in other sections of this License Application. Information relating to the following topics can be found in the referenced chapters listed below:

A general description of the facility and plant processes is presented in Chapter 1, General Information. A detailed description of the facility and plant processes is presented in Chapter 3, Integrated Safety Analysis Summary.

A description of the specific quantities and types of licensed materials used at the facility is provided in Chapter 1, Section 1.2, Institutional Information.

A general description of how licensed materials are used at the facility is provided in Chapter 3, Section 3.4, Enrichment and Other Process Descriptions.

10.1.3 Decommissioning Cost Estimate

10.1.3.1 Summary of Costs

The decommissioning cost estimate for the NEF is approximately \$825 million (January, 2002 dollars). The decommissioning cost estimate and supporting information are presented in Tables 10.1-1 through 10.1-7, consistent with the applicable provisions of NUREG-1727, NMSS Decommissioning Standard Review Plan (NRC, 2000).

More than 97% of the decommissioning costs (except tails disposition costs) for the NEF are attributed to the dismantling, decontamination, processing, and disposal of centrifuges and other equipment in the Separations Building Modules, which are considered classified. Given the classified nature of these buildings, the data presented in the Tables at the end of this chapter has been structured to meet the applicable NUREG-1727 (NRC, 2000) recommendations, to the extent practicable. However, specific information such as numbers of components and unit rates have been intentionally excluded to protect the classified nature of the data.

The remaining 3% of the decommissioning costs are for the remaining systems and components in other buildings. Since these costs are small in relation to the overall cost estimate, the cost data for these systems has also been summarized at the same level of detail as that for the Separations Building Modules.

The decommissioning project schedule is presented in Figure 10.1-1, National Enrichment Facility – Conceptual Decommissioning Schedule. Dismantling and decontamination of the equipment in the three Separations Building Modules will be conducted sequentially (in three phases) over a nine year time frame. Separations Building Module 1 will be decommissioned during the first three-year period, followed by Separations Building Module 2, and then Separations Building Module 3. Termination of Separations Module 3 operations will mark the end of uranium enrichment operations at the NEF. Decommissioning of the remaining plant systems and buildings will begin after Separations Building Module 3 operations have been permanently terminated.

10.1.3.2 Major Assumptions

Key assumptions underlying the decommissioning cost estimate are listed below:

- Inventories of materials and wastes at the time of decommissioning will be in amounts that are consistent with routine plant operating conditions over time
- Costs are not included for the removal or disposal of non-radioactive structures and materials beyond that necessary to terminate the NRC license
- Credit is not taken for any salvage value that might be realized from the sale of potential assets (e.g., recovered materials or decontaminated equipment) during or after decommissioning
- Decommissioning activities will be performed in accordance with current day regulatory requirements
- LES will be the Decommissioning Operations Contractor (DOC) for all decommissioning operations
- Decommissioning costs are presented in January, 2002 dollars.

10.1.4 Decommissioning Strategy

The plan for decommissioning is to promptly decontaminate or remove all materials from the site which prevent release of the facility for unrestricted use. This approach, referred to in the industry as DECON (i.e., immediate dismantlement), avoids long-term storage and monitoring of wastes on site. The type and volume of wastes produced at the NEF do not warrant delays in waste removal normally associated with the SAFSTOR (i.e., deferred dismantlement) option.

At the end of useful plant life, the enrichment facility will be decommissioned such that the site and remaining facilities may be released for unrestricted use as defined in 10 CFR 20.1402 (CFR, 2003b). Enrichment equipment will be removed; only building shells and the site infrastructure will remain. All remaining facilities will be decontaminated where needed to acceptable levels for unrestricted use. Confidential and Secret Restricted Data material, components, and documents will be destroyed and disposed of in accordance with the facility Standard Practice Procedures Plan for the Protection of Classified Matter.

Depleted UF₆ (tails), if not already sold or otherwise disposed of prior to decommissioning, will be disposed of in accordance with regulatory requirements. Radioactive wastes will be disposed of in licensed low-level radioactive waste disposal sites. Hazardous wastes will be treated or disposed of in licensed hazardous waste facilities. Neither tails conversion (if done), nor disposal of radioactive or hazardous material will occur at the plant site, but at licensed facilities located elsewhere.

Following decommissioning, no part of the facilities or site will remain restricted to any specific type of use.

Activities required for decommissioning have been identified, and decommissioning costs have been estimated. Activities and costs are based on actual decommissioning experience in Europe. Urenco has a fully operational dismantling and decontamination facility at its Almelo, Netherlands plant. Data and experience from this operating facility have allowed a very realistic estimation of decommissioning requirements. Using this cost data as a basis, financial arrangements are made to cover all costs required for returning the site to unrestricted use. Updates on cost and funding will be provided periodically and will include appropriate treatment for any replacement equipment. A detailed Decommissioning Plan will be submitted at a later date in accordance with 10 CFR 70.38 (CFR, 2003a).

The remaining subsections describe decommissioning plans and funding arrangements, and provide details of the decontamination aspects of the program. This information was developed in connection with the decommissioning cost estimate. Specific elements of the planning may change with the submittal of the decommissioning plan required at the time of license termination.

10.1.5 Decommissioning Design Features

10.1.5.1 Overview

Decommissioning planning begins with ensuring design features are incorporated into the plant's initial design that will simplify eventual dismantling and decontamination. The plans are implemented through proper management and health and safety programs. Decommissioning policies address radioactive waste management, physical security, and material control and accounting.

Major features incorporated into the facility design that facilitate decontamination and decommissioning are described below.

10.1.5.2 Radioactive Contamination Control

The following features primarily serve to minimize the spread of radioactive contamination during operation, and therefore simplify eventual plant decommissioning. As a result, worker exposure to radiation and radioactive waste volumes are minimized as well.

- Certain activities during normal operation are expected to result in surface and airborne radioactive contamination. Specially designed rooms are provided for these activities to preclude contamination spread. These rooms are isolated from other areas and are provided with ventilation and filtration. The Solid Waste Collection Room, Ventilated Room and the Decontamination Workshop meet these specific design requirements.
- All areas of the plant are sectioned off into Unrestricted and Restricted Areas. Restricted Areas limit access for the purpose of protecting individuals against undue risks from exposure to radiation and radioactive materials. Radiation Areas and Airborne Contamination Areas have additional controls to inform workers of the potential hazard in the area and to help prevent the spread of contamination. All procedures for these areas fall under the Radiation Protection Program, and serve to minimize the spread of contamination and simplify the eventual decommissioning.
- Non-radioactive process equipment and systems are minimized in locations subject to potential contamination. This limits the size of the Restricted Areas and limits the activities occurring inside these areas.
- Local air filtration is provided for areas with potential airborne contamination to preclude its spread. Fume hoods filter contaminated air in these areas.
- Curbing, pits, or other barriers are provided around tanks and components that contain liquid radioactive wastes. These serve to control the spread of contamination in case of a spill.

10.1.5.3 Worker Exposure and Waste Volume Control

The following features primarily serve to minimize worker exposure to radiation and minimize radioactive waste volumes during decontamination activities. As a result, the spread of contamination is minimized as well.

- During construction, a washable epoxy coating is applied to floors and walls that might be radioactively contaminated during operation. The coating will serve to lower waste volumes during decontamination and simplify the decontamination process. The coating is applied to floors and walls that might be radioactively contaminated during operation that are located in the Restricted Areas.
- Sealed, nonporous pipe insulation is used in areas likely to be contaminated. This will reduce waste volume during decommissioning.

- Ample access is provided for efficient equipment dismantling and removal of equipment that may be contaminated. This minimizes the time of worker exposure.
- Tanks are provided with accesses for entry and decontamination. Design provisions are also made to allow complete draining of the wastes contained in the tanks.
- Connections in the process systems provided for required operation and maintenance allow for thorough purging at plant shutdown. This will remove a significant portion of radioactive contamination prior to disassembly.
- Design drawings, produced for all areas of the plant, will simplify the planning and implementing of decontamination procedures. This in turn will shorten the durations that workers are exposed to radiation.
- Worker access to contaminated areas is controlled to assure that workers wear proper protective equipment and limit their time in the areas.

10.1.5.4 Management Organization

An appropriate organizational strategy will be developed to support the phased decommissioning schedule discussed in Section 10.1.3.1, Summary of Costs. The organizational strategy will ensure that adequate numbers of experienced and knowledgeable personnel are available to perform the technical and administrative tasks required to decommission the facility.

LES intends to be the prime Decommissioning Operations Contractor (DOC) responsible for decommissioning the NEF. In this capacity, LES will have direct control and oversight over all decommissioning activities. The role will be similar to that taken by Urenco at its facilities in Europe. In that role, Urenco has provided operational, technical, licensing, and project management support of identical facilities during both operational and decommissioning campaigns. LES also plans to secure contract services to supplement its capabilities as necessary.

Management of the decommissioning program will assure that proper training and procedures are implemented to assure worker health and safety. Programs and procedures, based on already existing operational procedures, will focus heavily on minimizing waste volumes and worker exposure to hazardous and radioactive materials. Qualified contractors assisting with decommissioning will likewise be subject to facility training requirements and procedural controls.

10.1.5.5 Health and Safety

As with normal operation, the policy during decommissioning shall be to keep individual and collective occupational radiation exposure as low as reasonably achievable (ALARA). A health physics program will identify and control sources of radiation, establish worker protection requirements, and direct the use of survey and monitoring instruments.

10.1.5.6 Waste Management

Radioactive and hazardous wastes produced during decommissioning will be collected, handled, and disposed of in accordance with all regulations applicable to the facility at the time of decommissioning. Generally, procedures will be similar to those described for wastes produced during normal operation. These wastes will ultimately be disposed of in licensed radioactive or hazardous waste disposal facilities located elsewhere. Non-hazardous and non-radioactive wastes will be disposed of consistent with good industrial practice, and in accordance with applicable regulations.

10.1.5.7 Security/Material Control

Requirements for physical security and for material control and accounting will be maintained as required during decommissioning in a manner similar to the programs in force during operation. The LES plan for completion of decommissioning, submitted near the end of plant life, will provide a description of any necessary revisions to these programs.

10.1.5.8 Record Keeping

Records important for safe and effective decommissioning of the facility will be stored in the LES Records Management System until the site is released for unrestricted use. Information maintained in these records includes:

1. Records of spills or other unusual occurrences involving the spread of contamination in and around the facility, equipment, or site. These records may be limited to instances when contamination remains after any cleanup procedures or when there is reasonable likelihood that contaminants may have spread to inaccessible areas as in the case of possible seepage into porous materials such as concrete. These records will include any known information on identification of involved nuclides, quantities, forms, and concentrations.
2. As-built drawings and modifications of structures and equipment in restricted areas where radioactive materials are used and/or stored and of locations of possible inaccessible contamination such as buried pipes which may be subject to contamination. Required drawings will be referenced as necessary, although each relevant document will not be indexed individually. If drawings are not available, appropriate records of available information concerning these areas and locations will be substituted.
3. Except for areas containing only sealed sources, a list contained in a single document and updated every two years, of the following:
 - (i) All areas designed and formerly designated as Restricted Areas as defined under 10 CFR 20.1003; (CFR, 2003c)
 - (ii) All areas outside of Restricted Areas that require documentation specified in item 1 above;

- (iii) All areas outside of Restricted Areas where current and previous wastes have been buried as documented under 10 CFR 20.2108 (CFR, 2003d); and
 - (iv) All areas outside of Restricted Areas that contain material such that, if the license expired, the licensee would be required to either decontaminate the area to meet the criteria for decommissioning in 10 CFR 20, subpart E, (CFR, 2003e) or apply for approval for disposal under 10 CFR 20.2002 (CFR, 2003f).
4. Records of the cost estimate performed for the decommissioning funding plan or of the amount certified for decommissioning, and records of the funding method used for assuring funds if either a funding plan or certification is used.

10.1.6 Decommissioning Process

10.1.6.1 Overview

Implementation of the DECON alternative for decommissioning may begin immediately following Separations Building Module equipment shutdown, since only low radiation levels exist at this facility. In the phased approach presented herein, dismantling and decontamination of the equipment in the three Separations Building Modules will be conducted sequentially (in three phases) over a nine year time frame. Separations Building Module 1 will be decommissioned during the first three year period, followed by Separations Building Module 2 in the next three years, and then Separations Building Module 3 in the final three years. Termination of Separations Building Module 3 operations will mark the end of uranium enrichment operations at the facility. Decommissioning of the remaining plant systems and buildings will begin after Separations Building Module 3 operations have been permanently terminated. A schematic of the NEF decommissioning schedule is presented in Figure 10.1-1, NEF – Conceptual Decommissioning Schedule.

Prior to beginning decommissioning operations, an extensive radiological survey of the facility will be performed in conjunction with a historical site assessment. The findings of the radiological survey and historical site assessment will be presented in a Decommissioning Plan to be submitted to the NRC. The Decommissioning Plan will be prepared in accordance with 10 CFR 70.38 (CFR, 2003a) and the applicable guidance provided in NUREG-1727 (NRC, 2000).

Decommissioning activities will generally include (1) installation of decontamination facilities, (2) purging of process systems, (3) dismantling and removal of equipment, (4) decontamination and destruction of Confidential and Secret Restricted Data material, (5) sales of salvaged materials, (6) disposal of wastes, and (7) completion of a final radiation survey. Credit is not taken for any salvage value that might be realized from the sale of potential assets (e.g., recovered materials or decontaminated equipment) during or after decommissioning.

Decommissioning, using the DECON approach, requires residual radioactivity to be reduced below specified levels so the facilities may be released for unrestricted use. Current Nuclear Material Safety and Safeguards guidelines for release serve as the basis for decontamination costs estimated herein. Portions of the facility that do not exceed contamination limits may remain as is without further decontamination measures applied. The intent of decommissioning

the facility is to remove all enrichment-related equipment from the buildings such that only the building shells and site infrastructure remain. The removed equipment includes all piping and components from systems providing UF₆ containment, systems in direct support of enrichment (such as refrigerant and chilled water), radioactive and hazardous waste handling systems, contaminated HVAC filtration systems, etc. The remaining site infrastructure will include services such as electrical power supply, treated water, fire protection, HVAC, cooling water and communications.

Decontamination of plant components and structures will require installation of two new facilities dedicated for that purpose. Existing plant buildings, such as the Centrifuge Assembly Building, are assumed to house the facilities. These facilities will be specially designed to accommodate repetitive cleaning of thousands of centrifuges, and to serve as a general-purpose facility used primarily for cleaning larger components. The two new facilities will be the primary location for decontamination activities during the decommissioning process. The small decontamination area in the Technical Services Building (TSB), used during normal operation, may also handle small items at decommissioning.

Decontaminated components may be reused or sold as scrap. All equipment that is to be reused or sold as scrap will be decontaminated to a level at which further use is unrestricted. Materials that cannot be decontaminated will be disposed of in a licensed radioactive waste disposal facility. As noted earlier, credit is not taken for any salvage value that might be realized from the sale of potential assets (e.g., recovered materials or decontaminated equipment) during or after decommissioning.

Any UF₆ tails remaining on site will be removed during decommissioning. Depending on technological developments occurring prior to plant shutdown, the tails may have become marketable for further enrichment or other processes. The disposition of UF₆ tails and relevant funding provisions are discussed in Section 10.3, Tails Disposition. The cost estimate takes no credit for any value that may be realized in the future due to the potential marketability of the stored tails.

Contaminated portions of the buildings will be decontaminated as required. Structural contamination should be limited to structures in the Restricted Areas. The liners and earthen covers on the facility evaporative basins are assumed to be mildly contaminated and provisions are made for appropriate disposal of these materials in the decommissioning cost estimate. Good housekeeping practices during normal operation will maintain the other areas of the site clean.

When decontamination is complete, all areas and facilities on the site will be surveyed to verify that further decontamination is not required. Decontamination activities will continue until the entire site is demonstrated to be suitable for unrestricted use.

10.1.6.2 Decontamination Facility Construction

New facilities for decontamination can be installed in existing plant buildings to avoid unnecessary expense. Estimated time for equipment installation is approximately one year. These new facilities will be completed in time to support the dismantling and decontamination of Separations Building Module 1. These facilities are described in Section 10.1.7, Decontamination Facilities.

10.1.6.3 System Cleaning

At the end of the useful life of each Separations Building Module, the enrichment process is shut down and UF_6 is removed to the fullest extent possible by normal process operation. This is followed by evacuation and purging with nitrogen. This shutdown and purging portion of the decommissioning process is estimated to take approximately three months.

10.1.6.4 Dismantling

Dismantling is simply a matter of cutting and disconnecting all components requiring removal. The operations themselves are simple but very labor intensive. They generally require the use of protective clothing. The work process will be optimized, considering the following.

- Minimizing the spread of contamination and the need for protective clothing
- Balancing the number of cutting and removal operations with the resultant decontamination and disposal requirements
- Optimizing the rate of dismantling with the rate of decontamination facility throughput
- Providing storage and laydown space required, as impacted by retrievability, criticality safety, security, etc
- Balancing the cost of decontamination and salvage with the cost of disposal.

Details of the complex optimization process will necessarily be decided near the end of plant life, taking into account specific contamination levels, market conditions, and available waste disposal sites. To avoid laydown space and contamination problems, dismantling should be allowed to proceed generally no faster than the downstream decontamination process. The time frame to accomplish both dismantling and decontamination is estimated to be approximately three years per Separations Building Module.

10.1.6.5 Decontamination

The decontamination process is addressed separately in detail in Section 10.1.7.

10.1.6.6 Salvage of Equipment and Materials

Items to be removed from the facilities can be categorized as potentially re-usable equipment, recoverable scrap, and wastes. However, based on a 30 year facility operating license, operating equipment is not assumed to have reuse value. Wastes will also have no salvage value.

With respect to scrap, a significant amount of aluminum will be recovered, along with smaller amounts of steel, copper, and other metals. For security and convenience, the uncontaminated materials will likely be smelted to standard ingots, and, if possible, sold at market price. The contaminated materials will be disposed of as low-level radioactive waste. No credit is taken for any salvage value that might be realized from the sale of potential assets during or after decommissioning.

10.1.6.7 Disposal

All wastes produced during decommissioning will be collected, handled, and disposed of in a manner similar to that described for those wastes produced during normal operation. Wastes will consist of normal industrial trash, non-hazardous chemicals and fluids, small amounts of hazardous materials, and radioactive wastes. The radioactive waste will consist primarily of crushed centrifuge rotors, trash, and citric cake. Citric cake consists of uranium and metallic compounds precipitated from citric acid decontamination solutions. It is estimated that approximately 5,000 m³ (6,539 yd³) of radioactive waste will be generated over the nine-year decommissioning operations period. (This waste is subject to further volume reduction processes prior to disposal).

Radioactive wastes will ultimately be disposed of in licensed low-level radioactive waste disposal facilities. Hazardous wastes will be disposed of in hazardous waste disposal facilities. Non-hazardous and non-radioactive wastes will be disposed of in a manner consistent with good industrial practice and in accordance with all applicable regulations. A complete estimate of the wastes and effluent to be produced during decommissioning will be provided in the Decommissioning Plan that will be submitted prior to initiating the decommissioning of the plant.

Confidential and Secret Restricted Data components and documents on site shall be disposed of in accordance with the requirements of 10 CFR 95 (CFR, 2003g). Such classified portions of the centrifuges will be destroyed, piping will likely be smelted, documents will be destroyed, and other items will be handled in an appropriate manner. Details will be provided in the facility Standard Practice Procedures Plan for the Protection of Classified Matter and Information, submitted separately in accordance with 10 CFR 95 (CFR, 2003g).

10.1.6.8 Final Radiation Survey

A final radiation survey must be performed to verify proper decontamination to allow the site to be released for unrestricted use. The evaluation of the final radiation survey is based in part on an initial radiation survey performed prior to initial operation. The initial survey determines the

natural background radiation of the area; therefore it provides a datum for measurements which determine any increase in levels of radioactivity.

The final survey will systematically measure radioactivity over the entire site. The intensity of the survey will vary depending on the location (i.e. the buildings, the immediate area around the buildings, and the remainder of the site). The survey procedures and results will be documented in a report. The report will include, among other things, a map of the survey site, measurement results, and the site's relationship to the surrounding area. The results will be analyzed and shown to be below allowable residual radioactivity limits; otherwise, further decontamination will be performed.

10.1.7 Decontamination Facilities

10.1.7.1 Overview

The facilities, procedures, and expected results of decontamination are described in the paragraphs below. Since reprocessed uranium will not be used as feed in the NEF, no consideration of ^{232}U , transuranic alpha-emitters and fission product residues is necessary for the decontamination process. Only contamination from ^{238}U , ^{235}U , ^{234}U , and their daughter products will require handling by decontamination processes. The primary contaminant throughout the plant will be in the form of small amounts of UO_2F_2 , with even smaller amounts of UF_4 and other compounds.

10.1.7.2 Facilities Description

A decontamination facility will be required to accommodate decommissioning. This specialized facility is needed for optimal handling of the thousands of centrifuges to be decontaminated, along with the UF_6 vacuum pumps and valves. Additionally, a general purpose facility is required for handling the remainder of the various plant components. These facilities are assumed to be installed in existing plant buildings (such as the Centrifuge Assembly Building).

The decontamination facility will have four functional areas that include (1) a disassembly area, (2) a buffer stock area, (3) a decontamination area, and (4) a scrap storage area for cleaned stock. The general purpose facility may share the specialized decontamination area. However, due to various sizes and shapes of other plant components needing handling, the disassembly area, buffer stock areas and scrap storage areas may not be shared. Barriers and other physical measures will be installed and administrative controls implemented, as needed, to limit the spread of contamination.

Equipment in the decontamination facility is assumed to include:

- Transport and manipulation equipment
- Dismantling tables for centrifuge externals
- Sawing machines

- Dismantling boxes and tanks, for centrifuge internals
- Degreasers
- Citric acid and demineralized water baths
- Contamination monitors
- Wet blast cabinets
- Crusher, for centrifuge rotors
- Smelting and/or shredding equipment
- Scrubbing facility.

The decontamination facilities provided in the TSB for normal operational needs would also be available for cleaning small items during decommissioning.

10.1.7.3 Procedures

Formal procedures for all major decommissioning activities will be developed and approved by plant management to minimize worker exposure and waste volumes, and to assure work is carried out in a safe manner. The experience of decommissioning European gas centrifuge enrichment facilities will be incorporated extensively into the procedures.

At the end of plant life, some of the equipment, most of the buildings, and all of the outdoor areas should already be acceptable for release for unrestricted use. If they are accidentally contaminated during normal operation, they would be cleaned up when the contamination is discovered. This limits the scope of necessary decontamination at the time of decommissioning.

Contaminated plant components will be cut up or dismantled, then processed through the decontamination facilities. Contamination of site structures will be limited to areas in the Separations Building Modules and TSB, and will be maintained at low levels throughout plant operation by regular cleaning. The Decontamination Workshop Area, Ventilated Room, Vacuum Pump Rebuild Workshop, and a portion of the Laundry Room are included as permanent Restricted Areas. Through the application of special protective coatings, to surfaces that might become radioactively contaminated during operation, and good housekeeping practices, final decontamination of these areas is assumed to require minimal removal of surface concrete or other structural material.

The centrifuges will be processed through the specialized facility. The following operations will be performed.

- Removal of external fittings
- Removal of bottom flange, motor and bearings, and collection of contaminated oil

- Removal of top flange, and withdrawal and disassembly of internals
- Degreasing of items as required
- Decontamination of all recoverable items for smelting
- Destruction of other classified portions by shredding, crushing, smelting, etc.

10.1.7.4 Results

Urenco plant experience in Europe has demonstrated that conventional decontamination techniques are effective for all plant items. Recoverable items have been decontaminated and made suitable for reuse except for a very small amount of intractably contaminated material. The majority of radioactive waste requiring disposal in the NEF will include crushed centrifuge rotors, trash, and residue from the effluent treatment systems.

European experience has demonstrated that the aluminum centrifuge casings can be successfully decontaminated and recycled. However, as a conservative measure for this decommissioning cost estimate, the aluminum centrifuge casings for the NEF are assumed to be disposed of as low-level radioactive waste.

Overall, no problems are anticipated that will prevent the site from being released for unrestricted use.

10.1.7.5 Decommissioning Impact on Integrated Safety Analysis (ISA)

As was described in Section 10.1.3.1, Summary of Costs, dismantling and decontamination of the equipment in the three Separations Building Modules will be conducted sequentially (in three phases) over a nine year time frame. Separations Building Module 1 will be decommissioned during the first three-year period, followed by Separations Building Module 2, and then Separations Building Module 3. Termination of Separations Module 3 operations will mark the end of uranium enrichment operations at the NEF. Decommissioning of the remaining plant systems and buildings will begin after Separations Building Module 3 operations have been permanently terminated.

Although decommissioning operations are planned to be underway while all the activities considered in the ISA continue to occur in the other portions of the plant, the current ISA has not considered these decommissioning risks. An updated ISA will be performed at a later date, but prior to decommissioning, to incorporate the risks from decommissioning operations on concurrent enrichment operations.

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10.2 FINANCIAL ASSURANCE MECHANISM

10.2.1 Decommissioning Funding Mechanism

LES intends to utilize a surety method, such as a letter or line of credit or surety bond, to provide reasonable assurance of decommissioning funding as required by 10 CFR 40.36(e)(2) (CFR, 2003h) and 70.25(f)(2) (CFR, 2003i). Finalization of the specific financial instruments to be utilized will be completed, and signed originals of those instruments will be provided to the NRC, prior to LES receipt of licensed material. LES intends to provide continuous financial assurance from the time of receipt of licensed material to the completion of decommissioning and termination of the license. Since LES intends to sequentially install and operate the Separations Building Modules over time, financial assurance for decommissioning will be provided during the operating life of the NEF at a rate that is in proportion to the decommissioning liability for these facilities as they are phased in. Similarly, LES will provide decommissioning funding assurance for disposition of depleted tails at a rate in proportion to the amount of accumulated tails onsite up to the maximum amount of the tails as described in Section 10.3, Tails Disposition.

The surety method adopted by LES will provide an ultimate guarantee that decommissioning costs will be paid in the event LES is unable to meet its decommissioning obligations at the time of decommissioning. The surety method will also be structured and adopted consistent with applicable NRC regulatory requirements and in accordance with NRC regulatory guidance contained in NUREG-1727 (NRC, 2000). Accordingly, LES intends that its surety method will contain, but not be limited to, the following attributes:

- The surety method will be open-ended or, if written for a specified term, such as five years, will be renewed automatically unless 90 days or more prior to the renewal date, the issuer notifies the NRC, the trust to which the surety is payable, and LES of its intention not to renew. The surety method will also provide that the full face amount be paid to the beneficiary automatically prior to the expiration without proof of forfeiture if LES fails to provide a replacement acceptable to the NRC within 30 days after receipt of notification of cancellation.
- The surety method will be payable to a trust established for decommissioning costs. The trustee and trust will be ones acceptable to the NRC. For instance, the trustee may be an appropriate State or Federal government agency or an entity which has the authority to act as a trustee and whose trust operations are regulated and examined by a Federal or State agency.
- The surety method will remain in effect until the NRC has terminated the license.

10.2.2 Adjusting Decommissioning Costs and Funding

In accordance with 10 CFR 40.36(d) (CFR, 2003h) and 70.25(e) (CFR, 2003i), LES will update the decommissioning cost estimate for the NEF, and the associated funding levels, over the life

of the facility. These updates will take into account changes resulting from inflation or site-specific factors, such as changes in facility conditions or expected decommissioning procedures. These funding level updates will also address anticipated operation of additional Separations Building Modules and accumulated tails.

As required by the applicable regulations 10 CFR 70.25(e) (CFR, 2003i), such updating will occur approximately every three years. A record of the update process and results will be retained for review as discussed in Section 10.2.3, below. The NRC will be notified of any material changes to the decommissioning cost estimate and associated funding levels (e.g., significant increases in costs beyond anticipated inflation). To the extent the underlying instruments are revised to reflect changes in funding levels, the NRC will be notified as appropriate.

10.2.3 Recordkeeping Plans Related to Decommissioning Funding

In accordance with 10 CFR 40.36(f) (CFR, 2003h) and 70.25(g) (CFR, 2003i), LES will retain records, until the termination of the license, of information that could have a material effect on the ultimate costs of decommissioning. These records will include information regarding: (1) spills or other contamination that cause contaminants to remain following cleanup efforts; (2) as-built drawings of structures and equipment, and modifications thereto, where radioactive contamination exists (e.g., from the use or storage of such materials); (3) original and modified cost estimates of decommissioning; and (4) original and modified decommissioning funding instruments and supporting documentation.

10.3 TAILS DISPOSITION

The disposition of tails from the NEF is an element of authorized operating activities. It involves neither decommissioning waste nor is it a part of decommissioning activities. The disposal of these tails is analogous to the disposal of radioactive materials generated in the course of normal operations (even including spent fuel in the case of a power reactor), which is authorized by the operating license and subject to separate disposition requirements. Such costs are not appropriately included in decommissioning costs (this principle (in the 10 CFR 50 context) is discussed in Regulatory Guide 1.159 (NRC, 1990), Section 1.4.2, page 1.159-8). Further, the "tails" products from the NEF are not mill tailings, as regulated pursuant to the Uranium Mill Tailings Radiation Control Act, as amended and 10 CFR 40, Appendix A (CFR, 2003j), and are not subject to the financial requirements applicable to mill tailings.

Nevertheless, LES intends to provide for expected tails disposition costs (even assuming ultimate disposal as waste) during the life of the facility. Funds to cover these costs are based on the amount of tails generated and the unit cost for the disposal of depleted UF₆.

It is anticipated that the NEF will generate 132,942 MT of depleted uranium over a nominal 30 year operational period. This estimate is conservative as it assumes continuous production of tails over 30 years of operation. Actual tails production will cease prior to the end of the license term as shown in Figure 10.1-1, NEF – Conceptual Decommissioning Schedule.

Waste processing and disposal costs for UF₆ tails are currently estimated to be \$5.50 per kg U or \$5,500 per MT U. This unit cost was obtained from four sets of cost estimates for the conversion of DUF₆ to DU₃O₈ and the disposal of DU₃O₈ product, and the transportation of DUF₆ and DU₃O₈. The cost estimates were obtained from analyses of four sources: a 1997 study by the Lawrence Livermore National Laboratory (LLNL) (Elayat, 1997), the Uranium Disposition Services (UDS) contract with the Department of Energy (DOE) of August 29, 2002 (DOE, 2002), information from Urenco, and the costs submitted to the Nuclear Regulatory Commission as part of the Claiborne Enrichment Center (CEC) license application (LES, 1993a) in the 1990s.

The four sets of cost estimates obtained are presented in Table 10.3-1, Summary Of Depleted UF₆ Disposal Costs From Four Sources, below, in 2002 dollars per kg of uranium (kg U). Note that the Claiborne Energy Center cost had a greater uncertainty associated with it. The UDS contract does not allow the component costs for conversion, disposal and transportation to be estimated. The costs in the table indicate that \$5.50 per kg U (\$2.50 per lb U) is a conservative and, therefore, prudent estimate of total depleted UF₆ disposition cost for the LES NEF. Urenco has reviewed this estimate and, based on its current cost for UBC disposal, finds this figure to be prudent.

In May 1997, the LLNL published UCRL-AR-127650, Cost Analysis Report for the Long-Term Management of Depleted Uranium Hexafluoride (Elayat, 1997). The report was prepared to provide comparative life-cycle cost data for the Department of Energy's (DOE's) Draft 1997 Programmatic Environmental Impact Statement (PEIS) (DOE, 1997) on alternative strategies for management and disposition of DUF₆. The LLNL report is the most comprehensive assessment of DUF₆ disposition costs for alternative disposition strategies available in the public domain.

The technical data on which the LLNL report is based is principally the May 1997 Engineering Analysis Report (UCRL-AR-124080, Volumes 1 and 2) (Dubrin, 1997).

When the LLNL report was prepared in 1997, more than six years ago, the cost estimates in it were based on an inventory of 560,000 MT of DUF_6 , or 378,600 MTU after applying the 0.676 mass fraction multiplier. This amount corresponds to an annual throughput rate of 28,000 MT of UF_6 or about 19,000 MTU of depleted uranium. The costs in the LLNL report are based on the 20 year life-cycle quantity of 378,600 MTU. The LLNL annual DUF_6 quantities are about 3.6 times the annual production rate of the proposed NEF.

The LLNL cost analyses assumed that the DUF_6 would be converted to DU_3O_8 , the DOE's preferred disposal form, using one of two dry process conversion options. The first — the anhydrous hydrogen fluoride (AHF) option — upgrades the hydrogen fluoride (HF) product to anhydrous HF (< 1.0% water). In the second option — the HF neutralization option — the hydrofluoric acid would be neutralized with lime to produce calcium fluoride (CaF_2). The LLNL cost analyses assumed that the AHF and CaF_2 conversion products are of sufficient purity that they could be sold for unrestricted use (negligible uranium contamination).

The costs in Table 10.3-1, represent the LLNL-estimated life-cycle capital, operating, and regulatory costs, in 2002 dollars, for conversion of 378,600 MTU over 20 years, of DUF_6 to DU_3O_8 by anhydrous hydrogen fluoride (HF) processing, followed by DU_3O_8 long-term storage disposal in a concrete vault, or in an exhausted underground uranium mine in the western United States, at or below the same cost. An independent new underground mine production cost analysis confirmed that the LLNL concrete vault alternative costs represent an upper bound for under ground mine disposal. The discounted 1996 dollar costs in the LLNL report were undiscounted and escalated to 2002 dollars. The LLNL life-cycle costs in 1996 dollars were converted to per kgU costs and adjusted to 2002 dollars using the Gross Domestic Product (GDP) Implicit Price Deflator (IPD). The escalation adjustment resulted in the 1996 costs being escalated by 11%.

On August 29, 2002, the DOE announced the competitive selection of Uranium Disposition Services, LLC to design, construct, and operate conversion facilities near the DOE enrichment plants at Paducah, Kentucky and Portsmouth, Ohio. UDS will operate these facilities for the first five years, beginning in 2005. The UDS contract runs from August 29, 2002 to August 3, 2010. UDS will also be responsible for maintaining the depleted uranium and product inventories and transporting depleted uranium from Oak Ridge East Tennessee Technology Park (ETTP) to the Portsmouth site for conversion. The DOE-UDS contract scope includes packaging, transporting and disposing of the conversion product DU_3O_8 .

UDS is a consortium formed by Framatome ANP Inc., Duratek Federal Services Inc., and Burns and Roe Enterprises Inc. The DOE-estimated value of the cost reimbursement contract is \$558 million (DOE Press Release, August 29, 2002) (DOE, 2002). Design, construction and operation of the facilities will be subject to appropriations of funds from Congress. On December 19, 2002, the White House confirmed that funding for both conversion facilities will be included in President Bush's 2004 budget. However, the Office of Management and Budget has not yet indicated how much funding will be allocated. The UDS contract quantities and costs are given in Table 10.3-2, DOE-UDS August 29, 2002, Contract Quantities and Costs.

Urenco is currently contracted with a supplier for DUF_6 to DU_3O_8 conversion. The supplier has been converting DUF_6 to DU_3O_8 on an industrial scale since 1984.

The CEC costs given in Table 10.3-1, are those presented to John Hickey of the NRC in the CEC letter of June 30, 1993 (LES, 1993b) as adjusted for changes in units and escalated to 2002. The conversion cost of \$4.00 per kg U was provided to CEC by Cogema at that time.

The costs in Table 10.3-1, indicate that \$5.50 is a conservative and, therefore, prudent estimate of total DU disposition cost for the NEF. Urenco has reviewed this estimate and, based on its current cost after tails disposal, finds this figure to be prudent.

Based on a computed tails production of 132,942 MTU during a nominal 30 years of operation and a tails processing cost of \$5.50/kgU or \$5,500 per MTU, the total tails disposition funding requirement is estimated at \$731,181,000. This sum will be included as part of the financial assurance for decommissioning (see Table 10.1-1, Total Decommissioning Costs). See Environmental Report Section 4.13.3.1.6, Costs Associated with UF_6 Tails Conversion and Disposal, for additional details.

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10.4 REFERENCES

CFR, 2003a. Title 10, Code of Federal Regulations, Section 70.38, Expiration and termination of licenses and decommissioning of sites and separate buildings or outdoor areas, 2003.

CFR, 2003b. Title 10, Code of Federal Regulations, Section 20.1402, Radiological criteria for unrestricted use, 2003.

CFR, 2003c. Title 10, Code of Federal Regulations, Part 20.1003, Definitions, 2003.

CFR, 2003d. Title 10, Code of Federal Regulations, Part 20.2108, Records of waste disposal, 2003.

CFR, 2003e. Title 10, Code of Federal Regulations, Part 20, Subpart E, Radiological Criteria for License Termination, 2003.

CFR, 2003f. Title 10, Code of Federal Regulations, Part 20.2002, Method for obtaining approval of proposed disposal procedures, 2003.

CFR, 2003g. Title 10, Code of Federal Regulations, Part 95, Security Facility Approval and Safeguarding of National Security Information and Restricted Data, 2003.

CFR, 2003h. Title 10, Code of Federal Regulations, Section 40.36, Financial assurance and recordkeeping for decommissioning, 2003.

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TABLES

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Table 10.1-1 Total Decommissioning Costs

(Note 9)

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(\$000's)

Task/Component	Separations Building Modules	Other Buildings	Total	Notes
Planning and Preparation	\$1,200	\$0	\$1,200	1
Decontamination and Dismantling of Radioactive Facility Components	\$24,060	\$1,110	\$25,170	10
Restoration of Contamination Areas on Facility Grounds	\$1,000	\$0	\$0	2
Final Radiation Survey	\$2,500	\$0	\$2,500	3
Site Stabilization and Long-term Surveillance	\$0	\$0	\$0	4
Waste Packaging Costs	\$0	\$0	\$0	5
Waste Shipping Costs	\$0	\$0	\$0	5
Waste Processing Costs	\$3,690	\$0	\$3,690	6
Waste Disposal Costs	\$17,904	\$440	\$18,344	7
Equipment Costs	\$21,260	\$100	\$21,360	
Supply Costs	\$910	\$0	\$910	
Laboratory Costs	\$870	\$0	\$870	
Period Dependent Costs	\$10,000	\$0	\$10,000	
SUBTOTAL	\$82,394	\$1,650	\$84,044	
Contingency (10%)	\$8,239	\$165	\$8,404	8
TOTAL DECOMMISSIONING	\$91,633	\$1,815	\$93,448	
Tails Disposition	\$0	\$0	\$731,181	11
GRAND TOTAL	-	-	\$824,629	12

Table 10.1-1 Total Decommissioning Costs
(Note 9)
Page 2 of 2

Notes:

1. The \$1,200 includes planning, site characterization, Decommissioning Plan preparation, and NRC review for the entire plant.
2. Cost provided is for removal and disposal of liners and earthen covers of the facility evaporative basins. Other contaminated areas outside of the plant buildings are not expected.
3. The \$2,500 includes the Final Radiation Survey, NRC review, confirmatory surveys and license termination for the entire plant.
4. Site stabilization and long-term surveillance will not be required.
5. Waste packaging and shipping costs are included in the Waste Disposal Costs line.
6. Waste processing costs are based on commercial metal melting equipment and unit rates obtained from Urenco experience in Europe.
7. Waste disposal costs for Other Buildings are based on a \$150 per cubic foot unit rate which includes packaging, shipping and disposal at Envirocare in Utah.
8. Based on extensive actual centrifuge decommissioning experience, a contingency of 10% is used in lieu of the 25% as suggested in NUREG-1727 (NRC, 2000). This is based upon over 10 years of Urenco experience decommissioning two pilot uranium enrichment centrifuge facilities at the Almelo enrichment facility in the Netherlands.
9. Refer to Table 10.1-2, Decommissioning Costs – Separations Building Modules for additional notes on Separations Building Module costs. More than 97% of the decommissioning costs for the facility are attributed to the dismantling, decontamination, processing, and disposal of centrifuges and other equipment in the Separations Building Modules, which are considered classified. Given the classified nature of these buildings, the data presented in these Tables have been structured to meet the applicable NUREG-1727 recommendations, to the extent practicable. However, specific information such as numbers of components and unit rates have been intentionally excluded to protect the classified nature of the data.

The remaining 3% of the decommissioning costs are for the remaining systems and components in Other Buildings. Since these costs are small in relation to the overall cost estimate, the cost data for these systems has also been summarized at the same level of detail as that for the Separations Building Modules.
10. The \$1,110 for Other Buildings includes the decontamination and dismantling of contaminated equipment in the TBS, Blending and Liquid Sampling Area, Centrifuge Test and Post Mortem Facilities, and Gaseous Effluent Vent System.
11. Refer to Section 10.3, for Tails Disposition discussion.
12. Combined total for both decommissioning and tails disposition

Table 10.1-2 Decommissioning Costs – Separations Building Modules

(Note 5)

Page 1 of 2

(\$000's)

Task/Component	Separations Building Modules	Notes
Planning and Preparation	\$1,200	Refer to Table 10.1-6
Decontamination and Dismantling of Radioactive Facility Components	\$24,060	Refer to Table 10.1-3
Restoration of Contamination Areas on Facility Grounds	\$1,000	1
Final Radiation Survey	\$2,500	Refer to Table 10.1-7
Site Stabilization and Long-term Surveillance	\$0	2
Waste Processing Costs	\$3,690	3
Waste Packaging, Transport & Disposal Costs	\$17,904	Refer to Table 10.1-5
Equipment Costs	\$21,260	Refer to Table 10.1-4
Supply Costs	\$910	6
Laboratory Costs	\$870	7
Period Dependent Costs	\$10,000	8
SUBTOTAL	\$82,394	
Contingency (10%)	\$8,239	4
TOTAL	\$91,633	

Notes:

1. Cost provided is for removal and disposal of liners and earthen covers of the facility evaporative basins. Other contaminated areas outside of the plant buildings are not expected.
2. Site stabilization and long-term surveillance will not be required.
3. Waste processing costs are based on commercial metal melting equipment and unit rates obtained from Urenco experience in Europe.
4. Based on extensive actual centrifuge decommissioning experience, a contingency of 10% is used in lieu of the 25% suggested in NUREG-1727 (NRC, 2000). This is based upon over 10 years of Urenco experience decommissioning two pilot uranium enrichment centrifuge facilities at the Almelo enrichment facility in the Netherlands.

Table 10.1-2 Decommissioning Costs – Separations Building Modules
(Note 5)

Page 2 of 2

5. More than 97% of the decommissioning costs for the NEF are attributed to the dismantling, decontamination, processing, and disposal of centrifuges and other equipment in the Separations Building Modules, which are considered classified. Given the classified nature of these buildings, the data presented in these Tables have been structured to meet the applicable NUREG-1727 recommendations, to the extent practicable. However, specific information such as numbers of components and unit rates have been intentionally excluded to protect the classified nature of the data.
6. Supply Costs include electricity, gas, water and other equipment requirements based on Urenco decommissioning experience at their European facilities.
7. Laboratory Costs are based on the analysis of 931 samples at a unit cost of \$934 per sample.
8. Period Dependent Costs include management, insurance, taxes, and other costs for the period beginning with the termination of operations of Separations Building Module 3 and the remaining plant facilities. This assumes \$2,000,000 per year for each of the five years at the end of the project. It has been assumed that the period dependent decommissioning costs incurred during concurrent enrichment operations will be funded from operating plant funding and not the decommissioning trust fund.

Table 10.1-3 Separations Building Modules – Decontamination & Dismantling of Radioactive Components

(Note 1)

Page 1 of 1

Major Decommissioning Tasks	Multi-Functional Shift-Worker	Other Labor	Total
Equipment Removal	\$3,600		\$3,600
Equipment Dismantling & Decontamination	\$13,430		\$13,430
Piping Decontamination & Removal	\$2,130		\$2,130
Plant Support – Cleaner	\$1,000		\$1,000
Other Labor:			
Supervision		\$2,600	\$2,600
Health & Safety		\$650	\$650
Management		\$650	\$650
TOTAL	\$20,160	\$3,900	\$24,060

Notes:

1. All costs are based on actual Urenco enrichment facility decommissioning experience at their European facilities.

Table 10.1-4 Decontamination Building & Equipment

(Note 1)

Page 1 of 1

Description	(\$000's)
Building: Dismantling & Decontamination Building Special Floor & Vent System	 \$6,490 \$1,240
Plant Equipment: Basic Decontamination Equipment Special Decontamination Equipment Evaporation Equipment Radiation & Control Equipment	 \$600 \$7,820 \$390 \$410
Electrical & Instrumentation: Electrical System Instrumentation	 \$500 \$590
Design & Engineering: Building Systems & Equipment Electrical & Instrumentation	 \$1,550 \$1,400 \$270
TOTAL	\$21,260

Notes:

1. All costs are based on actual Urenco enrichment facility decommissioning experience at their European facilities.

Table 10.1-5 Separations Building Modules – Radioactive Waste Packaging, Transport & Disposal Costs

Page 1 of 1

Low Level Waste Type	Disposal Volume m ³ (ft ³)	Number of Drums 208L (55 gal)	Unit Cost (\$/ft ³) (1)	Total Disposal Cost (\$000's)
Solidified Liquid Wastes	432 (15,251)	2,159 (2,075)	\$100	\$1,525
Centrifuge Components, Piping and Other Parts	1,036 (36,595)	5,180 (4,979)	\$100	\$3,659
Aluminum	3,602 (127,200)	N/A	\$100	\$12,720
TOTAL				\$17,904

(1) Unit cost (\$100/ft³) includes packaging, shipping to and disposal of bulk Class A low-level radioactive waste at Envirocare of Utah.

Table 10.1-6 Planning and Preparation
(Note 1)
Page 1 of 1

Activity	\$000's	Activity Duration (Months)	Notes
Project Plan & Schedule	\$100	4	
Site Characterization Plan	\$200	4	
Site Characterization	\$300	4	
Decommissioning Plan	\$350	6	
NRC Review Period	\$50	12	
Site Services Specifications	\$100	2	
Project Procedures	\$100	4	
TOTAL	\$1,200	36	2
TOTAL ELAPSED TIME		24	

Notes:

1. Estimates are based on recent commercial decommissioning cost estimates.
2. Some activities will be conducted in parallel to achieve a 24 month time frame.

Table 10.1-7 Final Radiation Survey

(Note 1)

Page 1 of 1

Activity	\$000's	Activity Duration (Months)	Notes
Prepare Survey Plans & Grid Areas	\$500	8	
Collect Survey Readings & Analyze Data	\$1,400	16	
Final Status Survey Report & NRC Review	\$300	8	
Confirmatory Survey & Report	\$200	6	
Terminate Site License	\$100	2	
Total	\$2,500	40	2
Total Elapsed Time		36	

Notes:

1. Estimates are based on recent commercial decommissioning cost estimates.
2. Some activities will be conducted in parallel to achieve a 36 month time frame.

Table 10.3-1 Summary Of Depleted UF₆ Disposal Costs From Four Sources
Page 1 of 1

Source	Costs in 2002 Dollars per kgU			
	Conversion	Disposal	Transportation	Total
LLNL (UCRL-AR-127650) (a)	2.63	2.17	0.25	5.05
UDS Contract (b)	(d)	(d)	(d)	3.92
URENCO (e)	(d)	(d)	(d)	(d)
CEC Cost Estimate (c)	4.93	1.47	0.34	6.74
<p>a. 1997 Lawrence Livermore National Laboratory cost estimate study for DOE, undiscounted and escalated to 2002.</p> <p>b. Uranium Disposition Services (UDS) contract with DOE for capital and operating costs for first five years of Depleted UF₆ conversion and Depleted U₃O₈ conversion product disposition.</p> <p>c. Based upon Depleted UF₆ and Depleted U₃O₈ disposition cost in 1996 dollars provided to the NRC during CEC license application in 1993.</p> <p>d. Cost component is proprietary or not made available in source document.</p> <p>e. The average of the three costs is \$5.24/kg U. LES has selected \$5.50/kg U as the disposal cost for the National Enrichment Facility. Urenco has reviewed this cost estimate and based on its current experience with UF₆ disposal finds this figure to be prudent.</p>				

Table 10.3-2 DOE-UDS August 29, 2002, Contract Quantities & Costs

Page 1 of 1

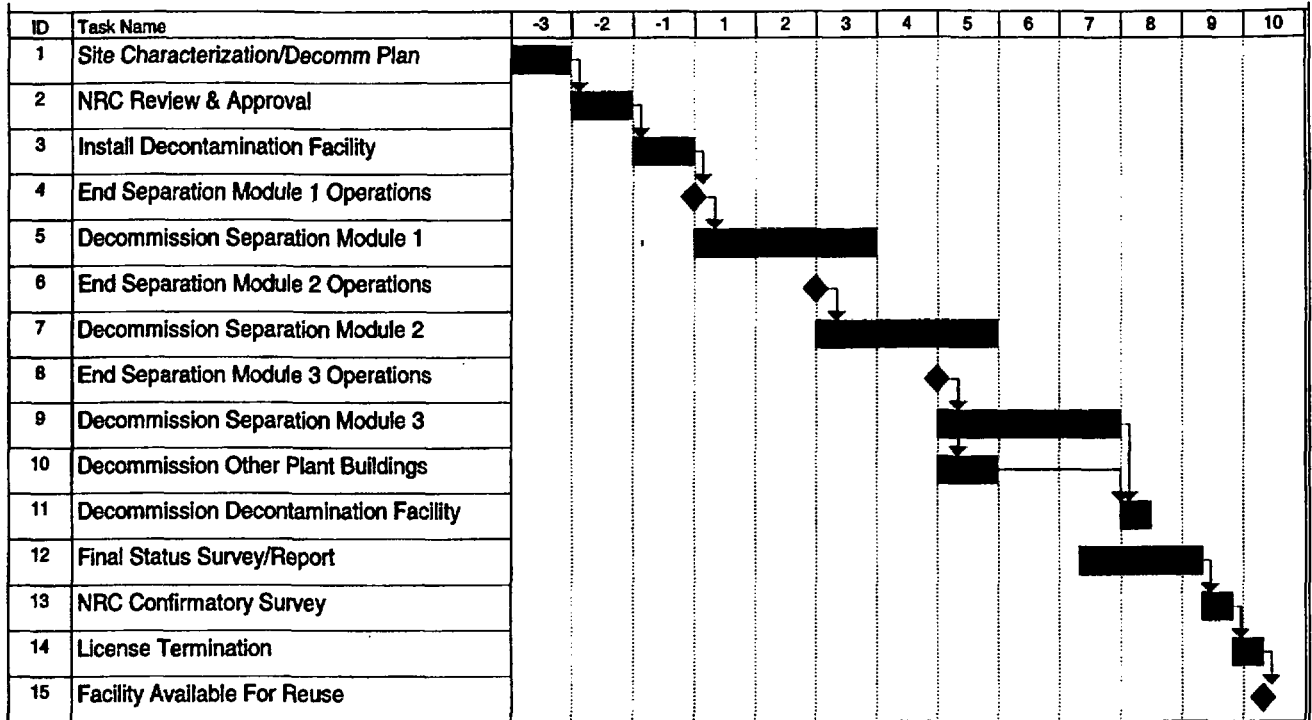
	Maximum Million kgU	
	DUF ₆ (a)	U (b)
UDS Conversion & Disposal Quantities:		
FY 2005 (Aug.-Sept.)	1.837	1.242
FY 2006	31.237	21.116
FY 2007	35.300	23.863
FY 2008	35.300	23.863
FY 2009	35.300	23.863
FY 2010 (Oct.-July)	29.417	19.886
Total:	168.391	113.832
Nominal Conversion Rate (Million kgU/Year)		21.3
Maximum Conversion Rate (Million kgU/Year)		23.9
UDS Contract Workscope Costs (c)		Million \$
Design, Permitting, Project Management, etc.		27.99
Construct Paducah Conversion Facility		93.96
Construct Portsmouth Conversion Facility		90.40
Operations for First 5 Years DUF ₆ & DU ₃ O ₈ (d)		283.23
Contract Estimated Total Cost w/o Fee per DOE		495.58
Contract Estimated Value per DOE PR, Aug. 29, 2002		558.00
Cost & Value Difference is Maximum Fee of 12.6%		62.42
Capital Cost w/o Fee		212.35
Capital Cost with Maximum Fee		239.10
First 5 Years Operating Cost with Maximum Fee		318.92
Estimated Conversion & Disposal Costs:		
Unit Maximum Capital Cost (e)		\$0.69/kgU
2006-2010 Unit Maximum Operating Costs in 2002 dollars		\$2.80/kgU
Total Estimated Maximum Unit Cost		\$3.49/kgU
(a) As on page B-10 of the UDS contract.		
(b) DUF ₆ weight multiplied by the uranium atomic mass fraction, 0.676.		
(c) Workscope costs as on UDS contract pages B-2 and B-3.		
(d) Does not include any potential off-set credit for HF sales.		
(e) Assumes 12% ROI over 25 years, 6% government cost of money, and no taxes.		

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FIGURES

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NATIONAL ENRICHMENT FACILITY - CONCEPTUAL DECOMMISSIONING SCHEDULE



REFERENCE NUMBER
Figure 10.1-1.doc



FIGURE 10.1-1
NATIONAL ENRICHMENT FACILITY -
CONCEPTUAL DECOMMISSIONING SCHEDULE

REVISION DATE: DECEMBER 2003

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APPENDIX A LES QA PROGRAM DESCRIPTION

11.0 MANAGEMENT MEASURES

Management measures are functions applied to item(s) relied on for safety (IROFS) and any items which may affect the function of IROFS to provide reasonable assurance that the IROFS are available and able to perform their functions when needed. This chapter addresses each of the management measures included in the 10 CFR 70.4 definition of management measures.

Management measures are implemented through a quality assurance (QA) program in accordance with 10 CFR 50, Appendix B (CFR, 2003b). The QA program also provides additional measures for ensuring that the design, construction, operation and decommissioning of IROFS are controlled commensurate with their importance to safety. The Louisiana Energy Services (LES) Quality Assurance Program is described in the LES QA Program Description document included as Appendix A to this chapter. The current LES QA Program is consistent with the QA Program submitted for Nuclear Regulatory Commission (NRC) review in Chapter 10 of the Claiborne Enrichment Center Safety Analysis Report (LES, 1993). The NRC staff evaluated the previous LES QA Program and concluded that the program, when implemented effectively, will meet the requirements of 10 CFR 50, Appendix B (CFR, 1994). The staff concluded in Section 12.3 of NUREG-1491 (NRC, 1994) that the LES QA program was acceptable for the design, construction, start-up, and operation of the enrichment facility. References to the NUREG-1491 (NRC, 1994) sections that document the NRC staff's previous acceptance of these management measures are included in each section as appropriate.

LES maintains full responsibility for assuring that the National Enrichment Facility (NEF) is designed, constructed, tested, and operated in conformance with good engineering practices, applicable regulatory requirements and specified design requirements and in a manner to protect the health and safety of the public. To this end, the LES Quality Assurance Program conforms to the criteria established in 10 CFR 50, Appendix B, Quality Assurance Criteria For Nuclear Power Plants and Fuel Reprocessing Plants (CFR, 2003b). The criteria in 10 CFR 50, Appendix B (CFR, 2003b), are implemented following the commitment to ASME NQA-1-1994, Quality Assurance Program Requirements for Nuclear Facilities (ASME, 1994), as revised by the ASME NQA-1a-1995 Addenda (ASME, 1995).

The QA Program described herein includes design, construction, pre-operational testing, and operation of the facility. This QA Program describes the requirements to be applied for those systems, components, items, and services that have been determined to be QA Level 1 as defined in Appendix A. LES and their contractors implement these requirements through the use of approved procedures. In addition, a quality assurance program as described in Appendix A is applied to certain other systems, components, items, and services which are not QA Level 1. The information provided in this chapter, the corresponding regulatory requirement, and the section of NUREG-1520 (NRC, 2002), Chapter 11 in which the NRC acceptance criteria are presented is summarized below.

Information Category and Requirement	10 CFR 70 Citation	NUREG-1520 Chapter 11 Reference
Section 11.1 Configuration Management	70.62(d) & 70.72	11.4.3.1
Section 11.2 Maintenance	70.62(d)	11.4.3.2
Section 11.3 Training and Qualifications	70.62(d) & 10CFR19	11.4.3.3
Section 11.4 Procedures Development and Implementation	70.62(d) & 70.22(a)(8)	11.4.3.4
Section 11.5 Audits and Assessments	70.62(d)	11.4.3.5
Section 11.6 Incident Investigations and Corrective Action Process	70.74(a)&(b) 70.62(a)(3)	11.4.3.6
Section 11.7 Records Management	70.62(a)(2)&(3) 70.62(d)	11.4.3.7
Section 11.8 Other QA Elements	70.62(d)	11.4.3.8
Appendix A: LES QA Program Description	70.62(d)	11.4.3.8

11.1 CONFIGURATION MANAGEMENT (CM)

This section describes the configuration management program for the NEF. Configuration management for the NEF is implemented through requirements of the QA Program and associated procedures.

The LES President is the executive responsible for quality assurance and is the highest level of management responsible for LES's QA policies, goals, and objectives. The President receives policy direction from the LES Management Committee. The LES organization during the design, construction and operation phases, including QA, is presented in Chapter 2, Organization and Administration.

11.1.1 Configuration Management Policy

Configuration management is provided throughout facility design, construction, testing, and operation. Configuration management provides the means to establish and maintain a technical baseline for the facility based on clearly defined requirements. During design and construction, the Engineering and Contracts Manager has responsibility for configuration management through the design control process. Selected documentation, including the integrated safety analysis (ISA), is controlled under the configuration management system in accordance with procedures associated with design control, document control, and records management. Design changes undergo formal review, including interdisciplinary reviews as appropriate, in accordance with these procedures. This interdisciplinary review includes as a minimum the review for ISA impacts.

Configuration management provides the means to establish and maintain the essential features of the design basis of IROFS, including the ISA. As the project progresses from design and construction to operation, configuration management is maintained by the Technical Services organization as the overall focus of activities changes. Procedures will define the turnover process and responsibilities since construction will continue on new work modules during operations.

During the design phase of the project, configuration management is based on the design control provisions and associated procedural controls over design documents to establish and maintain the technical baseline. Design documents, including the ISA, that provide design input, design analysis, or design results specifically for IROFS are identified with the appropriate QA level. These design documents undergo interdisciplinary review during the initial issue and during each subsequent revision. During the construction phase of the project, changes to drawings and specifications issued for construction, procurement, or fabrication are systematically reviewed and verified, evaluated for impact, including impact to the ISA, and approved prior to implementation. Proper implementation is verified and reflected in the design basis documentation.

In order to provide for the continued safe and reliable operation of the facility structures, systems and components, measures are implemented to ensure that the quality of these structures, systems and components is not compromised by planned changes (modifications). After issuance of the Operating License, the Plant Manager is responsible for the design of and modifications to facility structures, systems or components. The design and implementation of modifications are performed in a manner so as to assure quality is maintained in a manner

commensurate with the remainder of the system which is being modified, or as dictated by applicable regulations.

The administrative instructions for modifications during the operations phase are contained in procedures that are approved, including revisions, by the Technical Services Manager. The modification procedure contains the following items necessary to ensure quality in the modification program:

- The technical and quality requirements which shall be met to implement a modification
- The requirements for initiating, approving, monitoring, designing, verifying, and documenting modifications. The facility modification procedure shall be written to ensure that policies are formulated and maintained to satisfy the LES QA Program, as applicable.

Each change to the facility or to activities of personnel shall have an evaluation performed in accordance with the requirements of 10 CFR 70.72 (CFR, 2003e), as applicable. Each modification shall also be evaluated for any required changes or additions to the facility's procedures, personnel training, testing program, or regulatory documents.

Each modification is also evaluated and documented for radiation exposure to minimize worker exposures in keeping with the facility as low as reasonably achievable (ALARA) program, criticality and worker safety requirements and/or restrictions. Other areas of consideration in evaluating modifications may include, but are not limited to the review of:

- Modification cost
- Lessons learned from similar completed modifications
- QA requirements
- Potential operability or maintainability concerns
- Constructability concerns
- Post-modification testing requirements
- Environmental considerations
- Human factors
- Integrated safety analysis.

After completion of a modification to a structure, system, or component, the modification Project Manager, or designee, shall ensure that all applicable testing has been completed to ensure correct operation of the system(s) affected by the modification and documentation regarding the modification is complete. In order to ensure operators are able to operate a modified system safely, when a modification is complete, all documents necessary, e.g., the revised process description, checklists for operation and flowsheets are made available to operations and maintenance departments prior to the start-up of the modified system. Appropriate training on the modification is completed before a system is placed in operation. A formal notice of a

modification being completed is distributed to all appropriate managers. As-built drawings incorporating the modification are completed in accordance with the design control procedures. These records shall be identifiable and shall be retained in accordance with the records management procedures.

11.1.1.1 Scope of Structures, Systems, and Components

The scope of Structures, Systems, and Components (SSC) under configuration management includes all IROFS identified by the integrated safety analysis of the design bases and any items which may affect the function of the IROFS. The list of IROFS is provided in Chapter 3, Integrated Safety Analysis Summary. Design documents subject to configuration management include calculations, safety analyses, design criteria, engineering drawings, system descriptions, technical documents, and specifications that establish design requirements for IROFS. During the design phase, these design documents are maintained under configuration management when initially approved.

The scope of documents included in the configuration management program expands throughout the design process. As drawings and specification sections related to IROFS or items affecting the functions of IROFS are prepared and issued for procurement, fabrication, or construction, these documents are included in configuration management.

During construction, initial startup, and operations, the scope of documents under configuration management similarly expands to include, as appropriate: vendor data; test data; inspection data; initial startup, test, operating and administrative procedures as applicable to IROFS and nonconformance reports. These documents include documentation related to IROFS that is generated through functional interfaces with QA, maintenance, and training and qualifications of personnel. Configuration management procedures will provide for evaluation, implementation, and tracking of changes to IROFS, and processes, equipment, computer programs, and activities of personnel that impact IROFS.

11.1.1.2 Interfaces with Other Management Measures

Configuration management is implemented through or otherwise related to other management measures. Key interfaces and relationships to other management measures are described below:

- **Quality Assurance** - The QA program establishes the framework for configuration management and other management measures for IROFS and items that affect the function of the IROFS.
- **Records Management** - Records associated with IROFS and items affecting IROFS are generated and processed in accordance with the applicable requirements of the QA Program and provide evidence of the conduct of activities associated with the configuration management of those IROFS.
- **Maintenance** – Maintenance requirements are established as part of the design basis, which is controlled under configuration management. Maintenance records for IROFS and

items affecting IROFS provide evidence of compliance with preventative and corrective maintenance schedules.

- **Training and Qualifications** - Training and qualification are controlled in accordance with the applicable provisions of the QA Program. Personnel qualifications and/or training to specific processes and procedures are management measures that support the safe operation, maintenance, or testing of IROFS. Also, work activities that are themselves IROFS, (i.e., administrative controls) are proceduralized, and personnel are trained and qualified to these procedures. Training and qualification requirements and documentation of training may be considered part of the design basis controlled under configuration management. Reference Sections 11.3.2, Analysis and Identification of Functional Areas Requiring Training, and 11.3.3, Position Training Requirements, for interfaces with configuration management.
- **Incident Investigation/Audits and Assessments** - Audits, assessments, and incident investigations are described in Sections 11.5, Audits and Assessments, and 11.6, Incident Investigations and Corrective Action Process. Corrective actions identified as a result of these management measures may result in changes to design features, administrative controls, or other management measures (e.g., operating procedures). The Corrective Action Program (CAP) is described in Section 11.6, "Incident Investigations and Corrective Action Process." Changes are evaluated under the provisions of configuration management through the QA Program and procedures. Periodic assessments of the configuration management program are also conducted in accordance with the audit and assessment program described in Section 11.5.
- **Procedures** - Operating, administrative, maintenance, and emergency procedures are used to conduct various operations associated with IROFS and items affecting IROFS and will be reviewed for potential impacts to the design basis. Also, work activities that are themselves IROFS, (i.e., administrative controls) are contained in procedures.

11.1.1.3 Objectives of Configuration Management

The objectives of configuration management are to ensure design and operation within the design basis of IROFS by: identifying and controlling preparation and review of documentation associated with IROFS; controlling changes to IROFS; and maintaining the physical configuration of the facility consistent with the approved design.

The Urenco technology transfer documentation provides the enrichment plant design, and identifies those safety trips and features credited in the European safety analyses. The ISA of the design bases determines the IROFS and establishes the safety function(s) associated with each IROFS. Configuration control is accomplished during design through the use of procedures for controlling design, including preparation, review (including interdisciplinary review), design verification where appropriate, approval, and release and distribution for use. Engineering documents will be assessed for QA level classification. Changes to the approved design are subject to a review to ensure consistency with the design bases of IROFS. Configuration verification is also accomplished through design verification, which ensures that design documents are consistent and that design requirements for IROFS are met. During construction and testing, this verification also extends to verification that as-built configurations

are consistent with the design, and that testing that is specified to demonstrate performance of IROFS is accomplished successfully. Periodic audits and assessments of the configuration management program and of the design confirm that the system meets its goals and that the design is consistent with the design bases. The corrective action process occurs in accordance with the LES QA Program and associated procedures in the event problems are identified. Prompt corrective actions are developed as a result of incident investigations or in response to audit or assessment results.

11.1.1.4 Description of Configuration Management Activities

Configuration management includes those activities conducted under design control provisions for ensuring that design and construction documentation is prepared, reviewed, and approved in accordance with a systematic process. This process includes interdisciplinary reviews appropriate to ensure consistency between the design and the design bases of IROFS. During construction, it also includes those activities that ensure that construction is consistent with design documents. Finally, it includes activities that provide for operation of the IROFS in accordance with the limits and constraints established in the ISA, and that provide for control of changes to the facility in accordance with 10 CFR 70.72 (CFR, 2003e).

Configuration management also includes records to demonstrate that personnel conducting activities that are relied on for safety or that are associated with IROFS are appropriately qualified and trained to conduct that work.

Implementing documents are controlled within the document control system. These documents support configuration management by ensuring that only reviewed and approved procedures, specifications and drawings are used for procurement, construction, installation, testing, operation, and maintenance of IROFS, as appropriate.

11.1.1.5 Organizational Structure and Staffing Interfaces

The configuration management program is administered by the Engineering and Contracts organization during design and construction. Engineering includes engineering disciplines with responsible lead engineers in charge of each discipline, under the direction of design managers or project managers who report to the Engineering and Contracts Manager. The lead discipline engineers have primary technical responsibility for the work performed by their disciplines, and are responsible for the conduct of interdisciplinary reviews as discussed previously in this section. Reviews are also conducted, as appropriate, by construction management, operations, QA, and procurement personnel. The design control process also interfaces with the document control and records management process via procedures.

The various LES departments and contractors of LES perform quality-related activities. The primary LES contractors are responsible for development of their respective QA Programs, which shall be consistent with the requirements of the LES QA Program for those activities determined to be within the scope of the LES QA Program. The interfaces between contractors and LES or among contractors shall be documented. LES and contracted personnel have the responsibility to identify quality problems. If a member of another area disagrees, that individual is instructed to take the matter to appropriate management. The disagreement may either be resolved at this level or at any level up to and including the LES President.

11.1.2 Design Requirements

Design requirements and associated design bases are established and maintained by the Engineering and Contracts organization during design and construction and by the Technical Services organization during operations. The configuration management controls on design requirements and the integrated safety analysis of the design bases are described previously in this section. Design requirements are documented in a design requirements document that provides for a hierarchical distribution of these requirements through basis of design documents. The design requirements document and basis of design documents are controlled under the design control provisions of the configuration management program as described above, and are subject to the same change control as analyses, specifications, and drawings. Computer codes used in the design of IROFS are also subject to these design control measures, with additional requirements as appropriate for software control, verification, and validation.

IROFS and any items that affect the function of the IROFS are designated as QA Level 1 and the associated design documents are subject to interdisciplinary reviews and design verification. Analyses constituting the integrated safety analysis of the design bases are subject to the same requirements. Changes to the design are evaluated to ensure consistency with the design bases.

IROFS are listed in the design requirements document. This list will be augmented and maintained current as appropriate as IROFS are identified in more detail during detailed design.

A qualified individual who specifies and includes the appropriate codes, standards, and licensing commitments within the design documents prepares each design document, such as a calculation, specification, procedure, or drawing. This individual also notes any deviations or changes from such standards within the design documentation package. Each design document is then checked by another individual qualified in the same discipline and is reviewed for concept and conformity with the design inputs. These design inputs are in sufficient detail to permit verification of the document. The manager having overall responsibility for the design function approves the document. The Engineering Manager documents the entire review process in accordance with approved procedures. These procedures include provisions to assure that appropriate quality standards are specified in design documents, including quantitative or qualitative acceptance criteria. The QA Director conducts audits on the design control process using independent technically qualified individuals to augment the QA audit team.

During the check and review, emphasis is placed on assuring conformance with applicable codes, standards and license application design commitments. The individuals in engineering assigned to perform the check and review of a document have full and independent authority to withhold approval until questions concerning the work have been resolved. Design reviews, alternative calculations, or qualification testing accomplishes verification of design. The bases for a design, such as analytical models, theories, examples, tables, codes and computer programs must be referenced in the design document and their application verified during check and review. Model tests, when required to prove the adequacy of a concept or a design, are reviewed and approved by the responsible qualified individual. Testing used for design verification shall demonstrate adequacy of performance under conditions that simulate the most

adverse design conditions. The tests used for design verification must meet all the design requirements.

Qualified individuals other than those who performed the design but may be from the same organization perform design verification. Verification may be performed by the supervisor of the individual performing the design, provided this need is documented, approved in advance by the supervisor's management, and the supervisor did not specify a singular design approach or rule out certain design considerations, and did not establish the design inputs used in the design or, provided the supervisor is the only individual in the organization competent to perform the verification. The verification by a supervisor of their own design constraints, design input, or design work would only occur in rare instances. This would occur only when the supervisor is the only individual in the organization competent to perform the verification. These instances are authorized and documented in writing on a case-by-case basis.

Independent design verification shall be accomplished before the design document (or information contained therein) is used by other organizations for design work or to support other activities such as procurement, construction, or installation. When this is not practical due to time constraints, the unverified portion of the document is identified and controlled. In all cases, the design verification shall be completed before relying on the item to perform its function or installation becomes irreversible. Any changes to the design and procurement documents, including field changes, must be reviewed, checked and approved commensurate with the original approval requirements.

After design documents have been properly prepared, checked, reviewed, and approved by the appropriate parties, the responsible engineer sends the document to document control for distribution. When required, each recipient of a design document verifies receipt of such document to the document control center.

The document control center, after verification of distribution to a recipient, maintains the required documentation in its files.

When deficiencies are identified which affect the design of IROFS, such deficiencies are documented and resolved in accordance with approved CAP procedures. In accordance with the CAP the report is forwarded for appropriate review to the responsible manager, who coordinates further review of the problem and revises all design documents affected by the deficiency as necessary. Where required, the responsible manager forwards the report to the engineers in other areas, who coordinate necessary revisions to their affected documents.

Design interfaces are maintained by communication among the principals. Methods by which this is accomplished include the following:

- A. Design documents are reviewed by the responsible engineer or authorized representative. As appropriate, subsequent review or waiver of review by the other area engineers is documented.
- B. Project review meetings are scheduled and held to coordinate design, procurement, construction and pre-operational testing of the facility. These meetings provide a primary working interface among the principal organizations.
- C. Reports of nonconformances are transmitted and controlled by procedures. As required by the nonconformance procedure, the QA Director/Manager or designee approves resolution of nonconformances.

During the operational phase, measures are provided to ensure responsible facility personnel are made aware of design changes and modifications that may affect the performance of their duties.

11.1.2.1 Configuration Management Controls on the Design Requirements

Configuration control is accomplished during design through the use of procedures for controlling design, including preparation, review (including interdisciplinary review), and design verification where appropriate, approval, and release and distribution for use. Engineering documents are assessed for QA level classification. Changes to the approved design also are subject to a review to ensure consistency with the design bases of IROFS.

Configuration verification is also accomplished through design verification, which ensures that design documents are consistent and that design requirements for IROFS are met. During construction and testing, this verification also extends to verification that as-built configurations are consistent with the design, and that testing that is specified to demonstrate performance of IROFS is accomplished successfully.

The QA Program requires procedures that specify that work performed shall be accomplished in accordance with the requirements and guidelines imposed by applicable specifications, drawings, codes, standards, regulations, quality assurance criteria and site characteristics.

Acceptance criteria established by the designer are incorporated in the instructions, procedures and drawings used to perform the work. Documentation is maintained, including test results, and inspection records, demonstrating that the work has been properly performed. Procedures also provide for review, audit, approval and documentation of activities affecting the quality of items to ensure that applicable criteria have been met.

Maintenance, modification, and inspection procedures are reviewed by qualified personnel knowledgeable in the quality assurance disciplines to determine:

- A. The need for inspection, identification of inspection personnel, and documentation of inspection result
- B. That the necessary inspection requirements, methods, and acceptance criteria have been identified.

Facility procedures shall be reviewed by an individual knowledgeable in the area affected by the procedure on a frequency determined by the age and use of the procedure to determine if changes are necessary or desirable. Procedures are also reviewed to ensure procedures are maintained up-to-date with facility configuration. These reviews are intended to ensure that any modifications to facility systems, structures or components are reflected in current maintenance, operations and other facility procedures.

11.1.3 Document Control

Procedures are established which control the preparation and issuance of documents such as manuals, instructions, drawings, procedures, specifications, procurement documents and supplier-supplied documents, including any changes thereto. Measures are established to ensure documents, including revisions, are adequately reviewed, approved, and released for use by authorized personnel.

Document control procedures require documents to be transmitted and received in a timely manner at appropriate locations including the location where the prescribed activity is to be performed. Controlled copies of these documents and their revisions are distributed to and used by the persons performing the activity.

Superseded documents are destroyed or are retained only when they have been properly labeled. Indexes of current documents are maintained and controlled.

Document control is implemented in accordance with procedures. An electronic document management system is used both to file project records and to make available the latest revision (i.e., the controlled copy) of design documents. The system provides an "official" copy of the current document, and personnel are trained to use this system to retrieve controlled documents. The system is capable of generating indices of controlled documents, which are uniquely numbered (including revision number). Controlled documents are maintained until cancelled or superseded, and cancelled or superseded documents are maintained as a record, currently for the life of the project or termination of the license, whichever occurs later. Hard-copy distribution of controlled documents is provided when needed in accordance with applicable procedures (e.g., when the electronic document management system is not available).

A part of the configuration management program, the document control and records management procedures, as appropriate, capture the following documents:

- Design requirements, through the controlled copy of the design requirements document
- The design bases, through the controlled copy of the basis of design documents
- The integrated safety analysis of the design bases of IROFS, through the controlled copies of supporting analyses
- As-built drawings
- Specifications
- All procedures that are IROFS
- Procedures involving training
- QA
- Maintenance
- Audit and assessment reports
- Emergency operating procedures
- Emergency response plans
- System modification documents

- Assessment reports
 - Engineering documents including analyses, specifications, technical reports, and drawings.
- These items are documented in approved procedures.

11.1.4 Change Control

Procedures control changes to the technical baseline. The process includes an appropriate level of technical, management, and safety review and approval prior to implementation. During the design phase of the project, the method of controlling changes is the design control process described in the QA Program. This process includes the conduct of interdisciplinary reviews that constitute a primary mechanism for ensuring consistency of the design with the design bases. During both construction and operation, appropriate reviews to ensure consistency with the design bases of IROFS and the ISA, respectively, will similarly ensure that the design is constructed and operated/modified within the limits of the design basis. Additional details are provided below.

11.1.4.1 Design Phase

Changes to the design include a systematic review of the design bases for consistency. In the event of changes to reflect design or operational changes from the established design bases, both the integrated safety analysis and other documents affected by design bases of IROFS including the design requirements document and basis of design documents, as applicable are properly modified, reviewed, and approved prior to implementation. Approved changes are made available to personnel through the document control function discussed previously in this section.

During design, the method of ensuring consistency between documents, including consistency between design changes and the safety assessment, is the interdisciplinary review process. The interdisciplinary reviews ensure design changes either (1) do not impact the ISA, (2) are accounted for in subsequent changes to the ISA, or (3) are not approved or implemented.

11.1.4.2 Construction Phase

When the project enters the construction phase, changes to documents issued for construction, fabrication, and procurement will be documented, reviewed, approved, and posted against each affected design document. Vendor drawings and data also undergo an interdisciplinary review to ensure compliance with procurement specifications and drawings, and to incorporate interface requirements into facility documents.

During construction, design changes will be evaluated against the approved design bases of IROFS. Changes are expected to the design as detailed design progresses and construction begins. A systematic process consistent with the process described above will be used to evaluate changes in the design against the design bases of IROFS and the ISA. LES will notify the NRC of potential changes that reduce the level of commitments or margin of safety in the design bases of IROFS, and will not implement such changes without prior NRC approval in accordance with 10 CFR 70.72 (CFR, 2003e).

11.1.4.3 Operations Phase

During the operations phase, changes to design will also be documented, reviewed, and approved prior to implementation. LES will implement a change process that fully implements the provisions of 10 CFR 70.72 (CFR, 2003e). Measures are provided to ensure responsible facility personnel are made aware of design changes and modifications that may affect the performance of their duties.

In order to provide for the continued safe and reliable operation of the facility structures, systems and components, measures are implemented to ensure that the quality of these structures, systems and components is not compromised by planned changes (modifications). After issuance of the Operating License, the Plant Manager is responsible for the design of and modifications to facility structures, systems or components. The design and implementation of modifications are performed in a manner so as to assure quality is maintained in the remainder of the system that is being modified, or as dictated by applicable regulations.

The administrative instructions for modifications are contained in a facility administrative procedure that is approved, including revisions, by the Technical Services Manager with concurrence of the Quality Assurance Manager. The modification procedure contains the following items necessary to ensure quality in the modification program:

- The requirements that shall be met to implement a modification
- The requirements for initiating, approving, monitoring, designing, verifying, and documenting modifications. The facility modification procedure shall be written to ensure that policies are formulated and maintained to satisfy the quality assurance requirements specified in the LES QA Program, as applicable.

Each change to the facility or to activities of personnel shall have an evaluation performed in accordance with the requirements of 10 CFR 70.72 (CFR, 2003e), as applicable. Each modification shall also be evaluated for any required changes or additions to the facility's procedures, personnel training, testing program, or regulatory documents.

Each modification is also evaluated and documented for radiation exposure to minimize worker exposures in keeping with the facility ALARA program, criticality and worker safety requirements and/or restrictions. Other areas of consideration in evaluating modifications may include, but are not limited to the review of:

- Modification cost
- Lessons learned from similar completed modifications
- QA aspects
- Potential operability or maintainability concerns
- Constructability concerns
- Post-modification testing requirements
- Environmental considerations
- Human factors.

After completion of a modification to a structure, system, or component, the modification Project Manager, or designee, shall ensure that all applicable testing has been completed to ensure correct operation of the system(s) affected by the modification and documentation regarding the modification is complete. In order to ensure operators are able to operate a modified system safely, when a modification is complete, all documents necessary, e.g., the revised process description, checklists for operation and flowsheets are made available to operations and maintenance departments once the modified system becomes "operational." Appropriate training on the modification is completed before a system is placed in operation. A formal notice of a modification being completed is distributed to all appropriate managers. As-built drawings incorporating the modification are completed promptly. These records shall be identifiable and shall be retained for the duration of the facility license.

11.1.5 Assessments

Periodic assessments of the configuration management program are conducted to determine the system's effectiveness and to correct deficiencies. These assessments include review of the adequacy of documentation and system walk downs of the as-built facility. Such audits and assessments are conducted and documented in accordance with procedures.

Periodic audits and assessments of the configuration management program and of the design confirm that the system meets its goals and that the design is consistent with the design bases. Incident investigations occur in accordance with the QA Program and associated CAP procedures in the event problems are encountered. Prompt corrective actions are developed as a result of incident investigations or in response to adverse audit/assessment results, in accordance with CAP procedures.

11.2 MAINTENANCE

This section outlines the maintenance and functional testing programs to be implemented for the operations phase of the facility. Preventive maintenance activities, surveillance, and performance trending provide reasonable and continuing assurance that IROFS will be available and reliable to perform their safety functions.

The purpose of planned and scheduled maintenance for IROFS is to ensure that the equipment and controls are kept in a condition of readiness to perform the planned and designed functions when required. Appropriate plant management is responsible for ensuring the operational readiness of IROFS under this control. For this reason, the maintenance function is administratively closely coupled to operations. The Maintenance organization plans, schedules, tracks, and maintains records for maintenance activities.

In order to provide for the continued safe and reliable operation of the facility structures, systems and components, measures are implemented to ensure that the quality of these structures, systems and components is not compromised by planned changes (modifications) or maintenance activities. After issuance of the Operating License, the Plant Manager is responsible for the design of and modifications to facility structures, systems or components and all maintenance activities. The design and implementation of modifications are performed in a manner so as to assure quality is maintained in a manner commensurate with the remainder of the system which is being modified, or as dictated by applicable regulations.

The administrative instructions for modifications are contained in a facility administrative procedure that is approved, including revisions, by the Technical Services Manager with concurrence of the Quality Assurance Manager. The modification procedure contains the following items necessary to ensure quality in the modification program:

- The requirements which shall be met to implement a modification
- The requirements for initiating, approving, monitoring, designing, verifying, and documenting modifications. The facility modification procedure shall be written to ensure that policies are formulated and maintained to satisfy the quality assurance standards specified in the LES QA Program, as applicable.

Listed below are methods or practices that will be applied to the corrective, preventive, and functional-test maintenance elements. LES will prepare written procedures for performance of these methods and practices. These methods and practices include, as applicable:

Authorized work instructions with detailed steps and a reminder of the importance of the IROFS identified in the ISA Summary:

- Parts lists
- As-built or redlined drawings
- A notification step to the Operations function before conducting repairs and removing an IROFS from service

- Radiation Work Permits
- Replacement with like-kind parts and the control of new or replacement parts to ensure compliance with 10 CFR 21 (CFR, 2003a)
- Compensatory measures while performing work on IROFS
- Procedural control of removal of components from service for maintenance and for return to service
- Ensuring safe operations during the removal of IROFS from service
- Notification to Operations personnel that repairs have been completed.

Written procedures for the performance of maintenance activities include the steps listed above. The details of maintenance procedure acceptance criteria, reviews, and approval are provided in Section 11.4, Procedures Development and Implementation.

As applicable, contractors that work on or near IROFS identified in the ISA Summary will be required by LES to follow the same maintenance procedures described for the corrective, preventive, functional testing, or surveillance/monitoring activities listed above for the maintenance function.

Maintenance procedures involving IROFS commit to the topics listed below for corrective and preventive maintenance, functional testing after maintenance, and surveillance/monitoring maintenance activities:

- Pre-maintenance activities require reviews of the work to be performed, including procedure reviews for accuracy and completeness.
- Steps that require notification of all affected parties (operators and appropriate managers) before performing work and on completion of maintenance work. The discussion includes potential degradation of IROFS during the planned maintenance.
- Control of work by comprehensive procedures to be followed by maintenance technicians. Maintenance procedures are reviewed by the various safety disciplines, including criticality, fire, radiation, industrial, and chemical process safety. The procedures describe, as a minimum, the following:
 - Qualifications of personnel authorized to perform the maintenance, functional testing or surveillance/monitoring
 - Controls on and specification of any replacement components or materials to be used (this will be controlled by Configuration Management, to ensure like-kind replacement and adherence to 10 CFR 21 (CFR, 2003a))
 - Post-maintenance testing to verify operability of the equipment
 - Tracking and records management of maintenance activities

- o Safe work practices (e. g., lockout/tag out, confined space entry, moderation control or exclusion area, radiation or hot work permits, and criticality, fire, chemical, and environmental issues).

Maintenance activities generally fall into the following categories:

- Surveillance/monitoring
- Corrective maintenance
- Preventive maintenance
- Functional testing.

These maintenance categories are discussed in the following sections.

11.2.1 Surveillance/Monitoring

Surveillance/monitoring is utilized to detect degradation and adverse trends of IROFS so that action may be taken prior to component failure. The monitored parameters are selected based upon their ability to detect the predominate failure modes of the critical components. Data sources include; surveillance, periodic and diagnostic test results, plant computer information, operator rounds, walk downs, as-found conditions, failure trending, and predictive maintenance. Surveillance/monitoring and reporting is required for SSC that are identified as IROFS and any SSC and administrative controls that could impact the functions of an IROFS.

Plant performance criteria are established to monitor plant performance and to monitor IROFS functions and component parameters. These criteria are established using Urenco industry experience, operating data, surveillance data, and plant equipment operating experience. These criteria ensure the reliability and availability of IROFS. The performance criteria are also used to demonstrate that the performance or condition of an IROFS is being effectively controlled through appropriate predictive and repetitive maintenance strategies so that IROFS remain capable of performing their intended function.

Surveillance of IROFS is performed at specified intervals. The purpose of the surveillance program is to measure the degree to which IROFS meet performance specifications. The results of surveillances are trended, and when the trend indicates potential IROFS performance degradation, preventive maintenance frequencies are adjusted or other appropriate corrective action is taken.

Incident investigations may identify root causes of failures that are related to the type or frequency of maintenance. The lessons learned from such investigations are factored into the surveillance/monitoring and preventive maintenance programs as appropriate.

Maintenance procedures prescribe compensatory measures, if appropriate, for surveillance tests of IROFS that can be performed only while equipment is out of service.

Records showing the current surveillance schedule, performance criteria, and test results for all IROFS will be maintained in accordance with the Record Management System.

Results of surveillance/monitoring activities related to IROFS via the configuration management program will be evaluated by all safety disciplines to determine any impact on the ISA and any updates needed.

11.2.2 Corrective Maintenance

Corrective maintenance involves repair or replacement of equipment that has unexpectedly degraded or failed. Corrective maintenance of IROFS restores the equipment to acceptable performance through a planned, systematic, controlled, and documented approach for the repair and replacement activities.

Following any corrective maintenance on IROFS, and before returning an IROFS to operational status, functional testing of the IROFS, if necessary, is performed to ensure the IROFS performs its intended safety function.

The CAP requires facility personnel to determine the cause of conditions adverse to quality and promptly act to correct these conditions.

Results of corrective maintenance activities related to IROFS via the configuration management program will be evaluated by all safety disciplines to determine any impact on the ISA and any updates needed.

11.2.3 Preventive Maintenance

Preventive maintenance (PM) includes preplanned and scheduled periodic refurbishment, partial or complete overhaul, or replacement of IROFS, if necessary, to ensure their continued safety function. Planning for preventive maintenance includes consideration of results of surveillance and monitoring, including failure history. PM also includes instrument calibration and testing.

The PM program procedures and calibration standards (traceable to the national standards system or to nationally accepted calibration techniques, as appropriate) enable the facility personnel to calibrate equipment and monitoring devices important to plant safety and safeguards. Testing performed on IROFS that are not redundant will provide for compensatory measures to be put into place to ensure that the IROFS function is performed until it is put back into service.

Urenco's extensive experience in the industry (30 years) is used to determine initial PM frequencies and procedures. In determining the frequency of PM, consideration is given to appropriately balancing the objective of preventing failures through maintenance against the objective of minimizing unavailability of IROFS because of PM. In addition, feedback from PM and corrective maintenance and the results of incident investigations and identified root causes are used, as appropriate, to modify the frequency or scope of PM. The rationale for deviations from industry standards or vendor recommendations for PM shall be documented.

After conducting preventive maintenance on IROFS, and before returning an IROFS to operational status, functional testing of the SSC, if necessary, is performed to ensure the IROFS performs its intended safety function. Functional testing is described in detail in Section 11.2.4, Functional Testing.

All records pertaining to preventive maintenance will be maintained in accordance with the Records Management System.

Results of preventive maintenance activities related to IROFS via the configuration management system will be evaluated by all safety disciplines to determine any impact on the ISA and any updates needed.

11.2.4 Functional Testing

Functional testing of IROFS is performed as appropriate following initial installation, as part of periodic surveillance testing, and after corrective or preventive maintenance or calibration to ensure that the item is capable of performing its safety function when required.

The overall testing program is broken into the two major testing programs and within each testing program are two testing categories:

- A. Preoperational Testing Program
 - 1. Functional Testing
 - 2. Initial Startup Testing.
- B. Operational Testing Program
 - 1. Periodic Testing
 - 2. Special Testing.

Results of surveillance/monitoring activities related to IROFS via the configuration management program will be evaluated by all safety disciplines to determine any impact on the ISA and any updates needed.

11.2.4.1 Objectives

The objectives of the overall facility preoperational and operational testing programs are to ensure that items relied on for safety:

- A. Have been adequately designed and constructed
- B. Meet contractual, regulatory, and licensing requirements
- C. Do not adversely affect worker or the public health and safety
- D. Can be operated in a dependable manner so as to perform their intended function.

Additionally, the preoperational and operational testing programs ensure that operating and emergency procedures are correct and that personnel have acquired the correct level of technical expertise.

Periodic testing at the facility consists of that testing conducted on a periodic basis to monitor various facility parameters and to verify the continuing integrity and capability of IROFS.

Special testing at the facility consists of that testing which does not fall under any other testing program. This testing is of a non-recurring nature and is intended to enhance or supplement existing operational testing rather than replace or supersede other testing or testing programs.

11.2.4.2 Procedure Content

Test Procedures are sufficiently detailed that qualified personnel can perform the required functions without direct supervision. The content of test procedures is uniform to the extent practicable and consists of the following:

- A. Title
Each procedure contains a title descriptive of the activities to which it applies.
- B. Purpose
The purpose for which the procedure is intended is stated. This statement of applicability is as clear and concise as practicable.
- C. References
References are made to specific material used in the preparation and performance of a procedure. This includes applicable drawings, instruction manuals, specifications, and sections of the facility's operating license. These references are listed in a manner as to allow ready location of the material.
- D. Time Required
As applicable, estimates of the manpower and time requirements for performance of the specified testing activity are indicated.
- E. Prerequisites
Each procedure specifies those items that are required to be completed prior to the performance of the specified testing (e.g., a previous test or special operating conditions). This listing also includes any tests that are to be performed concurrently with the specified testing. Provisions are made to document verification of the completion of the specified prerequisite tests.
- F. Test Equipment
Each procedure contains a listing of special test equipment required in performing the specified testing. Procedures contain information and/or references for the items listed such as instruction manuals or procedures.
- G. Limits and Precautions
Limits on parameters being controlled and corrective measures necessary to return a parameter to its normal control band are specified. Procedures specifically incorporate limits and corrective measures for all operations affecting criticality safety.
Precautions are specified which alert the individual performing the task, of those situations for which important measures need to be taken early, or where extreme care must be used to protect personnel and equipment or to avoid an abnormal or an emergency situation.
- H. Required Plant Unit Status
The procedure specifies the plant unit status necessary to perform the specified testing. Provisions are made to document compliance with the status specified.

I. Prerequisite System Conditions

The procedure specifies the prerequisite system conditions necessary to perform the specified testing. Provisions are made to document compliance with the conditions specified.

J. Test Method

Each procedure contains a brief descriptive section that summarizes the method to be used for performing the specified testing.

K. Data Required

Each procedure specifies any data that must be compiled in the performance of the specified testing in order to verify satisfactory completion of the specified testing. This includes a description of any calculations necessary to reduce raw data to a workable form.

L. Acceptance Criteria

Each procedure states the criteria for evaluating the acceptability of the results of the specified testing. Test results are reduced to a meaningful and readily understandable form in order to facilitate evaluation of their acceptability. Adequate provisions are made to allow documentation of the acceptability, or unacceptability, of test results.

M. Procedure

Procedures contain step-by-step directions in the degree of detail necessary for performing the required testing. References to documents other than the subject procedure are included, as applicable. However, references are identified within these step-by-step directions when the sequence of steps requires that other tasks (not specified by the subject procedure) be performed prior to or concurrent with a procedure step. Where witnessing of a test is required, adequate provisions are made in the test procedure to allow for the required witnessing and to document the witnessing. Cautionary notes, applicable to specific steps, are included and are distinctly identified.

N. Enclosures

Data sheets, checklists and diagrams are attached to the procedure. In particular, checklists utilized to avoid or simplify lengthy or complex procedures are attached as enclosures.

11.2.4.3 Preoperational Testing Program

Preoperation functional tests are completed prior to UF₆ introduction. Other preoperational tests, not required prior to UF₆ introduction and not related to IROFS, such as office building ventilation tests, may be completed following UF₆ introduction. Tests (or portions of tests), which are not required to be completed before UF₆ introduction are identified in the test plan.

The Preoperational testing program comprises three parts:

- Constructor turnover
- Preoperational functional testing
- Initial start up testing.

Constructor Turnover

The constructor is responsible for completion of all as-built drawing verification, purging, cleaning, vacuum testing, system turnover and initial calibration of instrumentation in accordance with design and installation specifications provided by the architect engineers and vendors. As systems or portions of systems are turned over to LES, preoperational testing shall begin. The Technical Services Manager is responsible for coordination of the preoperational and startup test program.

The preoperational test plan including test summaries for all systems is available to the NRC at least 90 days prior to the start of testing. Subsequent changes to the preoperational test plan are also made available to the NRC. Preoperational testing as a minimum includes all system or component tests required by the pertinent design code which were not performed by the constructor prior to turnover. In addition, preoperational tests include all testing necessary to demonstrate that the IROFS are capable of performing their intended function.

Functional Testing

Preoperational functional testing at the facility consists of that testing conducted to initially determine various facility parameters and to initially verify the capability of SSC to meet performance requirements. The tests conducted are primarily associated with IROFS (QA Level 1) and certain QA Level 2 structures, systems and components, but may also include a number of other tests of a technical or financial interest to LES.

Preoperational functional tests are performed following constructor turnover. The major objective of preoperational functional testing is to verify that IROFS essential to the safe operation of the plant are capable of performing their intended function.

For structures, systems and components that are not QA Level 1, acceptance criteria are established to ensure worker-safety Occupational Safety and Health Administration (OSHA), reliable and efficient operation of the system and to demonstrate the performance of intended functions.

Initial startup testing at the facility consists of that testing which includes initial UF₆ introduction and all subsequent testing through the completion of Enrichment Setting Verification for each cascade. "Enrichment Setting Verification" is the verification of a selected enrichment weight percent by measurement of a physical sample collected during the "Enrichment Setting Verification" test run.

Initial startup testing is performed beginning with the introduction of UF₆ and ending with the start of commercial operation. The purpose of initial startup testing is to ensure safe and orderly UF₆ feeding and to verify parameters assumed in the ISA. Examples of initial startup tests include passivation and the filling phase.

Records of the preoperational and startup tests required prior to operation are maintained. These records include testing schedules and the testing results for all IROFS.

Initial Startup Testing

All aspects of initial startup testing are conducted under appropriate test procedures. See Section 11.4, Procedures Development and Implementation, for a detailed description of facility procedures. The use of properly reviewed and approved test procedures is required for all preoperational and startup tests. The results of each preoperational test are reviewed and

approved by the responsible department manager or designee before they are used as the basis of continuing the test program. The results of startup testing are reviewed and approved by the Technical Services Manager. In addition, the results of each individual startup test will receive the same review as that described for preoperation functional tests. All modifications to IROFS that are found necessary are subjected to an evaluation per 10 CFR 70.72 (CFR, 2003e) prior to making the change.

The impact of modifications on future and completed testing is evaluated during the 10 CFR 70.72 (CFR, 2003e) evaluation process and retesting is conducted as required.

Copies of approved test procedures are made available to NRC personnel approximately 60 days prior to their intended use, and not less than 60 days prior to the scheduled introduction of UF₆ for startup tests.

The overall preoperational functional testing program is reviewed, prior to initial UF₆ introduction, by the Plant Manager and all department Managers to ensure that all prerequisite testing is complete.

The facility operating, emergency and surveillance procedures are use-tested throughout the testing program phases and are also used in the development of preoperation functional testing and initial startup testing procedures to the extent practicable. The trial use of operating procedures serves to familiarize operating personnel with systems and plant operation during the testing phases and also serves to ensure the adequacy of the procedures under actual or simulated operating conditions before plant operation begins.

Procedures which cannot be use-tested during the testing program phase are revised based on initial use-testing, operating experience and comparison with the as-built systems. This ensures that these procedures are as accurate and comprehensive as practicable.

11.2.4.4 Operational Testing Program

The operational testing program consists of periodic testing and special testing. Periodic testing is conducted at the facility to monitor various facility parameters and to verify the continuing integrity and capability of facility IROFS. Special testing which may be conducted at the facility is testing which does not fall under any other testing program and is of a non-recurring nature.

The Maintenance Manager has overall responsibility for the development and conduct of the operational testing program and in conjunction with the Health, Safety and Environment (HS&E) Manager ensures that all testing commitments and applicable regulatory requirements are met.

The HS&E Manager shall ensure that new surveillance requirements or testing commitments are identified to the Maintenance Manager. The Maintenance Manager shall make responsibility assignments for new testing requirements.

Surveillance commitments, procedures identified to satisfy these commitments and surveillance procedure responsibility assignments for the facility are identified in a computer database. The database is also used to ensure surveillance testing is completed in the required time interval for all departments.

Test Coordinators are also used for operational testing. The Test Coordinator has the responsibility to be thoroughly familiar with the procedure to be performed. The Test Coordinator should have an adequate period of time in which to review the procedure and the

associated system before the start of the test. It is the responsibility of the appropriate section or department head to designate and ensure that each Test Coordinator meets the appropriate requirements. Operational testing is usually performed by each shift. The Test Coordinator, as part of the shift personnel, also performs regular shift duties in performance of the tests.

The Test Coordinator has the following responsibilities regarding the conduct of testing:

- A. Verification of all system and plant unit prerequisites
- B. Observance of all limits and precautions during the conduct of the test
- C. Compliance with the requirements of the facility license and any other facility directives regarding procedure changes and documentation
- D. Identifying and taking corrective actions necessary to resolve system deficiencies or discrepancies observed during the conduct of the test
- E. Verification of proper data acquisition, evaluation of results, and compliance with stated acceptance criteria
- F. Ensuring that adequate personnel safety precautions are observed during the conduct of the test
- G. Coordinating and observing additional manpower and support required from other departments or organizations.

Periodic and special testing procedures are sufficiently detailed that qualified personnel can perform the required functions without direct supervision. The administration requirements for periodic and special testing procedures are the same as ones used for preoperational functional test and initial startup test procedures as identified in Section 11.2.4.3, Preoperational Testing Program. Spaces for initials and dates are required for the following sections:

- A. Prerequisite Tests
- B. Required Facility (or Plant Unit) Status
- C. Prerequisite System Conditions
- D. Procedure
- E. Enclosures (where calculations are made).

Whenever possible generic procedures and enclosures for recording data for periodic and special tests are used. Also whenever possible, the enclosure is designed as a self-sufficient document that can be filed as evidence that the subject test was performed. Enclosures used as self-sufficient documents should contain sign-off blanks (Initials/Date) to verify that prerequisite tests, required facility status and prerequisite facility or plant unit status and prerequisite system conditions are met before conduct of the test.

11.2.4.4.1 Periodic Testing

The periodic testing program at the facility consists of testing conducted on a periodic basis to verify the continuing capability of IROFS to meet performance requirements.

The facility periodic test program verifies that the facility:

- A. Complies with all regulatory and licensing requirements
- B. Does not endanger health and minimizes danger to life or property
- C. Is capable of operation in a dependable manner so as to perform its intended function.

The facility periodic testing program begins during the preoperational testing stage and continues throughout the facility's life.

A periodic testing schedule is established to ensure that all required testing is performed and properly evaluated on a timely basis. The schedule is revised periodically, as necessary, to reflect changes in the periodic testing requirements and experience gained during plant operation. Testing is scheduled such that the safety of the plant is never dependent on the performance of an IROFS that has not been tested within its specified testing interval.

Periodic test scheduling is handled through the Maintenance department. The Maintenance department maintains the periodic test status index on the computer database. The purpose of this index is to assist groups in assuring that all surveillances are being completed within the required test interval.

The database includes all periodic testing, calibration or inspection required by regulatory requirements or licensing commitments, and provides the following information for each surveillance:

- Test #
- Title
- Equipment #
- Work Request # (if applicable)
- Test Frequency
- Plant Cascade #
- Last date test was performed
- Next date test is due.

In the event that a test cannot be performed within its required interval due to system or plant unit conditions, the responsible department notifies in writing, on the applicable form, the HS&E Manager, Operations Manager, and the Maintenance Manager, as appropriate. The originating department retains a copy as a record of the transmittal. The responsible department lists the earliest possible date the test could be performed and the latest date along with the required system or unit-mode condition. However, the responsible department will ensure that the test is performed as soon as practical once required conditions are met, regardless of the estimated date given earlier.

Periodic testing and surveillance associated with QA Level 1 and 2 structures, systems and components are performed in accordance with written procedures.

11.2.4.4.2 Special Testing

Special testing is testing conducted at the facility that is not a facility preoperational test, periodic test, post-modification test, or post-maintenance test. Special testing is of a non-recurring nature and is conducted to determine facility parameters and/or to verify the capability of IROFS to meet performance requirements. Purposes of special testing include, but are not necessarily limited to, the following:

- A. Acquisition of particular data for special analysis
- B. Determination of information relating to facility incidents
- C. Verification that required corrective actions reasonably produce expected results and do not adversely affect the safety of operations
- D. Confirmation that facility modifications reasonably produce expected results and do not adversely affect systems, equipment and/or personnel by causing them to function outside established design conditions; applicable to testing performed outside of a post-modification test.

The determination that a certain plant activity is a Special Test is intended to exclude those plant activities which are routine surveillances, normal operational evolutions, and activities for which there is previous experience in the conduct and performance of the activity. At the discretion of the Plant Manager, any test may be conducted as a special test. In making this determination, facility management includes the following evaluations of characteristics of the activity:

- A. Does the activity involve an unusual operational configuration for which there is no previous experience?
- B. Does the activity have the propensity, if improperly conducted, to significantly affect primary plant parameters?
- A. Does the activity involve seldom-performed evolutions, meeting one of the above criteria, in which the time elapsed since the previous conduct of the activity renders prior experience not useful?

11.3 TRAINING AND QUALIFICATIONS

This section describes the training program for the operations phase of the facility, including preoperational functional testing and initial startup testing. The training program requirements apply to those plant personnel who perform activities relied on for safety.

The QA Program provides training and qualification requirements, during the design, construction, and operations phases, for QA training of personnel performing QA levels 1 and 2 work activities; for nondestructive examination, inspection, and test personnel; and for QA auditors.

The principle objective of the LES training program system is to ensure job proficiency of all facility personnel involved in work through effective training and qualification. The training program system is designed to accommodate future growth and meet commitments to comply with applicable established regulations and standards.

Qualification is indicated by successful completion of prescribed training, demonstration of the ability to perform assigned tasks and where required by regulation, maintaining a current and valid license issued by the agency establishing the requirements. Training is designed, developed and implemented according to a systematic approach. Employees are provided with formal training to establish the knowledge foundation and on-the-job training to develop work performance skills. Continuing training is provided, as required, to maintain proficiency in these knowledge and skill components, and to provide further employee development.

The training program described in this section is consistent with that previously submitted for NRC review in Section 11.3 of the Claiborne Enrichment Center Safety Analysis Report (LES, 1993). The NRC Staff reviewed the previous submittal and found it to be acceptable. The NRC staff's review and conclusions associated with Training are documented in Section 10.4 of NUREG-1491 (NRC, 1994).

11.3.1 Organization and Management of the Training Function

Line managers are responsible for the content and effective conduct of training for their personnel. Training responsibilities for line managers are included in position descriptions, and line managers are given the authority to implement training for their personnel. The training organization provides support to line managers by facilitating the planning, directing, analyzing, developing, conducting, evaluating, and controlling of a systematic performance-based training process. Performance-based training is used as the primary management tool for analyzing, designing, developing, conducting, and evaluating training.

Facility administrative procedures establish the requirements for indoctrination and training of personnel performing activities relied on for safety and to ensure that the training program is conducted in a reliable and consistent manner throughout all training areas. Exceptions from training requirements may be granted when justified and documented in accordance with procedures and approved by appropriate management.

Lesson plans are used for classroom and on-the-job training to provide consistent subject matter. When design changes or facility modifications are implemented, updates of applicable lesson plans are included in the change control process of the configuration management program.

Training records are maintained to support management information needs associated with personnel training, job performance, and qualifications.

The training programs at the facility are the responsibility of the Human Resources Manager. Records are maintained on each employee's qualifications, experience, training and retraining. The employee training file shall include records of all general employee training, technical training, and employee development training conducted at the facility. The employee training file shall also contain records of special company sponsored training conducted by others. The training records for each individual are maintained so that they are accurate and retrievable. Training records are retained in accordance with the records management procedures.

11.3.2 Analysis and Identification of Functional Areas Requiring Training

A needs/job analysis is performed and tasks are identified to ensure that appropriate training is provided to personnel working on tasks related to IROFS.

The training organization consults with relevant technical and management personnel as necessary to develop a list of tasks for which personnel training for specific jobs is appropriate. The list of tasks selected for training is reviewed and compared to the training materials as part of the systematic evaluation of training effectiveness. The task list is also updated as necessitated by changes in procedures, processes, plant systems, equipment, or job scope.

11.3.3 Position Training Requirements

Minimum training requirements are developed for those positions whose activities are relied on for safety. Initial identification of job-specific training requirements is based on experience. Entry-level criteria (e.g., education, technical background, and/or experience) for these positions are contained in position descriptions.

The training program is designed to prepare initial and replacement personnel for safe, reliable and efficient operation of the facility. Appropriate training for personnel of various abilities and experience backgrounds is provided. The level at which an employee initially enters the training program is determined by an evaluation of the employee's past experience, level of ability, and qualifications.

Facility personnel may be trained through participation in prescribed parts of the training program that consists of the following:

- General Employee Training
- Technical Training
- Employee Development/Management-Supervisory Training.

Training is made available to facility personnel to initially develop and maintain minimum qualifications outlined in Chapter 2, Organization and Administration. The objective of the training shall be to ensure safe and efficient operation of the facility and compliance with applicable established regulations and requirements. Training requirements shall be applicable to, but not necessarily restricted to, those personnel within the plant organization who have a direct relationship to the operation, maintenance, testing or other technical aspect of the facility

IROFS. Training courses are kept up-to-date to reflect plant modifications and changes to procedures when applicable.

Continuing or periodic retraining courses shall be established when applicable to ensure that personnel remain proficient. Periodic retraining generally is conducted to ensure retention of knowledge and skills important to facility operations. The training may consist of periodic retraining exercises, instruction, and review of subjects as appropriate to maintain proficiency of all personnel assigned to the facility. Section 7, Maintenance of Radiological Contingency Preparedness Capability, of the Emergency Plan provides additional information on personnel training for emergency response tasks.

11.3.3.1 General Employee Training

General Employee Training encompasses those Quality Assurance, radiation protection, safety, emergency and administrative procedures established by facility management and applicable regulations. Continuing training is conducted in these areas as necessary to maintain employee proficiency. All persons under the supervision of facility management (including contractors) must participate in General Employee Training; however, certain facility support personnel, depending on their normal work assignment, may not participate in all topics of this training. Temporary maintenance and service personnel receive General Employee Training to the extent necessary to assure safe execution of their duties. Certain portions of General Employee Training may be included in a New Employee Orientation Program.

General Employee Training topics are listed below:

- General administrative controls and procedure use
- Quality Assurance policies and procedures
- Facility systems and equipment
- Nuclear safety (See Section 11.3.3.1.1 - includes the use of dosimetry, protective clothing and equipment)
- Industrial safety, health and first aid
- Emergency Plan and implementing procedures
- Facility Security Programs (includes the protection of classified matter)
- Chemical Safety
- Fire Protection and Fire Brigade (see Section 11.3.3.1.2)
- New Employee Orientation.

11.3.3.1.1 Nuclear Safety Training

Training programs are established for the various types of job functions (e.g., production operator, radiation protection technician, contractor personnel) commensurate with criticality safety and/or radiation safety responsibilities associated with each such position. Visitors to the Controlled Access Area are trained in the formal training program or are escorted by trained personnel while in the Controlled Access Area.

This training is highlighted to stress the high level of importance placed on the radiological, criticality and chemical safety of plant personnel and the public. This training is structured as follows:

- A. Personnel access procedures ensure the completion of formal nuclear safety training prior to permitting unescorted access into the Controlled Access Area.
- B. Training sessions covering criticality safety, radiation protection and emergency procedures are conducted on a regular basis to accommodate new employees or those requiring retraining. Topics covered in the training program include:
 - Notices, reports and instructions to workers
 - Practices designed to keep radiation exposures ALARA
 - Methods of controlling radiation exposures
 - Contamination control methods (including decontamination)
 - Use of monitoring equipment
 - Emergency procedures and actions
 - Nature and sources of radiation
 - Safe use of chemicals
 - Biological effects of radiation
 - Use of personnel monitoring devices
 - Principles of nuclear criticality safety
 - Risk to pregnant females
 - Radiation protection practices
 - Protective clothing
 - Respiratory protection
 - Personnel surveys.

Individuals attending these sessions must pass an initial examination covering the training contents to assure the understanding and effectiveness of the training. The effectiveness of the training programs is also evaluated by audits and assessments of operations and maintenance personnel responsible for following the requirements related to the topics listed above.

Newly hired or transferred employees reporting for work prior to the next regularly scheduled training session must complete nuclear safety training prior to unescorted access into the Controlled Access Area.

Since contractor employees perform diverse tasks in the Controlled Access Area, formal training for these employees is designed to address the type of work they perform. In addition to applicable radiation safety topics, training contents may include Radiation Work Permits, special bioassay sampling, and special precautions for welding, cutting, and grinding in the Controlled Access Area.

These training programs are conducted by instructors assigned by the HS&E Manager as having the necessary knowledge to address criticality safety and radiation protection. Records of the training programs are maintained as described in Section 11.7, "Records Management."

- C. Individuals requiring unescorted access to the Controlled Access Area receive annual retraining. Retraining for individuals is scheduled and reported by means of a computerized tracking system.
- D. Contents of the formal nuclear safety training programs are reviewed and updated periodically by the HS&E Manager, or designee, to ensure that the programs are current and adequate. In addition, at least annually, the contents of the radiation protection sections of the nuclear safety training program are reviewed and updated, as required, by the HS&E Manager or his designee.
- E. Operational personnel are further instructed in the specific safety requirements of their work assignments by their immediate supervisor or delegate during on-the-job training. Employees must demonstrate understanding of work assignment requirements based on observations by their immediate supervisor or delegate before working without direct supervision. Changes to work procedures including safety requirements are reviewed with operational personnel by their immediate supervisor or delegate.
- F. Radiation safety topics are also discussed and reviewed at least annually in roundtable safety meetings held by supervisors or delegates with their workers, and at other meetings held by managers with their employees.

11.3.3.1.2 Fire Brigade Training

The primary purpose of the Fire Brigade Training Program is to develop a group of facility employees skilled in fire prevention, fire fighting techniques, first aid procedures, and emergency response. They are trained and equipped to function as a team for the fighting of fires. The intent of the facility fire brigade is to be a first response effort designed to supplement the local fire department for fires at the plant and not to replace local fire fighters.

The Fire Brigade Training program provides for initial training of all new fire brigade members, semi-annual classroom training and drills, annual practical training, and leadership training for fire brigade leaders.

11.3.3.2 Technical Training

Technical training is designed, developed and implemented to assist facility employees in gaining an understanding of applicable fundamentals, procedures, and practices common to a gas centrifuge uranium enrichment facility. Also, technical training is used to develop manipulative skills necessary to perform assigned work in a competent manner. Technical training consists of four segments:

- Initial Training
- On-the-Job Training and Qualifications
- Continuing Training
- Special Training.

11.3.3.2.1 Initial Training

Initial job training is designed to provide an understanding of the fundamentals, basic principles, and procedures involved in work to which an employee is assigned. This training may consist of, but is not limited to, live lectures, taped and filmed lectures, self-guided study, demonstrations, laboratories and workshops and on-the-job training.

Certain new employees or employees transferred from other sections within the facility may be partially qualified by reason of previous applicable training or experience. The extent of further training for these employees is determined by applicable regulations, performance in review sessions, comprehensive examinations, or other techniques designed to identify the employee's present level of ability.

Initial job training and qualification programs are developed for operations, maintenance and technical services classifications. Training for each program is grouped into logical blocks or modules and presented in such a manner that specific behavioral objectives are accomplished. Trainee progress is evaluated using written examinations, oral or practical tests. Depending upon the regulatory requirements or individual's needs and plant operating conditions, allowances are made to suit specific situations. Brief descriptions of modules that may be contained in the initial training programs are as follows:

Operations Initial Training

A. General Systems

This training module provides the trainee with basic concepts and fundamentals in mathematics, physics, chemistry, heat transfer and electrical theory. Systems and components are taught in detail along with elementary process instrumentation and control. On-the-job orientation may be provided at an enrichment facility.

B. Specific Systems

This training module provides basic instruction in system and component identification and basic system operating characteristics. It provides a general overview of enrichment plant equipment and acquaints the trainees with enrichment plant

terminology and nomenclature and provides instruction describing basic system operations.

C. Nuclear Preparatory

This training module develops the necessary concepts in basic nuclear physics, plant chemistry, basic thermodynamics, radiation protection, and enrichment theory. Experience in enrichment control and radiation protection is also provided. It is normally presented to operations personnel following the Systems Specific training module.

D. Plant Familiarization

The Plant Familiarization module provides for the orientation of employees to plant layout, plant systems, and practical laboratory and equipment work at the facility.

Mechanical Maintenance Initial Training

A. General Systems

This training module provides the trainee with basic concepts and fundamentals in mathematics, physics, chemistry, heat transfer and electrical theory. Systems and components are taught in detail along with elementary process instrumentation and control. On-the-job orientation may be provided at an enrichment facility.

B. Fundamental Shop Skills

This training module provides instruction in fundamentals of mechanical maintenance performance. It combines academic instruction with hands-on training to familiarize trainees with design operational and physical characteristics of enrichment facility components, and basic skills and procedures used to perform mechanical repairs and/or equipment replacement. Task training lists are integrated into this module to assure that each trainee attains a minimum level of performance. Tasks are assigned and trainees use work procedures to guide them through a task. Both radiological and industrial safety is stressed in all phases of this training module.

C. Plant Familiarization

The Plant Familiarization module provides for the orientation of employees to plant layout, plant systems, and practical laboratory and equipment work at the facility.

Instrumentation and Electrical and Maintenance Initial Training

A. General Systems

This training module provides the trainee with basic concepts and fundamentals in mathematics, physics, chemistry, heat transfer and electrical theory. Systems and components are taught in detail along with elementary process instrumentation and control. On-the-job orientation may be provided at an enrichment facility.

B. Basic Instrument and Electrical

This training module provides the trainee with refresher training in Electrical and Electronic Fundamentals, Digital Techniques and Application, Instrumentation and Control Theory and Application, and an introduction to the types and proper use of measuring and test equipment commonly used in enrichment facilities.

The module also provides the student a working knowledge of nuclear and non-nuclear instrumentation systems, overall integrated plant operation and control, and, in particular, the hazards of calibration errors and calibration during plant operation.

C. Basic Performance

The Fundamental Performance module familiarizes the trainee with plant test procedures, test equipment, and testing as well as plant records, reports, and data collection. It provides a basic understanding of thermodynamics used in testing plant heat transfer.

D. Plant Familiarization

The Plant Familiarization module provides for the orientation of employees to plant layout, plant systems, and practical laboratory and equipment work at the plant.

Health Physics and Chemistry Initial Training

A. General Systems

This training module provides the trainee with basic concepts and fundamentals in mathematics, physics, chemistry, heat transfer and electrical theory. Systems and components are taught in detail along with elementary process instrumentation and control. On-the-job orientation may be provided at an enrichment facility.

B. Fundamental Health Physics

The Fundamental Health Physics Module presents to the trainees a more comprehensive and theoretical understanding of the nuclear processes with which they are involved. In addition, the techniques for applying theory are presented in this module. Use is made of various non-automated counting and spectrographic equipment and portable survey instruments. Administrative material is also presented in a more detailed manner.

C. Fundamental Chemistry

The Fundamental Chemistry module provides familiarization with chemistry theory, techniques, and procedures. The overall goal of this module is familiarization necessary for chemistry technicians to be able to work safely and competently in the enrichment facility.

D. Plant Familiarization

The Plant Familiarization module provides for the orientation of employees to plant layout, plant systems, and practical laboratory and equipment work at the plant.

Engineer/Professional Initial Training

This training is part of the technical staff and managers training program.

A. Facility Orientation

This training module provides an orientation to each section within the NEF. An on-the-job task list provides the trainee with training objectives that must be accomplished while working in the section.

B. Basic Engineer/Professional Training

The Basic Engineer/Professional Training provides a basic understanding of how uranium is enriched, the systems and components required for producing the final product, and the interrelationship of the various facility organizations in achieving the overall objective.

C. Enrichment/Chemical Engineer/Professional Training

The Enrichment/Chemical Engineer/Professional Training provides specific theoretical information related to enrichment plant operations. Topics (e.g., Thermal Science, Nuclear Physics) address applications in an enrichment facility.

D. Engineer/Professional Systems Training

The Engineer/Professional Systems Training provides an overview of plant systems, components and procedures necessary to operate an enrichment plant safely and efficiently.

11.3.3.2.2 On-the-Job Training and Qualifications

On-the-job training (OJT) is a systematic method of providing the required job related skills and knowledge for a position. This training is conducted in the work environment. Applicable tasks and related procedures make up the OJT/qualifications program for each technical area which is designed to supplement and complement training received through formal classroom, laboratory, and/or simulator training. The objective of the program is to assure the trainee's ability to perform job tasks as described in the task descriptions and the Training and Qualification Guides.

11.3.3.2.3 Continuing Training

Continuing training is any training not provided as initial qualification and basic training which maintains and improves job-related knowledge and skills such as the following:

- Facility systems and component changes
- OJT/Qualifications program retraining
- Policy and procedure changes
- Operating experience program documents review to include Industry and in-house operating experiences
- Continuing training required by regulation (e.g., emergency plan training)
- General employee, special, administrative, vendor, and/or advanced training topics supporting tasks that are elective in nature

- Training identified to resolve deficiencies (task-based) or to reinforce seldom used knowledge skills
- Refresher training on initial training topics
- Structured pre-job instruction, mock-up training, and walk throughs
- Quality awareness.

Continuing Training and Retraining may overlap to some degree in definition; however, Retraining refers to specific training designed for proficiency maintenance.

Continuing Training consists of formal and informal components performed on a frequency needed to maintain proficiency on the job. Each Section's Continuing Training Program is developed from a systematic approach, using information from job performance and safe operation as a basis for determining the content of continuing training. Continuing training may be offered, as needed, on any of the topics listed above.

Once the objectives for Continuing Training have been established, the methods for conducting the training may vary. The method selected must provide clear evidence of objective accomplishment and consistency in delivery.

11.3.3.2.4 Special Training

Special training involves those subjects of a unique nature required for a particular area of work. Special training is usually given to selected personnel based on specific needs not directly related to disciplinary lines.

11.3.4 Basis and Objectives for Training

Learning objectives identify the training content, as established by needs/job analyses and position-specific requirements. The task list from the needs/job analysis is used to develop action statements that describe the desired post-training performance. Objectives include the knowledge, skills, and abilities the trainee should demonstrate; the conditions under which required actions will take place; and the standards of performance the trainee should achieve upon completion of the training activity.

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

Lesson plans are developed from the learning objectives that are based on job performance requirements. Lesson plans and other training guides are developed under the guidance of the training function. Lesson plans are reviewed by the training function and, generally, by the organization cognizant of the subject matter. Lesson plans are approved prior to issue or use. Lesson plans are used for classroom training and on-the-job training as required and include Standards for evaluating acceptable trainee performance.

11.3.6 Evaluation of Trainee Learning

Trainee understanding and command of learning objectives is evaluated through observation/demonstration or oral or written tests as appropriate. Such evaluations measure the trainee's skills and knowledge of job performance requirements.

Evaluations are performed by individuals qualified in the training subject matter.

11.3.7 Conduct of On-the-Job Training

On-the-Job Training is an element of the technical training program (see Section 11.3.3.2.2, On-the-Job Training and Qualification). On-the-job training is used in combination with classroom training for activities that are IROFS. Designated personnel who are competent in the program standards and methods of conducting the training conduct on-the-job training using current performance-based training materials. Completion of on-the-job training is demonstrated by actual task performance or performance of a simulation of the task with the trainee explaining task actions using the conditions encountered during the performance of the task, including references, tools, and equipment reflecting the actual task to the extent practical.

11.3.8 Evaluation of Training Effectiveness

Periodically the training program is systematically evaluated to measure the program's effectiveness in producing competent employees. The trainees provide feedback after completion of classroom training sessions to provide data for this evaluation for program improvements. These evaluations identify program strengths and weaknesses, determine whether the program content matches current job needs, and determine if corrective actions are needed to improve the program's effectiveness. The training function is responsible for leading the training program evaluations and for implementing any corrective actions. Program evaluations may consist of an overall periodic evaluation or a series of topical evaluations over a given period.

Evaluation objectives that are applicable to the training program or topical area being reviewed are developed and may address the following elements of training:

- Management and administration of training and qualification programs
- Development and qualification of the training staff
- Position training requirements
- Determination of training program content, including its facility change control interface with the configuration management system
- Design and development of training programs, including lesson plans
- Conduct of training
- Trainee examinations and evaluations

- Training program assessments and evaluations.

Evaluation results are documented, with program strengths and weaknesses being highlighted. Identified weaknesses are reviewed, improvements are recommended, and changes are made to procedures, practices, or training materials as necessary.

Periodically, training and qualifications activities are monitored by designated facility and/or contracted training personnel. The Quality Assurance Department audits the facility training and qualification system. In addition, trainees and vendors may provide input concerning training program effectiveness. Methods utilized to obtain this information include, among other things surveys, questionnaires, performance appraisals, staff evaluation, and overall training program effectiveness evaluation instruments. Frequently conducted classes are not evaluated each time. However, they are routinely evaluated at a frequency sufficient to determine program effectiveness. Evaluation information may be collected through:

- Verification of program objectives as related to job duties for which intended
- Periodic working group program evaluations
- Testing to determine trainee accomplishment of objectives
- Trainee evaluation of the instruction
- Supervisor's evaluation of the trainee's performance after training on-the-job
- Supervisor's evaluation of the instruction.

Unacceptable individual performance is transmitted to the appropriate Line Manager.

11.3.9 Personnel Qualification

The qualification requirements for key management positions are described in Chapter 2, Organization and Administration. Training and qualification requirements associated with QA personnel are provided in Appendix A to this chapter. In addition, qualification and training requirements for process operator candidates shall be established and implemented in plant procedures.

11.3.10 Periodic Personnel Evaluations

Personnel performing activities relied on for safety are evaluated at least biennially to determine whether they are capable of continuing their activities that are relied on for safety. The evaluation may be by written test, oral test, or on-the-job performance evaluation. The results of the evaluation are documented. When the results of the evaluation dictate, retraining or other appropriate action is provided. Retraining is also required due to plant modifications, procedure changes, and QA program changes that result in new or revised information.

11.4 PROCEDURES DEVELOPMENT AND IMPLEMENTATION

The management measure described in this section is consistent with that previously submitted for NRC review in Section 11.4 of the Claiborne Enrichment Center Safety Analysis Report (LES, 1993). The NRC staff reviewed the previous submittal and found it to be acceptable. The NRC staff's review and conclusions associated with procedures are documented in Section 10.5 of NUREG-1491 (NRC, 1994).

All activities involving licensed materials or IROFS are conducted in accordance with approved procedures. Before initial enrichment activities occur at the facility, procedures are made available to the NRC for their inspection. As noted throughout this document, procedures are used to control activities in order to ensure the activities are carried out in a safe manner and in accordance with regulatory requirements.

Generally, four types of plant procedures are used to control activities: operating procedures, administrative procedures, maintenance procedures, and emergency procedures.

Operating procedures, developed for workstation and Control Room operators, are used to directly control process operations. Operating procedures include:

- Purpose of the activity
- Regulations, policies, and guidelines governing the procedure
- Type of procedure
- Steps for each operating process phase:
 - Initial startup
 - Normal operations
 - Temporary operations
 - Emergency shutdown
 - Emergency operations
 - Normal shutdown
 - Startup 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 (SNM)) or to licensed SNM.

- 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.

Applicable safety limits and IROFS are clearly identified in the procedures. LES will incorporate methodology for identifying, developing, approving, implementing, and controlling operating procedures. Identifying needed procedures will include consideration of ISA results. The method will ensure that, as a minimum:

- Operating limits and IROFS are specified in the procedure
- Procedures include required actions for off-normal conditions of operation, as well as normal operations
- If needed safety checkpoints are identified at appropriate steps in the procedure
- Procedures are validated through field tests
- Procedures are approved by management personnel responsible and accountable for the operation
- A mechanism is specified for revising and reissuing procedures in a controlled manner
- The QA elements and CM Program at the facility provide reasonable assurance that current procedures are available and used at all work locations
- The facility training program trains the required persons in the use of the latest procedures available.

Administrative procedures are used to perform activities that support the process operations, including management measures such as the following:

- Configuration management
- Nuclear criticality, radiation, chemical, and fire safety
- Quality Assurance
- Design control
- Plant personnel training and qualification
- Audits and assessments
- Incident investigations
- Record keeping and document control

- Reporting
- Procurement.

Administrative procedures are also used for:

- Implementing the Fundamental Nuclear Material Control (FNMC) Plan
- Implementing the Emergency Plan
- Implementing the Physical Security Plan
- Implementing the Standard Practice Procedures Plan for the Protection of Classified Matter.

Maintenance procedures address:

- Preventive and corrective maintenance of IROFS
- Surveillance (includes calibration, inspection, and other surveillance testing)
- Functional testing of IROFS
- Requirements for pre-maintenance activity involving reviews of the work to be performed and reviews of procedures.

Emergency procedures address the preplanned actions of operators and other plant personnel in the event of an emergency.

Periodic reviews will be performed on procedures to assure their continued accuracy and usefulness. Specifically, reviews of operating procedures will be conducted at a minimum of every five years and reviews of radiation protection procedures and emergency procedures will be conducted at a minimum of every year. In addition, applicable procedures will be reviewed after unusual incidents, such as an accident, unexpected transient, significant operator error, or equipment malfunction, or after any modification to a system, and procedures will be revised as needed.

11.4.1 Preparation of Procedures

Each procedure is assigned to a member of the facility staff or contractor for development. Initial procedure drafts are reviewed by other appropriate members of the facility staff, by personnel from the supplier of centrifuges (Urenco), and other vendors, as appropriate for inclusion and correctness of technical information, including formulas, set points, and acceptance criteria and includes either a walkdown of the procedure in the field or a tabletop walkthrough. Procedures that are written for the operation of IROFS shall be subjected to an independent review. The designated approver shall determine whether or not any additional, cross-disciplinary review is required. The Plant Manager or designee shall approve all procedures. If the procedure involves QA directly, the QA Manager must approve the procedure.

11.4.2 Administrative Procedures

Facility administrative procedures are written by each department as necessary to control activities that support process operations, including management measures. Listed below are several areas for which administrative procedures are written, including principle features:

- A. **Operator's authority and responsibility:** The operator is given the authority to manipulate controls which directly or indirectly affect the enrichment process, including a shut down of the process if deemed necessary by the Shift Manager. The operators are also assigned the responsibility for knowing the limits and set points associated with safety-related equipment and systems as specified in designated operating procedures.
- B. **Activities affecting facility operation or operating indications:** All facility maintenance personnel performing support functions (e.g., maintenance, testing) which may affect unit operation or Control Room indications are required to notify the Control Room Operator and/or Shift Manager, as appropriate, prior to initiating such action.
- C. **Manipulation of facility control:** No one is permitted to manipulate the facility controls who is not an operator, except for operator trainees under the direction of a qualified operator.
- D. **Relief of Duties:** This procedure provides a detailed checklist of applicable items for shift turnover.
- E. **Equipment control:** Equipment control is maintained and documented through the use of tags, labels, stamps, status logs or other suitable means.
- F. **Master surveillance testing schedule:** A master surveillance testing schedule is documented to ensure that required testing is performed and evaluated on a timely basis. Surveillance testing is scheduled such that the safety of the facility is not dependent on the performance of a structure, system or component which has not been tested within its specified testing interval. The master surveillance testing schedule identifies surveillance and testing requirements, applicable procedures, and required test frequency. Assignment of responsibility for these requirements is also indicated.
- G. **A Control Room Operations Logbook is maintained.** This logbook contains significant events during each shift such as enrichment changes, alarms received, or abnormal operational conditions.
- H. **Fire Protection Procedures:** Fire protection procedures are written to address such topics as training of the fire brigade, reporting of fires, and control of fire stops. The facility's Industrial Safety department has responsibility for fire protection procedures in general, with the facility's maintenance section having responsibility for certain fire protection procedures such as control of repairs to facility fire stops.

The administrative control of maintenance is maintained as follows:

- A. **In order to assure safe, reliable, and efficient operation, a comprehensive maintenance program for the facility's IROFS is established.**
- B. **Personnel performing maintenance activities are qualified in accordance with applicable codes and standards and procedures.**

- C. Maintenance is performed in accordance with written procedures that conform to applicable codes, standards, specifications, and other appropriate criteria.
- D. Maintenance is scheduled so as not to jeopardize facility operation or the safety of facility personnel.
- E. Maintenance histories are maintained on facility IROFS.

The administrative control of facility modifications is discussed in Section 2.3.1, Configuration Management.

11.4.3 Procedures

All activities involving licensed materials or IROFS are conducted in accordance with approved procedures. These procedures are intended to provide a pre-planned method of conducting operations of systems in order to eliminate errors due to on-the-spot analysis and judgments.

All procedures are sufficiently detailed that qualified individuals can perform the required functions without direct supervision. However, written procedures cannot address all contingencies and operating conditions. Therefore, they contain a degree of flexibility appropriate to the activities being performed. Procedural guidance exists to identify the manner in which procedures are to be implemented. For example, routine procedural actions may not require the procedure to be present during implementation of the actions, while complex jobs, or checking with numerous sequences may require valve alignment checks, approved operator aids, or in-hand procedures that are referenced directly when the job is conducted.

Examples of operating activities are:

- Evacuation and Preparatory Work Before Run Up of a Cascade
- Run Up of a Cascade
- Run Down of a Cascade
- Calibration of Pressure Transmitter
- Taking UF₆ Samples of a Cascade
- Installation of UF₆ Cylinders in Feed/Take-off Stations and Preparation for Operation
- Removal of UF₆ Cylinder from Feed/Take-off Stations
- Installation of UF₆ Cylinders in Take-off Stations
- UF₆ Gas Sampling in Take-off Lines
- UF₆ Sampling in Product Liquid Sampling Autoclaves
- Emptying of Cold Trap

- Exchange of Chemical Traps in Vent Systems.

Plant specific procedures for abnormal events are written for the facility. These procedures are based on a sequence of observations and actions, with emphasis placed on operator responses to indications in the Control Room. When immediate operator actions are required to prevent or mitigate the consequences of an abnormal situation, procedures require that those actions be implemented at the earliest possible time, even if full knowledge of the abnormal situation is not yet available. The actions outlined in abnormal event procedures are based on a conservative course of action to be followed by the operating crew.

Typical abnormal event procedures include:

- Power Failure
- Loss of Heat Tracing
- Damaged UF₆ Cylinder Repairs
- Annunciator alarms (procedures to include alarm set points, probable causes, automatic actions, immediate manual actions, supplementary actions and applicable references).

Temporary changes to procedures are issued for operating activities that are of a nonrecurring nature. Temporary changes to procedures are used when revision of an operating or other permanent procedure is not practical. Temporary changes to procedures shall not involve a change to the ISA and shall not alter the intent of the original procedure. Examples of uses of temporary changes to procedures are:

- To direct operating activities during special testing or maintenance
- To provide guidance in unusual situations not within the scope of normal procedures
- To ensure orderly and uniform operations for short periods of time when the facility, a unit, a cascade, a structure, a system or a component is performing in a manner not addressed by existing procedures or has been modified in such a manner that portions of existing procedures do not apply.

The temporary changes to procedures are approved by two members of the facility management staff, at least one of whom is a shift manager. Temporary changes to procedures are documented, reviewed and approved with the process described in Section 11.4.4, Changes to Procedures, within 14 days of implementation.

Maintenance of facility structures, systems and components is performed in accordance with written procedures, documented instructions, checklists, or drawings appropriate to the circumstances (for example, skills normally possessed by qualified maintenance personnel may not require detailed step-by-step delineation in a written procedure) that conform to applicable codes, standards, specifications, and other appropriate criteria.

The facility's maintenance department under the Maintenance Manager has responsibility for preparation and implementation of maintenance procedures. The maintenance, testing and calibration of facility IROFS is performed in accordance with approved written procedures.

Testing conducted on a periodic basis to determine various facility parameters and to verify the continuing capability of IROFS to meet performance requirements is conducted in accordance with approved, written procedures. Periodic test procedures are utilized to perform such testing and are sufficiently detailed that qualified personnel can perform the required functions without direct supervision. Testing performed on IROFS that are not redundant will provide for compensatory measures to be put into place to ensure that the IROFS performs until it is put back into service.

Periodic test procedures are performed by the facility's Technical Services, Operations and Maintenance departments. The Maintenance Manager has overall responsibility for assuring that the periodic testing is in compliance with the requirements.

Chemical and radiochemical activities associated with facility IROFS are performed in accordance with approved, written procedures. The facility's chemistry department has responsibility for preparation and implementation of chemistry procedures.

Radioactive waste management activities associated with the facility's liquid, gaseous, and solid waste systems are performed in accordance with approved written procedures. The facility's operations, chemistry and radiation protection departments have responsibility for preparation and implementation of the radioactive waste management procedures.

Likewise, other departments at the facility develop and implement activities at the facility through the use of procedures.

Procedures will include provisions for operations to stop and place the process in a safe condition if a step of a procedure cannot be performed as written.

11.4.4 Changes to Procedures

Changes to procedures shall be processed as described below.

- A. The preparer documents the change as well as the reason for the change.
- B. An evaluation shall be performed in accordance with 10 CFR 70.72 (CFR, 2003e) as appropriate. If the evaluation reveals that a change to the license is needed to implement the proposed changes, the change is not implemented until prior approval is received from the NRC.
- C. The procedure with proposed changes shall be reviewed by a qualified reviewer.
- D. The Plant Manager, a Department Manager, or a designee approved by the Plant Manager shall be responsible for approving procedure changes, and for determining whether a cross-disciplinary review is necessary, and by which department(s). The need for the following cross-disciplinary reviews shall be considered, as a minimum:
 - 1. For proposed changes having a potential impact on chemical or radiation safety, a review shall be performed for chemical and radiation hazards. Changes shall be approved by the HS&E Manager or designee.
 - 2. For proposed changes having a potential impact on criticality safety, a criticality safety review shall be performed. Changes shall be approved by the HS&E Manager or designee.

3. For proposed changes potentially affecting Material Control and Accounting, a material control review shall be performed. Changes shall be approved by the Uranium Management Manager or designee.

Records of completed cross-functional reviews shall be maintained in accordance with Section 11.7, Records Management, for all changes to procedures involving licensed materials or IROFS.

11.4.5 Distribution of Procedures

Originally issued approved procedures and approved procedure revisions are distributed in a controlled manner by document control.

Document Control shall establish and maintain an index of the distribution of copies of all facility procedures. Revisions are controlled and distributed in accordance with this index. Indexes are reviewed and updated on a periodic basis or as required.

Department Managers or their designees shall be responsible for ensuring all personnel doing work which require the use of the procedures have ready access to controlled copies of the procedures.

11.5 AUDITS AND ASSESSMENTS

LES will have a tiered approach to verifying compliance to procedures and performance to regulatory requirements. Audits are focused on verifying compliance with regulatory and procedural requirements and licensing commitments. Assessments are focused on effectiveness of activities and ensuring that IROFS are reliable and are available to perform their intended safety functions. This approach includes performing Assessments and Audits on critical work activities associated with facility safety, environmental protection and other areas as identified via trends.

Assessments are divided into two categories that will be owned and managed by the line organizations as follows:

- Management Assessments conducted by the line organizations responsible for the work activity
- Independent Assessments conducted by individuals not involved in the area being assessed.

Audits of the QA Level 1 work activities associated with IROFS and any items that affect the function of the IROFS will be the responsibility of the QA Department.

Audits and assessments are performed to assure that facility activities are conducted in accordance with the written procedures and that the processes reviewed are effective. As a minimum, they shall assess activities related to radiation protection, criticality safety control, hazardous chemical safety, industrial safety including fire protection, and environmental protection.

Audits and assessments shall be performed routinely by qualified staff personnel that are not directly responsible for production activities. Deficiencies identified during the audit or assessment requiring corrective action shall be forwarded to the responsible manager of the applicable area or function for action in accordance with the CAP procedure. Future audits and assessments shall include a review to evaluate if corrective actions have been effective.

The Quality Assurance Department shall be responsible for audits. Audits shall be performed in accordance with a written plan that identifies and schedules audits to be performed. Audit team members shall not have direct responsibility for the function and area being audited. Team members shall have technical expertise or experience in the area being audited and shall be indoctrinated in audit techniques. Audits shall be conducted on an annual basis.

The results of the audits shall be provided in a written report in a timely manner to the Plant Manager, the Safety Review Committee (SRC), and the Managers responsible for the activities audited. Any deficiencies noted in the audits shall be responded to promptly by the responsible Managers or designees, entered into the CAP and tracked to completion and re-examined during future audits to ensure corrective action has been completed.

Records of the instructions and procedures, persons conducting the audits or assessments, and identified violations of license conditions and corrective actions taken shall be maintained.

The management measure described in this section and Chapter 2, Organization and Administration, is consistent with that previously submitted for NRC review in the Claiborne

Enrichment Center Safety Analysis Report (LES, 1993). The NRC Staff reviewed the previous submittal and found it to be acceptable. The NRC Staff's review and conclusions associated with audits and assessments are documented in Section 10.7 of NUREG-1491 (NRC, 1994).

11.5.1 Activities to be Audited or Assessed

Audits and assessments are conducted for the areas of:

- Radiation safety
- Nuclear criticality safety
- Chemical safety
- Industrial safety including fire protection
- Environmental protection
- Emergency management
- QA
- Configuration management
- Maintenance
- Training and qualification
- Procedures
- CAP/Incident investigation
- Records management.

11.5.2 Scheduling of Audits and Assessments

A schedule is established that identifies audits and assessments to be performed and the responsible organization assigned to conduct the activity. The frequency of audits and assessments is based upon the status and safety importance of the activities being performed and upon work history. All major activities will be audited or assessed on an annual basis. The audit and assessment schedule is reviewed periodically and revised as necessary to ensure coverage commensurate with current and planned activities.

11.5.3 Procedures for Audits and Assessments

Internal and external audits and assessments are conducted using approved procedures that meet the QA Program requirements. These procedures provide requirements for the following audit and assessment activities:

- Scheduling and planning of the audit and assessment
- Certification requirements of audit personnel
- Development of audit plans and audit and assessment checklists as applicable
- Performance of the audit and assessment
- Reporting and tracking of findings to closure
- Closure of the audit and assessment.

The applicable procedures emphasize reporting and correction of findings to prevent recurrence.

Audits and assessments are conducted by:

- Using the approved audit and assessment checklists as applicable
- Interviewing responsible personnel
- Performing plant area walkdowns
- Reviewing controlling plans and procedures
- Observing work in progress
- Reviewing completed QA documentation.

Audit and assessment results are tracked in the Corrective Action Program. The data is periodically analyzed for potential trends and needed program improvements to prevent recurrence and/or for continuous program improvements. The resulting trend is evaluated and reported to applicable management. This report documents the effectiveness of management measures in controlling activities, as well as deficiencies. Deficiencies identified in the trend report require corrective action in accordance with the applicable CAP procedure. The QA organization also performs follow up reviews on identified deficiencies and verifies completion of corrective actions reported as a result of the trend analysis.

The audit and /or assessment team leader is required to develop the audit and /or assessment report documenting the findings, observations, and recommendations for program improvement. These reports provide management with documented verification of performance against established performance criteria for IROFS. These reports are developed, reviewed, approved,

and issued following established formats and protocols detailed in the applicable procedures. Responsible managers are required to review the reports and provide any required responses due to reported findings.

Corrective actions following issuance of the audit and/or assessment report require compliance with the CAP procedure. Audit reports are required to contain an effectiveness evaluation and statement for each of the applicable QA program elements reviewed during the audit. The audit/assessment is closed with the proper documentation as required by the applicable audit and assessment procedure. The QA organization will conduct follow-up audits or assessments to verify that corrective actions were taken in a timely manner.

11.5.4 Qualifications and Responsibilities for Audits and Assessments

The QA Director or QA Manager initiates audits. The responsible Lead Auditor and QA Director or Manager determines the scope of each audit. The QA Director or QA Manager may initiate special audits or expand the scope of audits. The Lead Auditor directs the audit team in developing checklists, instructions, or plans and performing the audit. The audit shall be conducted in accordance with the checklists, but the scope may be expanded by the audit team during the audit. The audit team consists of one or more auditors.

Auditors and lead auditors are responsible for performing audits in accordance with the applicable QA procedures. Auditors and lead auditors hold certifications as required by the QA Program. Additional details can be found in Appendix A of this chapter. Before being certified under the LES QA Program, auditors must complete training on the following topics:

- LES QA Program
- Audit fundamentals, including audit scheduling, planning, performance, reporting, and follow-up action involved in conducting audits
- Objectives and techniques of performing audits
- On-the-job training.

Certification of auditors and lead auditors is based on the QA Director's or Manager's evaluation of education, experience, professional qualifications, leadership, sound judgment, maturity, analytical ability, tenacity, and past performance and completion of QA training courses. A lead auditor must also have participated in a minimum of five QA audits or audit equivalent within a period of time not to exceed three years prior to the date of certification. Audit equivalents include assessments, pre-award evaluations or comprehensive surveillances (provided the prospective lead auditor took part in the planning, checklist development, performance, and reporting of the audit equivalent activities). One audit must be a nuclear-related QA audit or audit equivalent within the year prior to certification.

Personnel performing assessments do not require certification, but they are required to complete QA orientation training, as well as training on the assessment process.

Appendix A, Section 18 "Audits" of this chapter provides additional details regarding the QA Audit program requirements.

11.6 INCIDENT INVESTIGATIONS AND CORRECTIVE ACTION PROCESS

The incident investigation and corrective action process described in this section is consistent with that previously submitted for NRC review in Section 11.4 and Section 10.16 of the Claiborne Enrichment Center Safety Analysis Report (LES, 1993). The NRC Staff reviewed the previous submittal and found it to be acceptable. The NRC Staff's review and conclusions associated with the incident investigation and corrective action process are documented in Section 10.7.6 and Section 12 of NUREG-1491 (NRC, 1994).

11.6.1 Incident Investigations

The incident investigation process is a simple mechanism available for use by any person at the facility for reporting deficiencies, abnormal events and potentially unsafe conditions or activities. Abnormal events that potentially threaten or lessen the effectiveness of health, safety or environmental protection will be identified and reported to and investigated by the HS&E Manager. Each event will be considered in terms of its requirements for reporting in accordance with regulations and will be evaluated to determine the level of investigation required. The process of incident identification, investigation, root cause analysis, environmental protection analysis, recording, reporting, and follow-up shall be addressed in and performed by written CAP procedures. Radiological, criticality, hazardous chemical, and industrial safety requirements shall be addressed. Guidance for classifying occurrences shall be contained in CAP procedures, including examples of threshold off-normal occurrences. The depth of the investigation will depend upon the severity of the classified incident in terms of the levels of uranium released and/or the degree of potential for exposure of workers, the public or the environment.

The HS&E Manager is responsible for:

- Maintaining a list of agencies to be notified
- Determining if a report to an agency is required
- Notifying the agency when required.

The licensing organization has the responsibility for all appropriate communications with government agencies.

The HS&E Manager or designee shall maintain a record of corrective actions to be implemented as a result of off-normal occurrence investigations in accordance with CAP procedures. These corrective actions shall include documenting lessons learned, and implementing worker training where indicated, and shall be tracked to completion by the HS&E Manager or designee.

Specifics of the Incident Investigation process are as follows:

1. LES will establish a process to investigate abnormal events that may occur during operation of the facility, to determine their specific or generic root cause(s) and generic implications, to recommend corrective actions, and to report to the NRC as required by 10 CFR 70.50 (CFR, 2003c) and 70.74 (CFR, 2003f). The investigation process will include a prompt risk-based evaluation and, depending on the complexity and severity of

the event, one individual may suffice to conduct the evaluation. The investigator(s) will be independent from the line function(s) involved with the incident under investigation and are assured of no retaliation for participating in investigations. Investigations will begin within 48 hours of the abnormal event, or sooner, depending on safety significance of the event. The record of IROFS failures required by 10 CFR 70.62(a)(3) (CFR, 2003d) for IROFS will be reviewed as part of the investigation. Record revisions necessitated by post-failure investigation conclusions will be made within five working days of the completion of the investigation.

2. Qualified internal or external investigators are appointed to serve on investigating teams when required. The teams will include at least one process expert and at least one team member trained in root cause analysis.
3. LES will monitor and document corrective actions through completion.
4. LES will maintain auditable records and documentation related to abnormal events, investigations, and root cause analyses so that "lessons learned" may be applied to future operations of the facility. For each abnormal event, the incident report includes a description, contributing factors, a root cause analysis, findings, and recommendations. Relevant findings are reviewed with all affected personnel. Details of the event sequence will be compared with accident sequences already considered in the ISA, and the ISA Summary will be modified to include evaluation of the risk associated with accidents of the type actually experienced.

LES will develop CAP procedures for conducting an incident investigation, and the procedures will contain the following elements:

1. A documented plan for investigating an abnormal event.
2. A description of the functions, qualifications, and/or responsibilities of the manager who would lead the investigative team and those of the other team members; the scope of the team's authority and responsibilities; and assurance of cooperation of management.
3. Assurance of the team's authority to obtain all the information considered necessary and its independence from responsibility for or to the functional area involved in the incident under investigation.
4. Retention of documentation relating to abnormal events for two years or for the life of the operation, whichever is longer.
5. Guidance for personnel conducting the investigation on how to apply a reasonable, systematic, structured approach to determine the specific or generic root cause(s) and generic implications of the problem.
6. Requirements to make available original investigation reports to the NRC on request.
7. A system for monitoring the completion of appropriate corrective actions.

11.6.2 Corrective Action Process

The LES QA Program identifies the responsibilities and provides authority for those individuals involved in quality activities to identify any condition adverse to quality, such as failures, malfunctions, deficiencies, deviations, defective materials and equipment, and non-

conformances. These individuals identify and document conditions adverse to quality, analyze and determine how the conditions can be corrected or resolved, and take such steps as necessary to implement corrective actions in accordance with documented procedures.

The QA Program requires regularly scheduled audits and assessments to ensure that needed corrective actions are identified. LES employees have the authority and responsibility to initiate the corrective action process if they discover deficiencies. The QA Program contains procedures for identifying, reporting, resolving, documenting, and analyzing conditions adverse to quality. Reports of conditions adverse to quality are analyzed to identify trends in quality performance. Significant conditions adverse to quality and significant trends are reported to senior management in accordance with CAP procedures.

Follow-up action is taken by the QA Manager to verify proper and timely implementation of corrective action.

Significant conditions adverse to quality, the cause of the conditions and the corrective action taken to preclude repetition are documented and reported to management for review and assessment in accordance with CAP procedures.

Appendix A, Section 16 "Corrective Action" of this chapter provides additional details regarding the CAP requirements.

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11.7 RECORDS MANAGEMENT

The management measure described in this section is consistent with that previously submitted for NRC review in Section 11.4 of the Claiborne Enrichment Center Safety Analysis Report (LES, 1993). The NRC Staff reviewed the previous submittal and found it to be acceptable. The NRC Staff's review and conclusions associated with records management are documented in Section 10.6 of NUREG-1491 (NRC, 1994).

Records management shall be performed in a controlled and systematic manner in order to provide identifiable and retrievable documentation. Applicable design specifications, procurement documents, or other documents specify the QA records to be generated by, supplied to, or held, in accordance with approved procedures. QA records are not considered valid until they are authenticated and dated by authorized personnel.

The LES QA Program requires procedures for reviewing, approving, handling, identifying, retention, retrieval and maintenance of quality assurance records. These records include the results of tests and inspections required by applicable codes and standards, construction, procurement and receiving records, personnel certification records, design calculations, purchase orders, specifications and amendments, procedures, incident investigation results and approvals or corrective action taken, various certification forms, source surveillance and audit reports, component data packages, and any other QA documentation required by specifications or procedures. These records are maintained at locations where they can be reviewed and audited to establish that the required quality has been assured.

For computer codes and computerized data used for activities relied on for safety, as specified in the ISA Summary, procedures are established for maintaining readability and usability of older codes and data as computing technology changes. For example, procedures allow older forms of information and codes for older computing equipment to be transferred to contemporary computing media and equipment.

The facility maintains a Master File that access to, and use of is controlled. Documents in the Master File shall be legible and shall be identifiable as to the subject to which they pertain. Documents shall be considered valid only if stamped, initialed, signed or otherwise authenticated and dated by authorized personnel. Documents in the Master File may be originals or reproduced copies. Computer storage of data may be used in the Master File.

In order to preclude deterioration of records in the Master File, the following requirements are applicable:

- A. Records shall not be stored loosely. Records shall be firmly attached in binders or placed in folders or envelopes. Records should be stored in steel file cabinets.
- B. Special processed records, e.g., radiographs, photographs, negatives, microfilm, which are light-sensitive, pressure-sensitive and/or temperature-sensitive, shall be packaged and stored as recommended by the manufacturer of these materials.
- C. Computer storage of records shall be done in a manner to preclude inadvertent loss and to ensure accurate and timely retrieval of data. Dual-facility records storage uses an electronic data management system and storage of backup tapes in a fireproof safe.

The Master File storage system shall provide for the accurate retrieval of information without undue delay. Written instructions shall be prepared regarding the storage of records in a Master

File, and a supervisor shall be designated the responsibility for implementing the requirements of the instructions. These instructions shall include, but not necessarily be limited to the following.

- A. A description of the location(s) of the Master File and an identification of the location(s) of the various record types within the Master File
- B. The filing system to be used
- C. A method for verifying that records received are in agreement with any applicable transmittal documents and are in good condition. This is not required for documents generated within a section for use and storage in the same sections' satellite files.
- D. A method for maintaining a record of the records received
- E. The criteria governing access to and control of the Master File
- F. A method for maintaining control of and accountability for records removed from the Master File
- G. A method for filing supplemental information and for disposing of superseded records.

A qualified Fire Protection Engineer will evaluate record storage areas (including satellite files) to assure records are adequately protected from damage.

Records related to health and safety shall be maintained in accordance with the requirements of Title 10, Code of Federal Regulations. The following records shall be retained for at least the periods indicated in accordance with the Records Management procedures which specifies retention periods

The following are examples of records that will be retained:

- Operating logs
- Procedures
- Supplier QA documentation for equipment, materials, etc.
- Nonconforming item reports
- Test documentation/test results - preoperational/operational
- Facility modification records
- Drawings/specifications
- Procurement documents (e.g., purchase orders, purchase requisitions)
- Nuclear material control and accounting records
- Maintenance activities including calibration records
- Inspection documentation (plant processes)

- Audit reports
- Reportable occurrences and compliance records
- Completed work orders
- License conditions (specifications) records
- Software verification records
- System descriptions
- As-built design documentation packages
- Regulatory reports and corrective action.

Other retention times are specified for other facility records as necessary to meet applicable regulatory requirements. These retention times are indicated in facility administrative procedures.

Appendix A, Section 17 "Quality Assurance Records" of this chapter provides additional details regarding records management requirements.

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11.8 OTHER QA ELEMENTS

The QA Program and its supporting manuals, procedures and instructions are applicable to items and activities designated as QA Level 1 and 2.

The QA Director is responsible for developing and revising the QA Program and assuring it is in compliance with applicable regulations, codes and standards. The QA Director approves the supporting manuals, procedures, and revisions for their respective scope of responsibility.

The QA Program specifies mandatory requirements for performing activities affecting quality and is set forth in procedures which are distributed on a controlled basis to organizations and individuals responsible for quality. Revisions to these procedures are also distributed on a controlled basis. Applicable portions of the QA Program are documented, approved and implemented prior to undertaking an activity.

A management assessment of the QA program is performed at least six months prior to scheduled receipt of licensed material on the site. Items identified as needing completion or modification are entered into the CAP and corrective action completed before scheduled receipt of licensed material. LES Management monitors the QA program prior to this initial management assessment through project review meetings and annual assessments. This management assessment along with integrated schedules and program review meetings ensure that the QA program is in place and effective prior to receiving licensed material.

The LES QA program for design, construction, and preoperational testing continues simultaneously with the QA program for the operational phase while construction activities are in progress.

Anyone may propose changes to the QA Program supporting manuals and procedures. When reviewed by the QA Director and found acceptable and compatible with applicable requirements, guidelines and LES policy, the changes may be implemented. The QA Program and supporting manuals and procedures are reviewed periodically to ensure they are in compliance with applicable regulations, codes, and standards. New or revised regulations, codes, and standards are reviewed for incorporation into the QA Program and supporting manuals and procedures as necessary.

Personnel performing activities covered by the QA program shall perform work in accordance with approved procedures, and must demonstrate suitable proficiency in their assigned tasks. Formal training programs are established for quality assurance policies, requirements, procedures, and methods. Ongoing training is provided to ensure continuing proficiency as procedural requirements change. New employees are required to attend a QA indoctrination class on authority, organization, policies, manuals, and procedures.

Additional formal training is conducted in specific topics such as NRC regulations and guidance, procedures, auditing, and applicable codes and standards. Supplemental training is performed as required. On-the-job training is performed by the employee's supervisor in QA area-specific procedures and requirements. Training records are maintained for each person performing quality-related job functions.

The LES President assesses the scope, status, adequacy and regulatory compliance of the QA Program through regular meetings and correspondence with the Plant Manager and the LES

QA organization. Additionally, LES QA, through the QA Director, periodically informs the LES President and Plant Manager of quality concerns that need management resolution.

LES participates in the planning and scheduling for system turnover as construction is completed. Prior to system turnover, written procedures are developed for control of the transfer of systems, structures, components and associated documentation. The procedures include checklists, marked drawings, documentation lists, system status, and receipt control.

Major work activities contracted by LES shall be identified and controlled. Principal contractors shall be required to comply with the applicable portions of 10 CFR 50, Appendix B (CFR, 2003b), as determined by LES. The performance of contracted activities shall be formally evaluated by LES commensurate with the importance of the activities to safety.

Facility components and processes are assigned a QA level based on their safety significance. Each component will receive a classification of QA Level 1, QA Level 2, or QA Level 3 that applies throughout the life of the facility and is based on the following definitions:

QA Level 1 Requirements

The QA Level 1 Program shall conform to the criteria established in 10 CFR 50, Appendix B (CFR, 2003b). These criteria shall be met by commitments to follow the guidelines of ASME NQA-1-1994 (ASME, 1994), including supplements as revised by the ASME NQA-1a-1995 Addenda (ASME, 1995). The QA Level 1 QA program shall be applied to those structures, systems, components, and administrative controls that have been determined to be IROFS and items that affect the functions of the IROFS.

QA Level 2 Requirements

The QA Level 2 program is an owner-defined QA program that uses the ASME NQA-1-1994 standard (ASME, 1994), including supplements as revised by the ASME NQA-1a-1995 Addenda (ASME, 1995) as guidance. General QA Level 2 requirements are described in Section 20, "Quality Assurance Program for QA Level 2 Activities". For contractors, the QA Level 2 program shall be described in documents that must be approved by LES. The QA Level 2 program shall be applied to Owner designated structures, systems, components, and activities. An International Organization for Standardization (ISO) 9000 series QA program may be acceptable for QA Level 2 applications provided it complies with LES Quality Assurance Program Description requirements. The QA program manual must be reviewed and accepted by the LES QA Director.

QA Level 3 Requirements

The QA Level 3 program is defined as standard commercial practice. A documented QA Level 3 program is not required. QA Level 3 governs all activities not designated as QA Level 1 or QA Level 2.

Appendix A, "LES Quality Assurance Program Description" of this chapter provides additional details and commitments to other QA elements that will be implemented to support the Management Measures described in this chapter.

11.9 REFERENCES

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APPENDIX A

Louisiana Energy Services Quality Assurance Program Description Design, Construction, Operations and Decommissioning Phases

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Figure A2 **LES National Enrichment Facility Operating Organization**

INTRODUCTION

Louisiana Energy Services (LES) maintains full responsibility for ensuring that the enrichment facility is designed, constructed, operated, and decommissioned in conformance with applicable regulatory requirements, specified design requirements, applicable industry standards and good engineering practices in a manner to protect the health and safety of the employees and the public. To this end, the LES Quality Assurance Program conforms to the criteria established in Title 10 of the Code of Federal Regulations 10 CFR 50, Appendix B, Quality Assurance Criteria For Nuclear Power Plants and Fuel Reprocessing Plants. The criteria in 10 CFR 50, Appendix B, are met by LES's commitment to follow the guidelines of the American Society of Mechanical Engineers (ASME) Quality Assurance (QA) standard NQA-1-1994, Quality Assurance Program Requirements for Nuclear Facilities, including supplements as revised by the ASME NQA-1a-1995 Addenda.

The LES QA Program described herein covers design, construction (including pre-operational testing), operation (including testing), maintenance and modification, and decommissioning of the facility. This Quality Assurance Program Description (QAPD) describes the requirements to be applied to those structures, systems and components, and activities that have been designated Quality Assurance (QA) Level 1.

QA Level 1 is applied exclusively to items relied on for safety (IROFS) and any items which are determined to affect the function of the IROFS. The development of the IROFS list is a product of the Integrated Safety Analysis (ISA) process. Chapter 3, Integrated Safety Analysis Summary of the LES Safety Analysis Report (SAR) provides the methodology utilized to establish the IROFS list. IROFS are comprised of specific structures, systems and components (SSC) and administrative controls. All sections of this QAPD are applied to IROFS and any SSC and administrative controls which are determined to affect the functions of the IROFS. Application of the QAPD requirements is part of the configuration management system and will be performed in accordance with documented procedures. The LES QA organization reviews and concurs with the selection of the IROFS and the application of QA requirements to the IROFS and any items which are determined to affect the functions of the IROFS.

The QA Level 2 program description is provided in Section 20, Quality Assurance Program for QA Level 2 Activities of this QAPD. These requirements are implemented by LES and LES contractors through the use of approved QA programs and procedures. The Owner defined QA Level 2 SSCs and their associated activities i.e., those SSCs that are not IROFS, provide support of normal operations of the facility, and do not affect the functions of the IROFS (e.g., occupational exposure, radioactive waste management) and SSCs that minimize public, worker, and environmental risks (e.g., physical interaction protection, certain radiation monitors and criticality alarms) are evaluated against the requirements in Section 20, of this QAPD. This evaluation identifies which QA controls are needed to ensure these SSC meet their intended functions and do not affect the functions of the IROFS. This evaluation may also include nuclear industry precedent in the application of augmented QA requirements.

Three QA Levels have been established and apply throughout the life of the facility from licensing and siting through design, construction, operation, and decommissioning. The three levels are defined as follows.

QA LEVEL 1 REQUIREMENTS

The QA Level 1 Program shall conform to the criteria established in 10 CFR 50, Appendix B. These criteria shall be met by commitments to follow the guidelines of ASME NQA-1-1994, including supplements as revised by the ASME NQA-1a-1995 Addenda. The QA Level 1 QA program shall be applied to those structures, systems, components, and administrative controls that have been determined to be IROFS and items that affect the functions of the IROFS.

QA LEVEL 2 REQUIREMENTS

The QA Level 2 program is an owner-defined QA program that uses the ASME NQA-1 standard as guidance. General QA Level 2 requirements are described in Section 20, Quality Assurance Program for QA Level 2 Activities. For contractors, the QA Level 2 program shall be described in documents that must be approved by LES. The QA Level 2 program shall be applied to Owner designated structures, systems, components, and activities. An International Organization for Standardization (ISO) 9000 series QA program may be acceptable for QA Level 2 applications provided it complies with applicable LES QAPD requirements and the QAPD is reviewed and accepted by the LES QA Director.

QA LEVEL 3 REQUIREMENTS

The QA Level 3 program is defined as standard commercial practice. A documented QA Level 3 program is not required. QA Level 3 governs all activities not designated as QA Level 1 or QA Level 2.

As described in Section 19, Provisions for Change, subsequent changes to the LES QA Program shall be incorporated in this QAPD. Any changes that reduce the commitments in the approved QAPD will be submitted to the Nuclear Regulatory Commission (NRC) for review and approval prior to implementation.

SECTION 1 ORGANIZATION

The elements of the LES QA Program described in this section and associated QA procedures implement the requirements of Criterion 1, Organization, of 10 CFR 50, Appendix B, and the commitment to Basic Requirement 1 and Supplement 1S-1 of NQA-1-1994.

LES employees and contractor employees representing LES have full responsibility to ensure that the facility is designed, constructed, operated, and decommissioned in a manner to protect the health and safety of the public. This responsibility begins with initial design and continues throughout the life of the facility. The LES QA Program is designed to ensure that the necessary quality requirements for structures, systems, components and work activities are met. This objective is attained by ensuring that the organizational structure and the responsibility assignments are such that (a) quality is achieved and maintained by those who have been assigned responsibility for performing work and, (b) quality achievement is verified by persons or organizations not directly responsible for performing the work.

CORPORATE ORGANIZATION AND FUNCTIONS

LES is the owner and operator of the enrichment facility. LES is a registered limited partnership formed to provide uranium enrichment services for commercial nuclear power plants. LES is responsible for the design, construction, operation and decommissioning of the enrichment facility in accordance with its QA Program. The President of LES reports to the LES Management Committee. The committee is composed of representatives from the general partners of LES.

The LES President establishes the basic policies of the QA Program. These policies are described in this QA Program, are transmitted to all levels of management, and are implemented through approved procedures. The LES QA Director has overall responsibility for development, management and implementation of the LES QA Program during all phases of the enrichment facility. As part of this responsibility, the QA Director is responsible for ensuring that contractor QA Programs meet all applicable requirements of the LES QA Program. LES management is continually involved in activities affecting quality and QA requirements.

Reporting to the President are the Engineering and Contracts Manager, Corporate Communications Manager, Chief Financial Officer (CFO), Quality Assurance Director, Chief Operating Officer (COO) and the Health, Safety and Environment Manager. Figure A1, LES Corporate, Design and Construction Organization, shows the levels of authority and lines of communications for activities affecting quality.

DESIGN AND CONSTRUCTION ORGANIZATION AND FUNCTIONS

As the owner of the enrichment technology and operator of the enrichment facilities in Europe, LES, under the responsibility of the Engineering and Contracts Manager or President acting in that capacity, has contracted Urenco Limited to prepare the reference design for the facility. An architect/engineering (A/E) firm has been contracted and is under the responsibility of the Engineering and Contracts Manager or President to further specify structures and systems of the facility, and ensure the reference design meets all applicable U.S. codes and standards. A contractor specializing in site evaluations has been contracted and is under the responsibility of the Engineering and Contracts Manager or President to perform the site selection evaluation. A nuclear consulting company has been contracted and is under the responsibility of the

Engineering and Contracts Manager or President to conduct the site characterization, perform the Integrated Safety Analysis and to support development of the license application including the Environmental Report.

During the design and construction phases, preparation of design and construction documents and construction itself are contracted to qualified contractors. The Engineering and Contracts Manager is responsible for managing the design, construction, startup, including pre-operational testing and procurement activities during these phases. Contractor QA Programs will be reviewed by the LES QA organization and must be approved by the LES QA Director before work can start as described in Section 4, Procurement Document Control, and Section 7, Control of Purchased Material, Equipment and Services. Urenco will design, manufacture and deliver to the site the centrifuges necessary for the facility under a QA Program approved by the LES QA Director or under the LES QA Program. In addition, Urenco is supplying the technical assistance and consultation for the facility in accordance with the applicable requirements of the LES QA Program. As shown in Figure A1, the Engineering and Contracts Manager is responsible for managing the work and contracts with the Technology Supplier (i.e., Urenco) and a select group of Project Managers. These Project Managers will be responsible for the areas of Procurement, Construction, Engineering, Project Engineering, Project Controls and Start up.

QA Procedures will be developed by the Engineering and Contracts organization to implement this QAPD in the Engineering and Contracts area.

OPERATING ORGANIZATION AND FUNCTIONS

The operating organization is shown in Figure A2, LES National Enrichment Facility Operating Organization. The Plant Manager reports to the COO and is responsible for the overall operation and administration of the enrichment facility. The Plant Manager is also responsible for ensuring the facility complies with all applicable regulatory requirements including the requirements of this QAPD. In the discharge of these responsibilities, the Plant Manager directs the activities of the following groups.

- Health, Safety and Environment
- Operations
- Uranium Management
- Technical Services
- Human Resources
- Quality Assurance

Procedures will be developed by the respective operations organizations to implement the requirements of this QAPD. Specific details of organizational responsibilities and job descriptions are provided in the National Enrichment Facility (NEF) Safety Analysis Report.

QA ORGANIZATION AND FUNCTIONS

The LES QA organization during the design and construction phases will be headed by the LES QA Director. The LES QA Director reports directly to the LES President and is vested with the authority, access to work areas, and organizational independence to ensure that the requirements of this QAPD are properly implemented.

The LES QA Director is responsible for managing the LES QA Program that includes the following activities:

- QA Technical Support
 - Maintain the LES QAPD
 - Maintain QA procedures
 - QA technical reviews of procurement documents
 - Review and concurrence of changes to the identified IROFS and items that could affect the functions of IROFS
 - Administer the Corrective Action and Nonconformance Processes
 - Maintain the LES Approved Suppliers List (ASL)
 - Administer the Auditor and Lead Auditor Certification Process
 - QA reviews of project documents
 - Approval of contractor QA Programs
 - Oversight of contractor QA Programs Implementation
 - Oversight of the quality of design and construction, including but not limited to the ISA process and the resultant selection of IROFS
 - Oversight of document and records control
- QA Verification
 - Audits, surveillances and assessments
 - Contractor/supplier evaluations
 - Contractor nonconformances
 - Equipment/Vendor Shop Inspections
 - Witness vendor acceptance testing

During the transition from construction to operations, when startup testing and plant operations may be concurrent as the facility is completed in phases, a plant QA Manager will be added to the LES QA Organization. During this transition period as well as during operations, the plant QA Manager will report to the Plant Manager. However, the plant QA Manager has the authority and responsibility to contact the LES President, through the QA Director, with any QA concerns during startup and plant operations. After construction has been completed on the facility the corporate functions reporting the LES QA Director, i.e., QA Technical Support and QA Verification; will transition to the plant QA Manager. During the operations and decommissioning phases, the LES QA Director will advise the LES President on quality-related matters and continue to have governance and oversight responsibilities with respect to the QA organization headed by the plant QA Manager. The following additional QA Manager responsibilities are included for start up testing and operations:

- QA Technical Support
 - Quality Engineering support of startup organization
 - Oversight of startup activities
 - QA selected reviews and oversight of programs developed for operations, including but not limited to the ISA process, the identification of IROFS and items that affect the

performance of IROFS and any changes thereto, the controls for assuring IROFS performance and verifying and maintaining the facility design basis.

- o QA selected reviews and oversight of operations including maintenance and testing and modification procedures
- o Review and concurrence of changes to the identified IROFS and items that could affect the functions of IROFS
- o QA Oversight of operations procedure implementation
- o Quality Control (QC) Inspection certification process
- QC Inspections
 - o Receipt Inspections of QA Level 1 items
 - o Applicable discipline inspections of modifications to QA Level 1 components

Accordingly, during the transition from construction to operations, the operations phase, and the decommissioning phase, the management of the QA organization and the QA staff have the responsibility to make quality assurance decisions and have sufficient authority, access to work areas, and organizational freedom to:

- Identify quality problems
- Initiate and recommend solutions to quality problems through designated channels
- Verify implementation of solutions
- Assure that further processing, delivery, installation, or use of items is controlled until proper disposition of nonconformances, deficiencies or unsatisfactory conditions has occurred
- Have direct access to highest levels of management
- Be sufficiently independent from cost and schedule considerations and have stop-work authority.

ORGANIZATIONAL INTERFACES

The organizational interfaces between LES, contractors, and project applicable regulatory agencies are identified in the appropriate plans, contracts and implementing procedures. These documents contain the appropriate protocols, applicable roles, responsibilities and approval authorities for the specific topics for which they apply. LES design interfaces shall be identified and procedurally controlled. Design efforts shall be coordinated among interfacing organizations as detailed in LES procedures. Interface controls shall include the assignment of responsibility and the establishment of implementing documents among interfacing design organizations for the review, approval, release, distribution and revision of documents involving design interfaces. LES design information transmitted across interfaces shall be documented and procedurally controlled. LES transmittals of design information and/or documents shall reflect the status of the transmitted information and documents. Incomplete designs that require further evaluation, review or approval shall be identified. When it is necessary to initially transmit the design information orally or by other informal means, design information shall be promptly confirmed through a controlled implementing document.

DELEGATION OF WORK

The delegation of work between LES and contractors is identified in applicable plans, contracts and implementing procedures. In all cases of delegation, LES retains the overall responsibility for all work performed under the direction of LES. All LES QA Level 1 work activities shall meet the requirements of this QAPD. Responsible managers have the authority to delegate tasks to another qualified individual within their organization provided the designated individual possesses the required qualifications and these qualifications are documented. All delegations shall be in writing. The responsible manager retains the ultimate responsibility and accountability for implementing the applicable requirements.

RESOLUTION OF DISPUTES

Disputes involving differences of opinion on quality matters or issues are brought to the attention of line management, and if not resolved by the individual's manager, are elevated progressively to the QA Director. If satisfactory resolution cannot be obtained at that level, the matter is then elevated to the LES President for final resolution.

WORKER RESPONSIBILITIES

Each employee has an obligation to identify concerns using the corrective action process with respect to work within their scope of responsibility whenever the health and safety of our workers, the public, or the environment is involved or when continued work will produce results that are not in compliance with the LES QA Program. This process is controlled by an LES procedure, which applies across the entire project/facility. The authorities and responsibilities for stopping work, the criteria and documentation required to process the stop work and the actions required before work may resume are detailed in an LES procedure. This process ensures that safety related activities are controlled until the deficiency, or unsatisfactory condition, has been resolved. Worker responsibilities are further discussed in Section 16, *Corrective Action*.

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SECTION 2 QUALITY ASSURANCE PROGRAM

The elements of the LES QA Program described in this section and associated QA procedures implement the requirements of Criterion 2, Quality Assurance Program, of 10 CFR 50, Appendix B, and the commitment to Basic Requirement 2 and Supplements 2S-1, 2S-2, 2S-3 and 2S-4 of NQA-1-1994 Part I as revised by NQA-1a-1995 Addenda of NQA-1-1994.

PROGRAM BASIS

The LES Quality Assurance Program complies with 10 CFR 50, Appendix B, Quality Assurance Criteria for Nuclear Power Plants and Fuel Reprocessing Plants, and applies to all levels of the organization, including contractors, who perform QA Level 1 activities. Part I and selected sections of Part II of ASME NQA-1-1994, Quality Assurance Requirements for Nuclear Facility Applications, as revised by NQA-1a-1995 Addenda are used in conjunction with 10 CFR 50, Appendix B and provide additional detailed quality assurance guidelines which are committed to in this QAPD. The LES QAPD describes LES's overall compliance with 10 CFR 50, Appendix B and commitments to ASME NQA-1. This document states LES policies, assigns responsibilities and specifies requirements governing implementation of the QA Program to the design, construction, operation and decommissioning of the LES enrichment facility. All 18 criteria of 10 CFR 50, Appendix B have been addressed to identify the scope of QA Program applied to the LES enrichment facility. QA requirements will also apply to contractors as delineated in procurement documents controlled under Section 4, Procurement Document Control, of this QAPD. The necessary management measures to control the quality of subcontracted activities for the LES design, procurement, and installation and testing of QA Level 1 components and activities have been established in this QAPD. The QAPD will be reviewed for needed revisions as described in Section 19, Provisions For Change.

Specific processes and controls, which implement the provisions of 10 CFR 50, Appendix B and the commitment to ASME NQA-1-1994, as specified in this QAPD are delineated in procedures. Development, review, approval and training on procedures shall be performed prior to performance of the activities controlled by the procedures.

The QA Program provides for the planning and accomplishment of activities affecting quality under suitably controlled conditions. Controlled conditions include the use of appropriate equipment, suitable environmental conditions for accomplishing the activity, and assurance that prerequisites for the given activity have been satisfied. The LES QA Program provides for special controls, processes, test equipment, tools and skills to attain the required quality and verification of quality. QA requirements contained in this QAPD are also invoked on LES contractors for their contracted scope of work.

When work cannot be accomplished as specified in implementing QA procedures, or accomplishment of such work would result in an adverse condition, work is stopped until proper corrective action is taken. If procedures cannot be used as written, then work is stopped until the procedures are changed. Requirements for stop work are further discussed in Section 16, Corrective Action.

Flowdown of QA Requirements to Contractors and Suppliers

QA requirements for QA Level 1 activities are imposed on LES contractors and suppliers through the respective procurement documents for the particular scope of work being

contracted. Determination of the specific QA requirements, supplier evaluations, and proposal/bid evaluations are in accordance with the requirements of Section 4, Procurement Document Control, and Section 7, Control of Purchased Material, Equipment and Services, of this document. Applicable QA Program elements required for the particular scope of work are identified in procurement documents. Potential contractors/suppliers are required to submit their QA Programs to the LES QA organization for review in accordance with the request for proposal/procurement specification. The LES QA organization performs an audit at the contractor's/supplier's facility of their QA program and its implementation verifying that the contractor's/supplier's QA program meets the requirements established in the request for proposal/procurement specification. If the audit is acceptable then the contractor/supplier is added to the LES ASL and a contract between LES and the contractor/supplier may be issued. For procured items, LES may also require that the LES QA organization perform source inspections or witness tests at the supplier's facility prior to shipment if the equipment/component warrants inspection due to its safety significance and/or complexity. Such requirements are also identified in the procurement documents and/or contract.

Construction contractors for LES QA Program controlled construction activities are required to be placed on the ASL prior to contract award. Construction contractors are required to perform the QA activities required by their QA program including audits of their own activities as well as any required quality control (QC) inspections. The LES QA organization will provide oversight of these contractors in the form of audits and surveillances verifying that each contractor is properly implementing its QA program as approved by LES QA. Contractually contractors will be required to promptly correct LES identified deficiencies and nonconformances.

IDENTIFICATION AND APPLICATION OF QA CONTROLS

QA Level 1 is applied exclusively to IROFS and any items which are determined to affect the function of the IROFS. Since the development of the IROFS list is a product of the ISA process, the applicable QA Level 1 requirements are also applied to this process. Chapter 3, Integrated Safety Analysis Summary of the NEF Safety Analysis Report (SAR) provides the methodology utilized to establish the IROFS list. IROFS are comprised of specific structures, systems and components (SSC) and administrative controls. All applicable sections of this QAPD are applied to IROFS and any SSC and administrative controls which are determined to affect the functions of the IROFS. Application of the QAPD requirements is part of the configuration management program used to verify and maintain the facility design basis and will be performed in accordance with documented procedures. Accordingly, as described in Section 1, Organization, the QA organization is responsible for selected reviews and oversight of these processes and programs. In particular, the LES QA organization reviews and concurs with the selection of the IROFS and the application of QA requirements to the IROFS and any items which are determined to affect the functions of the IROFS.

The QA Level 2 program description is provided in Section 20, Quality Assurance Program for QA Level 2 Activities of this QAPD. These requirements are implemented by LES and LES contractors through the use of approved QA programs and procedures. The Owner defined QA Level 2 SSCs and their associated activities i.e., those SSCs that are not IROFS, provide support of normal operations of the facility, and do not affect the functions of the IROFS (e.g., occupational exposure, radioactive waste management) and SSCs that minimize public, worker, and environmental risks (e.g., physical interaction protection, certain radiation monitors and criticality alarms) are evaluated against the requirements in Section 20, of this QAPD. This evaluation identifies which QA controls are needed to ensure these SSCs meet their intended

functions and do not affect the functions of the IROFS. This evaluation may also include nuclear industry precedent in the application of augmented QA requirements.

Three QA Levels have been established and apply throughout the life of the facility from licensing and siting through design, construction, testing, startup, operation, maintenance, modification, and decommissioning. The three levels are defined as follows.

QA LEVEL 1 REQUIREMENTS

The QA Level 1 Program shall conform to the criteria established in 10 CFR 50, Appendix B. These criteria shall be met by commitments to follow the guidelines of ASME NQA-1-1994, including supplements as revised by the ASME NQA-1a-1995 Addenda. The QA Level 1 QA program shall be applied to those structures, systems, components, and administrative controls that have been determined to be IROFS and items that affect the functions of the IROFS.

QA LEVEL 2 REQUIREMENTS

The QA Level 2 program is an owner-defined QA program that uses the ASME NQA-1 standard as guidance. General QA Level 2 requirements are described in Section 20, Quality Assurance Program for QA Level 2 Activities. For contractors, the QA Level 2 program shall be described in documents that must be approved by LES. The QA Level 2 program shall be applied to Owner designated structures, systems, components, and activities. An International Organization for Standardization (ISO) 9000 series QA program may be acceptable for QA Level 2 applications provided it complies with LES QAPD requirements and the QAPD is reviewed and accepted by the LES QA Director.

QA LEVEL 3 REQUIREMENTS

The QA Level 3 program is defined as standard commercial practice. A documented QA Level 3 program is not required. QA Level 3 governs all activities not designated as QA Level 1 or QA Level 2.

QUALITY ASSURANCE TRAINING

LES employees who perform QA Level 1 activities receive LES QA Indoctrination Training. This training includes general criteria, including introduction to applicable codes, standards, QA Procedures, QA Program elements and job responsibilities and authorities. LES personnel assigned to perform QA Level 1 activities are also required to complete training in the specific LES QA procedures needed to perform their job roles and responsibilities as assigned by their supervisor. Detailed QA training is provided on the LES QA Program and job specific QA procedures prior to an employee beginning QA Level 1 work. Supervision is responsible for ensuring that personnel performing work under their supervision are appropriately trained.

The Human Resources Manager is responsible for coordinating QA training activities for LES. Human Resources serves as a centralized training support service for supervision in coordinating training and maintaining QA training records. This responsibility is carried out as support for line management. LES supervisory personnel are responsible for determining the type and extent of the training to be provided to an individual, and ensuring that the training is properly documented for personnel performing QA Level 1 activities. Retraining, when applicable, shall occur in order to maintain proficiency or when changes to work methods, technology, or job responsibilities occur. Such retraining is also documented.

MANAGEMENT ASSESSMENTS

The LES President is responsible for ensuring that management assessments are conducted annually to determine if the LES QA Program is effective. Recommendations are provided to the LES President for action. Functional Managers and the QA Director conduct assessments annually of QA activities under their control. The managers report the results to the LES President for review. The results of these assessments are reviewed by senior management to determine the adequacy of implementation of the LES QA Program and to direct any needed changes for program improvements.

QUALIFICATION/CERTIFICATION OF INSPECTION AND TEST PERSONNEL

Inspection and test personnel performing QA Level 1 activities shall be certified in accordance with NQA-1-1994 Part I Supplement 2S-1, *Supplementary Requirements for the Qualification of Inspection and Test Personnel*.

QUALIFICATION/CERTIFICATION OF NONDESTRUCTIVE EXAMINATION (NDE) PERSONNEL

Nondestructive Examination (NDE) personnel performing QA Level 1 activities shall be certified in accordance with NQA-1a-1995 Part 1 Supplement 2S-2, *Supplementary Requirements for the Qualification of Nondestructive Examination Personnel and American Society of Nondestructive Testing (ASNT) Recommended Practice No. SNT-TC-1A, Personnel Qualification and Certification in Nondestructive Testing*, December 1988 Edition. Qualification/certification records meeting the requirements of Supplement 2S-2 shall be established and maintained as QA records.

QUALITY ASSURANCE AUDIT PERSONNEL

Audit personnel performing QA Level 1 activities shall be certified in accordance with NQA-1a-1995 Part 1 Supplement 2S-3 *Supplemental Requirements for the Qualification of Quality Assurance Program Audit Personnel*.

QUALITY ASSURANCE PROGRAM STATUS REPORTING TO MANAGEMENT

Management is regularly informed by the LES QA organization of adverse trends and lessons learned as a result of reviews conducted on audit reports, surveillance reports, corrective action reports, management assessments, etc. Corrective action is initiated as necessary.

SECTION 3 DESIGN CONTROL

The elements of the LES QA Program described in this section and associated procedures implement the requirements of Criterion 3, Design Control, of 10 CFR 50, Appendix B, and the commitment to Basic Requirements 3 and Supplement 3S-1 of NQA-1-1994 Part I as revised by NQA-1a-1995 Addenda of NQA-1-1994. The LES QA Program also implements the commitment to Part II of NQA-1-1994 Subpart Part 2.7, *Quality Assurance Requirements of Computer Software for Nuclear Facility Applications*, as revised by NQA-1a-1995 Addenda of NQA-1-1994. These commitments also apply to computer software that is used to produce or manipulate data that is used directly in the design, analysis and operation of structures, systems and components relied on for safety. Part I, Supplement 11S-2, *Supplementary Requirements for Computer Program Testing*, requirements for computer software qualification and use are also implemented by the LES QA Program.

Measures are established in procedures to assure that applicable requirements are correctly translated into design documents. Design inputs are specified on a timely basis to support LES milestones. Controls are established for the selection and suitability of application of materials, parts, equipment and processes that are essential to the functions of structures, systems and components. Design interfaces to ensure completeness and efficiency of design are established in applicable procedures. Procedures detail the controls for design input, design process, design verification, design changes and approval. These procedures include appropriate quantitative and/or qualitative acceptance criteria for determining that activities have been satisfactorily accomplished. LES design documents are prepared, reviewed, and approved by qualified individuals. Design is verified by one or more of the following verification methods: design reviews, alternate calculations or qualification tests. Design changes are governed by control measures commensurate with those applied to the original design. The design process and design verification practices and procedures shall be reviewed and modified, as necessary, when a significant design change is required because of an incorrect design. These and any other design deficiencies discovered during the design process on subsequent design related activities that affect the design of SSC shall be entered into the Corrective Action Program (CAP) according to Section 16, Corrective Action. If these deficiencies cause constructed or partially constructed items (systems, structures or components) to be deficient, the affected items shall be controlled in accordance with Section 15, Nonconforming Items. Configuration management is maintained in accordance with the applicable procedure and the applicable procedures controlling changes to the various types of design documents.

DESIGN INPUT CONTROL

Applicable design inputs (such as design basis, conceptual design reports, performance requirements, regulatory requirements, codes and standards) shall be controlled by the LES Engineering and Contracts Manager according to the following requirements:

- Design inputs shall be identified and documented, and their selection reviewed and approved.
- Design inputs shall be specified and approved in a manner to support the schedule. Design inputs shall provide the necessary details to permit design to be carried out in a manner that provides a consistent basis for making design decisions, accomplishing design verification

and evaluating design changes.

- Changes from approved design inputs and reasons for the changes shall be identified, approved, documented and controlled.
- Design inputs based on assumptions that require re-verification shall be identified and controlled by the appropriate procedures.

DESIGN PROCESS

The LES design process shall be controlled by the Engineering and Contracts Manager according to the following requirements:

- LES design work shall be prescribed and documented on a timely basis and to the level of detail necessary to permit the design process to be carried out in a correct manner and to permit verification that the design meets requirements.
- Design documents shall be adequate to support design, construction and operation.
- Appropriate quality standards shall be identified and documented, and their selection reviewed and approved.
- Changes from specified standards, including the reasons for the change, shall be identified, approved, documented and controlled.
- Design methods, materials, parts, equipment and processes that are essential to the function of the structure, system, or component shall be selected and reviewed for and suitability of application.
- Applicable information derived from experience as set forth in reports or other documentation, shall be made available to cognizant design personnel.
- Final design documents (i.e., approved design output documents and approved changes thereto) shall be sufficiently detailed as to purpose, method, assumptions, design input, references and units such that a person technically qualified in the subject/engineering discipline can understand the documents and verify their adequacy without recourse to the originator of the design document.
- Procedural controls for identifying sub-assemblies or components on final design documents that are part of the item being designed shall be established. When a commercial grade item is modified and/or tested to new requirements that are more restrictive than the supplier's published product description, the component part shall be traceable to documentation noting that it is different from the originally approved commercial grade item.
- LES design drawings, specifications or other design output documents shall contain appropriate inspection, examination and testing acceptance criteria.

DESIGN ANALYSIS

LES design analyses shall be planned, controlled and documented. Design analysis documents shall be legible, in a form suitable for reproduction, filing and retrieval, and under configuration management control. LES design calculations shall be identifiable by subject (including structure, system or component to which the calculation applies), originator, reviewer and date, or by other designators in order that approved calculations are retrievable.

Computer software used to perform design analyses shall be developed and/or qualified, and used according to the provisions of ASME NQA-1-1994, Part II, Subpart 2.7 as revised by NQA-

1a-1995 Addenda and Supplement 11S-2. Computer software developed and/or qualified under the LES or its contractor QA programs may also be used to perform design analyses for LES, provided that the LES QA organization confirms these contractor QA programs meet the provisions NQA-1-1994, Part I, Supplement 11S-2 and NQA-1-1994 Part II, Subpart 2.7 as revised by NQA-1a-1995 addenda.

Computer programs may be utilized for design analysis without individual verification of the program for each application provided:

- The computer program has been verified to show that it produces correct solutions for the encoded mathematical model within defined limits for each parameter employed; and
- The encoded mathematical model has been shown to produce a valid solution to the physical problem associated with the particular application.

Computer programs shall be controlled to assure that changes are documented and approved by authorized personnel. Where changes to previously verified computer programs are made, verification shall be required for the change, including evaluation of the effects of these changes on the above.

LES design analyses documentation shall include:

- Definition of the objective of the analyses,
- Definition of design inputs and their sources,
- Results of literature searches or other applicable background data,
- Identification of assumptions and designation of those that must be verified as the design proceeds,
- Identification of any computer calculation, including computer type, computer program (e.g., name), revision identification, inputs, outputs, evidence of reference to computer program verification and the bases (or reference thereto) supporting application of the computer program to the specific physical problem,
- Review and approval.

DESIGN VERIFICATION

The following design control requirements shall be applied to verify the adequacy of LES design.

- LES design verification is required for design documents, and shall be performed using one or a combination of the design review, alternate calculations and/or qualification testing methods.
- The particular design verification method used shall be documented.
- Results of design verification shall be documented and shall include the identification of the verifier(s).
- Competent individuals or groups, other than those, who performed the original design (but may be from the same organization), shall perform design verification. If necessary, this verification may be performed by the originator's supervisor provided that the engineering supervisor did not specify a singular design approach or rule out certain design considerations and did not establish the design inputs used in the design; or the supervisor is the only individual in the organization competent to perform the verification.

LES design verification shall be performed in a timely manner at appropriate times during the design process. Verification shall be performed before release for procurement, manufacture or construction, or release to another organization for use in other design work. In some cases (such as when insufficient data exists) it may be necessary to release unverified designs to other engineering organizations or disciplines to support schedule requirements. Unverified portions of the design shall be clearly identified and procedurally controlled. In all cases, design verification shall be completed before relying on the item or computer program to perform its function. The extent of design verification required shall be a function of the importance to safety, complexity of design, degree of standardization, state of the art and similarity with previously proven designs.

LES use of previously standardized designs shall be controlled according to the following requirements:

- The applicability of standardized or previously proven designs shall be verified with respect to meeting pertinent design inputs for each application.
- Known problems affecting standard or previously proven designs and their effects on other features shall be considered.
- The "Americanization" of previously proven European designs shall be documented in accordance with the applicable QA procedure.
- The original design and associated verification measures shall be adequately documented and referenced in the files for subsequent application of the design.
- Changes in previously verified designs shall require re-verification. Such verifications shall include the evaluation of the effects of those changes on the overall previously verified design and on any design analyses upon which the design is based.

DESIGN VERIFICATION METHODS

Acceptable verification methods include, but are not limited to, any one of the following or a combination of the following:

- Design Reviews
- Alternate Calculations
- Qualification Testing

DESIGN REVIEWS

Design reviews are critical reviews to provide assurance that the final design is correct and satisfactory. The following items shall be addressed, as applicable during the review:

- Were the design inputs correctly selected and incorporated into the design?
- Are assumptions necessary to perform the design activity adequately described, reasonable and, where necessary, re-verified?
- Was an appropriate design method used?
- Is the design output reasonable compared to the applicable design inputs?
- Are the necessary design input and verification requirements for interfacing organizations specified in the design documents or in supporting procedures and instructions?

ALTERNATE CALCULATIONS

The appropriateness of assumptions, input data, and the computer program or other calculation methods used, shall be evaluated and the results shall be checked through the use of alternate calculation methods to verify the correctness of the original calculations or analyses.

QUALIFICATION TESTS

If design adequacy is to be verified by qualification testing, the tests shall be identified, procedurally controlled and documented according to the following:

- The test configuration shall be defined and documented.
- Testing shall demonstrate the adequacy of performance under conditions that simulate the most adverse design conditions. Operating modes and environmental conditions in which the item must perform satisfactorily shall be considered in determining the most adverse design conditions.
- If the tests verify only specific design features, then the other features of the design shall be verified by other means.
- Test results shall be documented and evaluated to ensure that test requirements have been met.
- If qualification testing indicates that a modification to an item is necessary to obtain acceptable performance, then the modification shall be documented and the item modified and re-tested or otherwise verified to ensure satisfactory performance.
- Scaling laws shall be established, verified and documented when tests are being performed on models or mockups.
- The results of model test work shall be subject to error analysis, where applicable, before using the results in final design work.

DESIGN CHANGE CONTROL

Design changes during the initial design phase and the operational phase shall be controlled according to the following requirements:

- Changes to final designs, field changes, modifications to the operating facility and nonconforming items dispositioned as "use-as-is" or "repair," as described in Section 15, Nonconforming Items, and shall have documented justification for use and are subject to the same design control measures and reviews as those applied to the original design.
- Design control measures for changes shall include provisions to ensure that the design analyses for the item are still valid.
- Changes shall be reviewed and approved by the affected groups or organizations that reviewed and approved the original design documents, with the following clarifications:
 - If the organization that originally was responsible for approving a particular design document is no longer responsible, then a new responsible organization shall be designated.
 - The designated organization shall have demonstrated competence in the specific design area of interest and have an adequate understanding of the requirements and intent of the original design.

- The interface between the design organization responsible for finalizing a design change and other organizations either involved in the review of the change, such as the QA and configuration management organizations, and those affected by the change, such as the operations and maintenance organizations, described in the next subsection, Design Interface Control, shall be maintained.
- The design process and design verification practices and procedures shall be reviewed and modified, as necessary, when a significant design change is required because of an incorrect design. These design deficiencies shall be documented according to Section 16.0, Corrective Actions. If these deficiencies cause constructed or partially constructed items (systems, structures or components) to be deficient, the affected items shall be controlled in accordance with Section 15, Nonconforming Items.
- When a design change is approved other than revision to the affected design documents, field changes shall be incorporated into affected design documents when such incorporation is appropriate.

DESIGN INTERFACE CONTROL

LES design interfaces shall be identified and procedurally controlled. Design efforts shall be coordinated among interfacing organizations as detailed in LES procedures. Interface controls shall include the assignment of responsibility and the establishment of procedures among interfacing design organizations for the review, approval, release, distribution and revision of documents involving design interfaces. LES design information transmitted across interfaces shall be documented and procedurally controlled. LES transmittals of design information and/or documents shall reflect the status of the transmitted information and documents. Incomplete designs that require further evaluation, review or approval shall be identified. When it is necessary to initially transmit the design information orally or by other informal means, design information shall be promptly confirmed through a controlled document.

During the operational phase, the Plant Manager is responsible for ensuring the facility complies with all applicable regulatory requirements including the requirements of this QA Program. In the discharge of these responsibilities, the Plant Manager directs the activities of the Technical Services, which includes Engineering and Maintenance, and Operations. Procedures for controlling the interfaces and configuration management ensure that changes and modifications are properly managed and disseminated to those responsible personnel or organizations whose duties may be affected by the design change or modification and do not adversely impact the safe operation of the plant.

COMPUTER SOFTWARE CONTROLS

If LES uses software to produce or manipulate data that is used directly in the design, analysis and operation of structures, systems, and components relied on for safety, the provisions provided in Part II ASME NQA-1-1994 Subpart Part 2.7, *Quality Assurance Requirements of Computer Software for Nuclear Facility Applications*, as revised by NQA-1a-1995 Addenda of NQA-1-1994 and ASME NQA-1-1994, Part I, Supplement 11S-2, *Supplementary Requirements for Computer Program Testing* shall apply. Procedures will be developed to implement of these provisions as applicable.

DOCUMENTATION AND RECORDS

Design documentation which provide evidence that the design and design verification were performed in accordance with this QAPD shall be collected and maintained in accordance with the requirements of Section 17 Quality Assurance Records. The documentation shall include not only final design documents such as drawings, specifications and revision thereto but also documentation which identifies the important steps, including sources of design inputs that support the final design.

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SECTION 4

PROCUREMENT DOCUMENT CONTROL

The elements of the LES QA Program described in this section and associated procedures implement the requirements of Criterion 4, Procurement Document Control, of 10 CFR 50, Appendix B, and the commitment to Basic Requirement 4 and Supplement 4S-1 of NQA-1-1994.

LES procurements shall be issued only to those suppliers that have been evaluated and qualified as acceptable for the particular scope of material, equipment and services to be procured. The material, equipment and services shall be procured from approved suppliers by procurement documents, approved by the LES President and QA Director or their qualified designees. Applicable design bases and other requirements necessary to assure adequate quality shall be included or referenced in documents for procurement of items and services. Procurement documents shall require suppliers to have a quality assurance program consistent with the applicable requirements of 10 CFR 50 Appendix B and this QAPD. The requirements of 10 CFR 21 Reporting of Defects and Nonconformance are invoked during design, construction, testing and operations of QA Level 1 procurement or dedication of items and services including the dedication of items or services used to satisfy the requirements of 10 CFR 50, Appendix B or 10 CFR 70 Domestic Licensing of Special Nuclear Material.

Procurement Document Content

LES procurement documents issued for QA Level 1 items or services shall include the following provisions, as applicable to the procured material, equipment or service:

- Statement of the scope of work to be performed by the supplier.
- Technical requirements including:
 - Design bases, identified or referenced in the procurement documents.
 - Specific documents (such as drawings, codes, standards, regulations, procedures or instructions) describing the technical requirements of the material, equipment or services to be furnished, shall be specified along with their revision level or change status.
 - Tests, inspections or acceptance requirements that LES will use to monitor and evaluate the performance of the supplier shall be specified.
- Quality Assurance Program requirements including:
 - A requirement for the supplier to have a documented quality assurance program that implements applicable requirements of 10 CFR 50, Appendix B and this QAPD in place before the initiation of work. The extent of the quality assurance program shall depend on the scope, nature or complexity of the material, equipment or service to be procured. The supplier shall also incorporate the appropriate requirements into any subtier supplier issued procurement documents.
 - A requirement invoking NRC reporting requirements of 10 CFR 21 for QA Level 1 procurements.
- Right of access to supplier, including subtier, facilities and records for inspection or audit by LES, or other designee authorized by LES.
- Provisions for establishing witness/inspection hold points beyond which work cannot

proceed by the supplier without LES QA Director authorization. The LES Engineering and Contracts Manager may also establish hold points indicating work that cannot proceed without authorization by the Engineering and Contracts Manager.

- Documentation required to be submitted to LES for information, review or acceptance shall be identified along with a document submittal schedule. Record retention times, disposition requirements and record maintenance responsibilities shall be identified for documentation that will become quality assurance records.
- Requirements for the supplier to report to LES in writing adverse quality conditions resulting in work stoppages and nonconformances. LES approval of partial and full work releases and disposition of nonconformances is required.
- Identification of any spare and replacement parts or assemblies and the appropriate delineation of technical and quality assurance data required for ordering these parts or assemblies. Commercial Grade procurements shall also be identified in procurement documents.

Procurement Document Review and Approval

Procurement document reviews shall be performed and documented before issuing the procurement documents to the supplier. A review of the procurement documents and any changes thereto shall be made to verify that documents include all applicable requirements specified under Section 4, Procurement Document Content, above and contain appropriate provisions to ensure that material, equipment or services will meet the governing requirements. Reviews shall be performed and documented to provide objective evidence of satisfactory accomplishment of such review prior to contract award. Changes made as a result of the bid evaluation or precontract negotiations shall be incorporated into the procurement documents. The review of such changes and their effects shall be completed prior to contract award. This review shall include the following considerations: 1) appropriate requirements specified in Procurement Document Content above, 2) a determination of any additional or modified design criteria, and 3) an analysis of exceptions or changes requested by the supplier and a determination on the impacts such changes may have on the intent of the procurement documents or quality of the item or service to be provided shall be performed by the LES organization initiating the procurement. Personnel who have access to pertinent information and have an adequate understanding of the requirements and scope of the procurement shall perform reviews of the procurement documents. Reviewers shall include representatives from the Engineering and Contracts and QA organizations. The QA review shall assure compliance to quality assurance requirements.

Procurement Document Change

Changes to the scope of work, technical requirements, quality assurance program requirements, right of access, documentation requirements, work stoppage and nonconformance, hold points and lists of spare and replacement parts delineated in procurement documents, shall be subject to the same degree of control as used in the preparation of the original procurement document.

SECTION 5

INSTRUCTIONS, PROCEDURES, AND DRAWINGS

The elements of the LES QA Program described in this section and associated procedures implement the requirements of Criterion 5, Instructions, Procedures, and Drawings, of 10 CFR 50, Appendix B, and the commitment to Basic Requirement 5 of NQA-1-1994 Part I.

Activities affecting quality shall be prescribed by and conducted in accordance with approved procedures and other implementing documents (drawings, specifications, etc.) appropriate to the circumstances. Generally, four types of procedures are used by LES to ensure that activities are carried out in compliance with the requirements of this QAPD and in a safe manner. These include administrative, operating, maintenance and emergency procedures. Administrative procedures would include areas such as engineering procurement, etc. Administrative procedures are the higher level procedures that prescribe the implementation of the requirements provided in this QAPD. Operating and maintenance procedures are utilized to implement the QA program during the start up, operation, and testing of the facility. During the design and construction phases, procedures are reviewed and approved by the affected organizations with review and oversight by the QA organization. Those procedures that delineate the responsibilities and functions of the QA organization, the QA procedures, are approved by the LES QA Director to ensure compliance with QAPD. During operations, the LES QA Manager and Plant Manager have responsibility to review and approve the procedures that cover activities under their organizational purview that relate to the QAPD and the safe operation of the plant. Procedures approved by the Plant Manager will be subject to selected review and oversight by the QA organization.

TYPES OF DOCUMENTS

The type of document to be used to perform work shall be appropriate to the nature and circumstances of the work being performed. Documents include procedures, drawings and specifications. Work controlling procedures may also utilize approved checklists, travelers or other means to assure process requirements are met including prerequisite requirements prior to starting work. Procedures provide a consistent method for process performance and documentation of completion as well as ensure specified safety and environmental conditions are maintained.

CONTENT OF DOCUMENTS

Documents shall include or reference the following information as appropriate to the work to be performed:

- Responsibilities of the organizations affected by the document,
- Quality, technical and regulatory requirements,
- A sequential description of the work to be performed including controls for altering the sequence of required inspections, tests and other operations,
- Quantitative or qualitative acceptance criteria sufficient for determining that prescribed activities have been satisfactorily accomplished,
- Prerequisites, limits, precautions, process parameters and environmental conditions,
- Quality verification points and hold points,

- Methods for demonstrating that the work was performed as required,
- Identification of the lifetime or nonpermanent quality assurance records generated by the implementing document, and
- Identification of associated QA Levels as appropriate.

REVIEW, APPROVAL, AND CONTROL OF DOCUMENTS

Procedures and implementing documents shall be controlled according to the requirements of Section 6, Document Control of this document. Procedures and implementing documents shall be reviewed and approved as described in this section and in Section 6.

SECTION 6 DOCUMENT CONTROL

The elements of the LES QA Program described in this section and associated procedures implement the requirements of Criterion 6, Document Control, of 10 CFR 50, Appendix B, and the commitment to Basic Requirement 6 and Supplement 6S-1 of NQA-1-1994.

Procedures are established which control the preparation, issuance and changes of documents that specify quality requirements or prescribe activities affecting quality. Measures are established to ensure that documents, including revisions are adequately reviewed, approved, and released for use by authorized personnel. Controlled documents are transmitted to the appropriate locations where the prescribed activity is being performed. Superseded documents are destroyed or retained only when they have been properly marked.

TYPES OF DOCUMENTS

QA procedures, other administrative procedures and implementing documents and documents specifying quality requirements or prescribing activities affecting quality shall be controlled in accordance with this section. LES documents controlled under the LES QA Program will be specified by procedures and include, but are not limited to, procedures, design requirements document, design basis documents, engineering specifications, instructions, drawings, calculations, procurement documents, and documents that need to be controlled due to being input to other LES design documents or used for construction and operations affecting quality.

PREPARING AND REVIEWING DOCUMENTS

The document control system shall ensure that the identification of documents to be controlled and their specified distribution are proceduralized. The system shall further ensure that the responsibility for preparing, reviewing, approving and issuing documents shall be assigned by procedure to the appropriate LES functional area manager. Implementing documents and documents specifying quality requirements or prescribing activities affecting quality, shall be reviewed in accordance with applicable procedures for adequacy, correctness and completeness and by the QA organization as specified by procedure, prior to approval and issuance. The organizational position(s) responsible for approving the document(s) for release shall be identified in the applicable procedures.

CONTROLLING THE DISTRIBUTION AND USE OF DOCUMENTS

Documents needing to be placed under the document control system are transmitted to the Document Control organization with the distribution list for document holders. The Document Control organization shall enter the document into the Document Control electronic database and master list of controlled documents, assign document control numbers, complete transmittal forms and distribute the documents and transmittal form to the document holders. Document holders shall acknowledge receipt on the transmittal and send the acknowledgement to the Document Control organization. The up-to-date master listing of controlled documents will be made continuously available to document holders to verify that they have the current revisions. The document control process will be audited in accordance with the requirements of Section 18, QA Audits, to verify implementation effectiveness.

CHANGES TO DOCUMENTS

Changes to documents other than minor changes shall be reviewed for adequacy, correctness and completeness, prior to approval and issuance. Major changes shall be reviewed and approved by the same organization that performed the original review and approval unless other organizations are specifically designated. The reviewing organization shall have access to the applicable background data or information upon which to base their approval. A temporary procedure change that does not change the intent of the procedure may be made at the work location by responsible management. The applicable procedure shall control the process, documentation and approval of the temporary changes.

MINOR CHANGES

Minor changes such as inconsequential editorial corrections may be made to documents without being subject to the review and approval of the requirements specified above. The applicable procedure shall define the organizational positions authorized and criteria acceptable for making minor changes.

SECTION 7

CONTROL OF PURCHASED MATERIAL, EQUIPMENT AND SERVICES

The elements of the LES QA Program described in this section and associated procedures implement the requirements of Criterion 7, Control of Purchased Material, Equipment and Services, of 10 CFR 50, Appendix B, and the commitment to Basic Requirement 7 and Supplement 7S-1 of NQA-1-1994 Part I as revised by NQA-1a-1995 Addenda of NQA-1-1994.

LES procurement of material, equipment and services is controlled to assure conformance with specified requirements. These controls include requirements for pre-award evaluations of suppliers' QA programs, annual evaluations, periodic audits/source inspections and surveillance. Suppliers with a LES approved QA program are placed on the LES ASL prior to award of contract. Source inspections and surveillances, evaluation of objective evidence of quality furnished by the supplier, maintaining the ASL, as well as, examination of received items and services are the responsibility of LES QA organization and are performed, as necessary, upon delivery or completion to ensure requirements specified in procurement documents are met. Supplier evaluations, annual evaluations, audits, surveillances, source inspections and receipt inspections shall be documented.

PROCUREMENT PLANNING

LES procurements shall be planned and documented to ensure a systematic approach to the procurement process exists and supports the schedule. Procurement planning shall:

- Identify procurement methods and organizational responsibilities, including what is to be accomplished, who is to accomplish it, how it is to be accomplished, and when it is to be accomplished.
- Identify and document the sequence of actions and milestones needed to effectively complete the procurement.
- Provide for the integration of the following activities:
 - Procurement document preparation, review and change control according to the requirements of Section 4, Procurement Document Control
 - Selection of procurement sources, proposal/bid evaluation and award
 - LES evaluation of supplier performance
 - LES verifications including any hold and witness point notifications
 - Control of nonconformances
 - Corrective action
 - Acceptance of the material, equipment or service
 - Identification of quality assurance records to be provided to LES.
- Be accomplished as early as possible, and no later than at the start of those procurement activities that are required to be controlled to assure interface compatibility and a uniform approach to the procurement process.
- Be performed relative to the level of importance, complexity and quantity of the item or service being procured and the supplier's quality performance.

- Include the involvement of the LES QA organization to ensure that the QA requirements have been properly identified.

SOURCE EVALUATION AND SELECTION

Supplier selection shall be based on an evaluation, performed before the contract and/or purchase order is awarded, of the supplier's capability to provide items or services in accordance with procurement document (technical and quality) requirements. The functional area needing the procurement shall request that the LES QA organization evaluate the potential supplier for placement on the LES ASL. Responsibilities and measures for evaluating and selecting procurement sources are detailed in the applicable QA procedure and include one or more of the following methods for evaluating potential suppliers:

- Evaluation of the supplier's history for providing an identical or similar product that performs satisfactorily in actual use. The supplier's history shall reflect current capability.
- Evaluation of supplier's current quality assurance records supported by any documented qualitative and quantitative information which can be objectively evaluated.
- Evaluation of the supplier's technical and quality capability based on an evaluation of supplier facilities, personnel and quality assurance program implementation.

The results of procurement source evaluation and selection shall be documented in accordance with the applicable QA procedure.

PROPOSAL/BID EVALUATION

For proposals and bids, technically qualified personnel from the QA and Engineering and Contracts or other affected/involved organizations shall perform an evaluation to determine if the proposal/bid meets procurement document requirements. As a minimum, this evaluation shall review the following subjects consistent with the importance, complexity and quantity of items or services being procured:

- Technical considerations
- QA program requirements
- Supplier personnel qualifications
- Supplier production capability and past performance
- Alternatives and exceptions

Before the contract is awarded, the LES QA Director or Engineering and Contracts Manager, or other affected/involved organization manager shall resolve, or obtain commitments to resolve, unacceptable quality conditions identified during the proposal/bid evaluation. Supplier quality assurance programs shall be evaluated by the QA organization before contract placement, and any deficiencies that would affect quality shall be corrected before starting work subject to these requirements. Supplier QA programs shall be accepted by the LES QA Director before the supplier starts work.

SUPPLIER PERFORMANCE EVALUATION

The LES Engineering and Contracts Manager in coordination with the QA Director shall establish measures to routinely interface with the supplier and to verify supplier performance. The measures shall include:

- Establishing an understanding between LES and the supplier of the requirements and specifications identified in procurement documents.
- Requiring the supplier to identify planning techniques and processes to be used in fulfilling procurement document requirements.
- Reviewing supplier documents that are prepared or processed during work performed to fulfill procurement requirements.
- Identifying and processing necessary change information.
- Establishing the method to be used to document information exchanges between LES and supplier.
- Establishing the extent of source surveillance and inspection.

The extent of LES verifications shall be a function of the relative importance, complexity/quantity of items or services being procured and the supplier's quality performance. Verification activities shall be accomplished by qualified personnel assigned to check, inspect, audit, or witness the activities of the suppliers. LES verifications shall be conducted as early as practical and shall not relieve the supplier of the responsibility for the verification of quality achievement.

Verifications shall include supplier audits, surveillances or source inspections (or combinations) used as a method of evaluating the supplier's performance, and evaluation of purchaser's documentation to aid in the determination of the effectiveness of the supplier's quality assurance program. Records, including source surveillances and inspections, audits, receiving inspections, nonconformances, dispositions, waivers, and corrective actions shall be maintained in accordance with the requirements of Section 17, Quality Assurance Records.

CONTROL OF SUPPLIER GENERATED DOCUMENTS

Supplier generated documents shall be controlled, processed and accepted by LES in accordance with the requirements established in the applicable QA procedures. Measures shall be implemented to ensure that the submittal of supplier generated documents is accomplished in accordance with the procurement document requirements. These measures shall also provide for the acquisition, processing and recorded evaluation of technical, inspection and test data compared against the acceptance criteria.

CONTROL OF CHANGES IN ITEMS OR SERVICES

LES shall establish contractual controls with suppliers to ensure that changes in procurement documents are controlled and documented in accordance with this QAPD.

ACCEPTANCE OF ITEMS OR SERVICES

Methods for accepting supplier furnished material, equipment or services shall include one or more of the following, as appropriate to the items or services being procured:

- Evaluating the supplier certificate of conformance,
- Performing one or a combination of source verification, receiving inspection or post-installation test,

- Technical verification of the data produced (services only),
- Surveillance or audit of the activities (services only),
- Review of objective evidence for conformance to procurement requirements (services only).

The supplier shall verify that furnished material, equipment or services comply with LES's procurement requirements before offering the material, equipment or services for acceptance and shall provide to LES objective evidence that material, equipment or services conform to procurement documents. Where required by code, regulations or contract provisions, documentary evidence that items conform to procurement documents shall be available at the site prior to installation or use.

CERTIFICATE OF CONFORMANCE

When a certificate of conformance is used to accept material, equipment or service:

- The certificate shall identify the purchased material, equipment or service to the specific procurement document.
- The certificate shall identify the specific procurement requirements met by the purchased material, equipment or service. The procurement requirements identified shall include any approved changes, waivers or deviations applicable to the material, equipment or service.
- The certificate shall identify any procurement requirements that have not been met together with an explanation and the means for resolving nonconformances.
- The certificate shall be signed and dated or otherwise authenticated by an individual who is responsible for the supplier's quality assurance function and whose responsibilities and position are described in the supplier's quality assurance program.
- The certification process, including the implementing documents to be followed in filling out a certificate and the administrative implementing documents for review and approval of the certificates, shall be described in the supplier's quality assurance program.
- Measures shall be identified to verify the validity of supplier certificates and the effectiveness of the certification process (such as by audit of the supplier or by an independent inspection or test of the item). Verifications shall be conducted by LES at intervals commensurate with the past quality performance of the supplier.

SOURCE VERIFICATION

LES may accept material, equipment or service by monitoring, witnessing or observing activities performed by the supplier. This method of acceptance is called source verification. Source verification shall be implemented consistent with the supplier's planned inspections, examinations or tests at predetermined points and performed at intervals consistent with the importance and complexity of the item. Documented evidence of acceptance of source verified material, equipment or services shall be furnished to the receiving destination of the item, to LES, and to the supplier. Personnel qualified in accordance with the applicable requirements for the material, equipment or service being procured shall perform source verification.

RECEIVING INSPECTION

When receiving inspection is used to accept an item:

- The inspection shall consider any source verifications/audits and the demonstrated quality

performance of the supplier.

- The inspection shall be performed in accordance with established inspection procedures.
- The inspection shall verify, as applicable, proper configuration; identification; dimensional, physical and other characteristics; freedom from shipping damage; and cleanliness.
- The inspection shall be planned and executed according to the requirements of Section 10 Inspection.
- Receiving inspection shall be coordinated with a review for adequacy and completeness of any required supplier documentation submittals.

POST-INSTALLATION TESTING

When post-installation testing is used as a method of acceptance, the LES Engineering and Contracts Manager or the affected/involved LES organization manager and the supplier shall mutually establish test requirements and acceptance documentation.

CONTROL OF SUPPLIER NONCONFORMANCES

The LES Engineering and Contracts organization and the supplier shall establish and document the process for disposition of items that do not meet procurement document requirements. The supplier shall evaluate nonconforming items according to the applicable requirements of Section 15, Nonconforming Items and submit a report of nonconformance to LES Engineering and Contracts organization including supplier recommended disposition (for example, use-as-is or repair) and technical justification. Reports of nonconformances to procurement document requirements, or documents approved by LES, shall be submitted to LES Engineering and Contracts organization for approval of the recommended disposition whenever one of the following conditions exists:

- Technical or material requirements are violated.
- A requirement in supplier documents, which have been approved by LES, is violated.
- The nonconformance cannot be corrected by continuation of the original manufacturing process or by re-work.
- The item does not conform to the original requirement even though the item can be restored to a condition such that the capability of the item to function is unimpaired.

LES Engineering and Contracts organization shall disposition the supplier's recommendation and verify implementation of the disposition. LES will maintain records of the supplier-submitted nonconformances.

COMMERCIAL GRADE ITEMS

Where the design utilizes commercial grade material and/or equipment, the following requirements are an acceptable alternate to other requirements of this Section:

- The commercial grade material/equipment is identified in an approved design output document. An alternate commercial grade material/equipment may be applied, provided there is verification that the alternate commercial grade material/equipment will perform the intended function and will meet design requirements applicable to both the replaced material/equipment and its application.
- Supplier evaluation and selection, where determined necessary by the LES based on

complexity and importance to safety, shall be in accordance with *Source Evaluation and Selection* section of this document.

- Commercial grade items shall be identified in the purchase order by the manufacturer's published product description (e.g., catalog number).
- One or a combination of the following methods shall be utilized to provide reasonable assurance that the item meets the acceptance criteria for the characteristics identified to be verified for acceptance:
 - special test(s) or inspection (s) or both;
 - commercial grade survey of the supplier;
 - source verification;
 - acceptable supplier/item performance records.
- Prior to acceptance of a commercial grade item, LES QA organization shall determine that:
 - damage was not sustained during shipment;
 - the item received has satisfied the specified acceptance criteria;
 - inspection and/or testing is accomplished, as required, to assure conformance with critical characteristics; and
 - documentation, as applicable to the item, was received and is acceptable.

APPROVED SUPPLIER LIST

The LES Quality Assurance Director is responsible for the development and maintenance of the LES ASL. The ASL contains those suppliers with acceptable QA Programs that have been evaluated and accepted by the LES QA in accordance with approved procedures. The LES QA organization shall perform and document an evaluation of each supplier every 12 months. Satisfactory results will allow the supplier to remain on the ASL. Additionally, suppliers will be evaluated by means of an audit at least triennially, if initial approval was by audit or survey. Suppliers that have unacceptable evaluations or that have not had a procurement placed with them in three years will be removed from the ASL.

SECTION 8

IDENTIFICATION AND CONTROL MATERIALS, PARTS AND COMPONENTS

The elements of the LES QA Program described in this section and associated procedures implement the requirements of Criterion 8, Identification and Control of Materials, Parts and Components, of 10 CFR 50, Appendix B, and the commitment to Basic Requirement 8 and Supplement 8S-1 of NQA-1-1994 Part I as revised by NQA-1a-1995 Addenda.

The controls necessary to ensure that only correct and accepted items are used or installed will be required by the appropriate QA procedure. Identification requirements for materials, parts and components are stated in design specifications, drawings, and procurement documents. Specific identification requirements are as follows.

- Identification markings, when used shall be applied using materials and methods which provide a clear and legible identification and do not detrimentally affect the function or service life of the item. Markings shall be transferred to each part of an item when subdivided and shall not be obliterated or hidden by surface treatments or coatings unless other means of identification are substituted.
- When required by specifications or codes and standards, identification of material or equipment with traceability to the corresponding mill test reports, certifications and other required documentation is maintained throughout fabrication, erection, installation, or use.
- Sufficient precautions shall be taken to preclude identifying materials in a manner that degrades the function or quality of the item being identified.

Control of material, parts and components is governed by approved procedures. Specific control requirements include the following.

- Identification of nonconforming or rejected materials, parts or components to ensure that they are not inadvertently used.
- Verification of correct identification of materials (including consumable materials or items with a limited shelf life), parts, and components shall be required to prevent the use of incorrect or defective items.
- Receipt inspection to ensure that materials, parts or components are properly identified and that supporting documentation is available as required by procurement specifications.
- Maintaining and replacement of markings and identification records due to damage during handling, aging or environmental exposure.

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SECTION 9 CONTROL OF SPECIAL PROCESSES

The elements of the LES QA Program described in this section and associated procedures implement the requirements of Criterion 9, Control of Special Processes, of 10 CFR 50, Appendix B, and the commitment to Basic Requirement 9 and Supplement 9S-1 of NQA-1994 Part I.

Processes affecting the quality of items or services shall be controlled by written procedures using drawings, checklists, travelers or other appropriate means. These means shall ensure that the process parameters are controlled and that specified environmental conditions are maintained. Special processes that control or verify quality, such as those used in welding, heat treating, and nondestructive examination, shall be performed by qualified personnel using qualified procedures in accordance with specified requirements.

SPECIAL PROCESSES

Special processes that control or verify quality shall be controlled according to the requirements of this section whether or not they are covered by existing codes and standards, or whether or not the quality requirements specified for an item exceed those of existing codes or standards.

PERSONNEL, IMPLEMENTING DOCUMENTS, AND EQUIPMENT QUALIFICATIONS

Implementing LES documents shall be used to ensure that process parameters are controlled and that the specified environmental conditions are maintained. Each special process shall be performed in accordance with appropriate implementing documents and these implementing documents shall include or reference:

- The responsibility of the organization performing the special process to adhere to the approved procedures and processes,
- Qualification requirements for personnel, implementing documents and equipment,
- Conditions necessary for accomplishment of the special process. These conditions shall include proper equipment, controlled parameters of the process and calibration requirements, and/or
- Requirements of applicable codes and standards, including acceptance criteria for the special process.

QUALIFICATION OF NONDESTRUCTIVE EXAMINATION PERSONNEL

Personnel who have been qualified and certified in accordance with Section 2.0, QA Program, of this QAPD shall perform nondestructive examinations required for the LES work activities.

DOCUMENTATION

Records shall be maintained as appropriate in accordance with Section 17, Quality Assurance Records, for currently qualified personnel, processes and equipment of each special process.

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SECTION 10 INSPECTION

The elements of the LES QA Program described in this section and associated procedures implement the requirements of Criterion 10, Inspection, of 10 CFR 50, Appendix B, and the commitment to Basic Requirement 10 and Supplement 10S-1 of NQA-1-1994 Part I.

Inspections required to verify conformance of an item or activity to specified requirements are planned and executed. Characteristics to be inspected and inspection methods to be employed are specified in procedures. Inspection results are documented. Persons other than those who performed or directly supervised the work being inspected shall perform inspection for acceptance. Inspection requirements and acceptance criteria shall include specified requirements contained in the applicable design documents or other pertinent technical documents approved by the responsible design organization. Inspection activities are documented and controlled by instructions, procedures, drawings, checklists, travelers or other appropriate means.

INSPECTION PLANNING

Inspection planning shall be performed, documented and include:

- Identification of each work operation where inspection is necessary to ensure quality and implementing documents that shall be used to perform the inspections;
- Identification of the characteristics to be inspected and the identification of when, during the work process, inspections are to be performed;
- Identification of inspection or process monitoring methods to be employed;
- The final inspection shall be planned to arrive at a conclusion regarding conformance of the item to specified requirements;
- Identification of the functional qualification level (category or class) of personnel performing inspections;
- Identification of acceptance criteria;
- Methods to record objective evidence of inspection results; and
- Selection and identification of the measuring and test equipment to be used to perform the inspection.

SELECTING INSPECTION PERSONNEL TO PERFORM INSPECTION

The individual who performs an inspection to verify conformance of an item to specified acceptance criteria shall be qualified to perform the assigned inspection tasks in accordance with the requirements of Section 2, QA Program. Data recorders, equipment operators or other inspection team members who are supervised by a qualified inspector shall not be required to be a qualified inspector. Verification of conformance shall be by a qualified person. Inspections shall be performed by personnel other than those who performed or directly supervised the work being inspected. Inspection personnel shall not report directly to the immediate supervisors who are responsible for performing the work being inspected.

INSPECTION HOLD POINTS

When mandatory hold points are used to control work that shall not proceed without the specific

consent of the organization placing the hold point, the specific hold points shall be indicated in implementing documents. Consent to waive specified hold points shall be documented and approved before continuing work beyond the designated hold point.

STATISTICAL SAMPLING

When statistical sampling is used to verify the acceptability of a group of items, the statistical sampling method used shall be based on recognized standard practices and these practices shall be implemented through applicable approved procedures.

IN-PROCESS INSPECTIONS AND MONITORING

Items shall be inspected when necessary to verify quality. If inspection of processed items is impossible or disadvantageous, indirect control by monitoring of processing methods, equipment and personnel shall be provided. Inspection and process monitoring shall be conducted when control is inadequate with only one method. A combination of inspection and process monitoring methods, when used, shall be performed in a systematic manner to ensure that the specified requirements for control of the process and the quality of the item are met throughout the duration of the process. Controls shall be established and documented for the coordination and sequencing of inspections and monitoring at established inspection points during successive stages of the process or construction.

FINAL INSPECTION

Finished items shall be inspected for completeness, markings, calibration, adjustments, protection from damage or other characteristics as required in order to verify the quality and conformance of the item to specified requirements. Documentation not previously examined shall be examined for adequacy and completeness. The final inspection shall be planned to arrive at a conclusion regarding conformance of the item to specified requirements. Final inspections shall include a review of the results and resolution of any nonconformances identified by earlier inspections. Modifications, repairs or replacements of items performed subsequent to final inspection shall require re-inspection or retest, as appropriate, to verify acceptability.

ACCEPTING ITEMS

The acceptance of an item shall be documented and approved by qualified and authorized personnel. The inspection status of an item shall be identified according to Section 14, Inspection, Test and Operating Status.

INSERVICE INSPECTION

Inservice inspection or surveillance of structures, systems, or components shall be planned and implemented by or for the LES Operating organization. Procedures shall control the inspections to verify that the characteristics of the item remain within the specified limits. The inspection procedure shall include the following, as appropriate:

- Evaluations of performance capabilities of essential emergency and safety systems and equipment,
- Verification of calibration and integrity of instruments and instrument systems, and
- Verification of maintenance.

INSPECTION DOCUMENTATION

Inspection documentation shall identify:

- The item inspected, date of inspection, the name of the inspector who documented, evaluated and determined acceptability;
- Name of data recorder, as applicable and type of observation or method of inspection;
- The inspection criteria, sampling plan or reference documents (including revision levels) used to determine acceptance;
- Results or acceptability of characteristics inspected;
- Measuring and test equipment used during the inspection including the identification number and the most recent calibration date; and
- Reference to information on actions taken in connection with nonconformances, as applicable.

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SECTION 11 TEST CONTROL

The elements of the LES QA Program described in this section and associated procedures implement the requirements of Criterion 11, Test Control, of 10 CFR 50, Appendix B, and the commitment to Basic Requirement 11 and Supplement 11S-1 of NQA-1-1994 Part I. The commitment to the provisions in Supplement 11S-2, Supplementary Requirements for Computer Program Testing is addressed in Section 3, Design Control.

Tests required to verify conformance of an item or computer program to specified requirements and to demonstrate satisfactory performance for service are planned and executed.

Characteristics to be tested and test methods to be employed are specified. Test results are documented and their conformance with acceptance criteria is evaluated. Tests required to collect data, such as for siting or design input, shall be planned, executed, documented and evaluated.

TEST REQUIREMENTS

Test requirements and acceptance criteria shall be provided or approved by the organization responsible for the design of the item to be tested unless otherwise designated. Required tests, including, as appropriate, prototype qualification tests, production tests, proof tests prior to installation, construction tests, pre-operational tests, and operational tests are controlled. Test requirements and acceptance criteria are based upon specified requirements contained in applicable design or other pertinent technical documents.

TEST PROCEDURES

Test procedures shall include:

- Test objectives and the identification of any implementing documents to be developed to control and perform tests as appropriate;
- Identification of items to be tested, test requirements and acceptance limits, including required levels of precision and accuracy;
- Identification of test methods to be employed and instructions for performing the test;
- Test prerequisites that address calibrated instrumentation, appropriate and adequate test equipment/instrumentation, trained personnel, condition of test equipment and the item to be tested, suitably controlled environmental conditions and provisions for data acquisition;
- Mandatory hold points and methods to record data and results;
- Provisions for ensuring that prerequisites for the given test have been met;
- Selection and identification of the measuring and test equipment to be used to perform the test to ensure that the equipment is of the proper type, range, accuracy, and tolerance to accomplish the intended function; and
- Identification of the functional qualification level of personnel performing tests.

PERFORMING TESTS

Tests shall be performed in accordance with procedures that address the following requirements as applicable:

- Provisions for determining when a test is required, describing how tests are performed, and ensuring that testing is conducted by trained and appropriately qualified personnel.
- Include or reference test objectives and provisions for ensuring that prerequisites for the given test have been met, adequate calibrated instrumentation is available and used, necessary monitoring is performed and suitable environmental conditions are maintained.
- Test requirements and acceptance criteria provided or approved by the organization responsible for the design of the item to be tested, unless otherwise designated.
- Test requirements and acceptance criteria based upon specified requirements contained in applicable design or other pertinent technical documents.
- Potential sources of uncertainty and error. Test parameters affected by potential sources of uncertainty and error shall be identified and controlled.

MONITORING AND OVERSIGHT OF SUPPLIER TEST

The LES Engineering and Contracts Manager in coordination with the QA Director shall establish measures to routinely interface with the supplier and to verify supplier performance. LES may accept material, equipment or service by monitoring, witnessing or observing activities performed by the supplier. This method of acceptance is called source verification. Source verification shall be implemented consistent with the supplier's planned inspections, examinations or tests at predetermined points and performed at intervals consistent with the importance and complexity of the item. Documented evidence of acceptance of source verified material, equipment or services shall be furnished to the receiving destination of the item, to LES, and to the supplier. Personnel qualified in accordance with the applicable requirements for the material, equipment or service being procured shall perform source verification.

USE OF OTHER TESTING DOCUMENTS

Other testing documents (e.g., American Society for Testing and Materials (ASTM)) specifications, supplier manuals or other related documents containing acceptance criteria may be used instead of preparing special test procedures. If used, the information shall be incorporated by reference in the approved test procedure. Implementing documents shall include adequate supplemental instructions as required to ensure the required quality of the testing work.

TEST RESULTS

Test results shall be documented and their conformance with acceptance criteria shall be evaluated by a qualified individual within the responsible organization to ensure that test requirements have been satisfied.

TEST DOCUMENTATION

Test documentation shall include:

- Item or work product tested, date of test, names of tester and data recorders, type of observation and method of testing;
- Identification of test criteria or reference documents used to determine acceptance;
- Results and acceptability of the test;
- Actions taken in connection with any nonconformances or deviations noted;
- Name of the person evaluating the test results; and
- Identification of the measuring and test equipment (M&TE) used during the test.

SECTION 12

CONTROL OF MEASURING AND TEST EQUIPMENT

The elements of the LES QA Program described in this section and associated procedures implement the requirements of Criterion 12, Control of Measuring and Test Equipment, of 10 CFR 50, Appendix B, and the commitment to Basic Requirement 12 and Supplement 12S-1 of NQA-1-1994 Part I.

This section establishes LES control for tools, gages, instruments and other measuring and test equipment (M&TE) used for activities affecting quality, including design activities where applicable, construction, operation and decommissioning. M&TE is controlled and at specified periods calibrated and adjusted to maintain accuracy within necessary limits. Selection of M&TE shall be controlled to ensure that such items are of proper type, range, accuracy, and tolerance to accomplish the functions of determining conformance to specified requirements.

CALIBRATION

M&TE shall be calibrated, adjusted and maintained at prescribed intervals or, prior to use, against reference calibration standards having traceability to nationally recognized standards. If no nationally recognized standards or physical constants exist, the basis for calibration shall be documented. Calibration standards shall have a greater accuracy than the required accuracy of the M&TE being calibrated. If calibration standards with a greater accuracy than required of the M&TE being calibrated do not exist or are unavailable, calibration standards with accuracy equal to the required calibration accuracy may be used, provided they are shown to be adequate for the requirements. The basis for the calibration acceptance shall be documented and authorized by responsible management as defined in applicable procedures. The level of management authorized to perform this function shall be identified. The method and interval of calibration for each device shall be defined, based on the type of equipment, stability characteristics, required accuracy, intended use and other conditions affecting measurement control. For M&TE used in one-time-only applications, the calibration shall be performed both before and after use. A calibration shall be performed when the accuracy of calibrated M&TE is suspect. Calibrated M&TE shall be labeled, tagged, or otherwise suitably marked or documented to indicate due date or interval of the next calibration and uniquely identified to provide traceability to its calibration data.

DOCUMENTING THE USE OF M&TE

The use of M&TE shall be documented. As appropriate to equipment use and its calibration schedule, the documentation shall identify the processes monitored, data collected or items inspected or tested since the last calibration.

OUT OF CALIBRATION M&TE

M&TE shall be considered to be out-of-calibration and not be used until calibrated if any of the following conditions exist:

- The calibration due date or interval has passed without re-calibration.
- The device produces results known or suspected to be in error.

- Out-of-Calibration M&TE shall be controlled. The controls shall include the following requirements:
 - Out-of-Calibration M&TE shall be tagged, segregated or otherwise controlled to prevent use until they have been recalibrated.

When M&TE is found out-of-calibration, the validity of results obtained using that equipment since its last valid calibration shall be evaluated to verify the acceptability of previously collected data, processes monitored, or items previously inspected or tested. The evaluation shall be documented.

If any M&TE is consistently found out-of-calibration during the re-calibration process, it shall be repaired or replaced.

LOST M&TE

When M&TE is lost, the validity of results obtained using that equipment since its last valid calibration shall be evaluated to determine acceptability of previously collected data, processes monitored or items previously inspected or tested. The evaluation shall be documented.

HANDLING AND STORAGE

M&TE shall be properly handled and stored to maintain accuracy.

COMMERCIAL DEVICES

Calibration and control shall not be required for rulers, tape measures, levels and other normal commercial equipment that provides adequate accuracy.

M&TE DOCUMENTATION

M&TE calibration documentation shall include the following information:

- Identification of the measuring or test equipment calibrated;
- Traceability to the calibration standard used for calibration;
- Calibration data;
- Identification of the individual performing the calibration;
- Identification of the date of calibration and the re-calibration due date or interval, as appropriate;
- Results of the calibration and statement of acceptability;
- Reference to any actions taken in connection with out-of-calibration or nonconforming M&TE including evaluation results, as appropriate; and
- Identification of the implementing document used in performing the calibration.

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SECTION 13 HANDLING, STORAGE, AND SHIPPING

The elements of the LES QA Program described in this section and associated procedures implement the requirements of Criterion 13, Handling, Storage and Shipping, of 10 CFR 50, Appendix B, and the commitment to Basic Requirement 13 and Supplement 13S-1 of NQA-1-1994 Part I.

Handling, storage, cleaning, packaging, shipping and preservation of items are controlled in accordance with requirements of this section to prevent damage or loss and to minimize deterioration.

CONTROLS

Handling, storage, cleaning, packaging, shipping and preservation of items shall be conducted in accordance with established work and inspection implementing procedures, shipping instructions or other specified documents. For critical, sensitive, perishable or high-value articles, specific instructions for handling, storage, cleaning, packaging, shipping and preservation shall be prepared and used.

SPECIAL EQUIPMENT, TOOLS AND ENVIRONMENTS

If required for particular items, special equipment (i.e., containers, shock absorbers and accelerometers) and special protective environments (i.e., inert gas and specific moisture/temperature levels) shall be specified and provided. If special equipment and environments are used, provisions shall be made for their verification. Special handling tools and equipment shall be used and controlled as necessary to ensure safe and adequate handling. Special handling tools and equipment shall be inspected and tested at specified time intervals and in accordance with procedures to verify that the tools and equipment are adequately maintained. Operators of special handling and lifting equipment shall be experienced or trained in the use the equipment.

MARKING AND LABELING

Measures shall be established for marking and labeling for the packaging, shipping, handling and storage of items as necessary to adequately identify, maintain and preserve the item. Markings and labels shall indicate the presence of special environments or the need for special controls if necessary.

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SECTION 14 INSPECTION, TEST, AND OPERATING STATUS

The elements of the LES QA Program described in this section and associated procedures implement the requirements of Criterion 14, Inspection, Test and Operating Status, of 10 CFR 50, Appendix B, and the commitment to Basic Requirement 14 of NQA-1-1994 Part I.

This section establishes requirements for LES to identify the status of inspection and test activities. Status is indicated either on the items or in documents traceable to the items where it is necessary to assure that required inspections and tests are performed and to assure that items which have not passed the required inspections and tests are not inadvertently installed, used or operated. Status is maintained through indicators (i.e., physical location and tags, markings, shop travelers, stamps, inspection records or other suitable means). The authority for application and removal of tags, markings, labels and stamps are specified. Status indicators shall also provide for indicating the operating status of systems and components of the nuclear facility (i.e., tagging valves and switches) to prevent inadvertent operation.

Process control procedures, test and inspection procedures, nonconforming item control procedures, installation records, and checklists are used as applicable to control the installation of structures, system and components. These documents contain hold points, activity checklists, and in many cases, step-by-step signoffs which indicate the status of fabrication, installation, inspections, and test. This system is used to prevent inadvertent use of nonconforming items or bypassing of inspections and tests and prevent inadvertent operation.

During operation, in order to ensure that equipment status is clearly evident, and to prevent inadvertent operation, the LES QA Program requires structures, systems and components that are inoperable to be identified as such. This identification may be by means of tags, labels, stamps or other suitable methods. When tags, labels, or stamps are utilized for the identification of equipment status, the issuance and removal thereof is documented to ensure proper control of such identification measures. Also, procedures require that the operability of an item removed from operation for maintenance or testing be verified prior to returning the item to normal service.

Measures taken by QA personnel, during the performance of required inspection and quality control activities, to identify equipment status are controlled by the QA organization independent of measures taken to identify and control equipment status by LES.

Changing the sequence of inspections, tests, and other activities involving safety requires the same controls as the original review and approval.

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SECTION 15 NONCONFORMING ITEMS

The elements of the LES QA Program described in this section and associated QA procedures implement the requirements of Criterion 15, Nonconforming Items, of 10 CFR 50, Appendix B, and the commitment to Basic Requirement 15 and Supplement 15S-1 of NQA-1-1994 Part 1.

This section provides the process for controlling items that do not conform to specified requirements. For the purposes of this QAPD, items referenced to in this section means materials, parts, or components. The control of nonconforming activities and services is described in Section 16, Corrective Action. These items are controlled to prevent inadvertent installation or use. The controls provide for identification, documentation, evaluation, segregation when practical, disposition of nonconforming items and for notification to affected organizations.

DOCUMENTING AND EVALUATING NONCONFORMING ITEMS

Nonconformance documentation shall clearly identify and describe the characteristics that do not conform to specified criteria. Nonconformance documentation shall be reviewed by the responsible affected organization and recommended dispositions of nonconforming items shall be proposed in accordance with procedures. The review shall include determining the need for additional corrective actions according to the requirements of Section 16, Corrective Action. In addition, organizations affected by the nonconformance shall be notified. Recommended dispositions shall be evaluated and approved in accordance with procedures. Personnel performing evaluations of recommended dispositions shall have demonstrated competence in the specific area they are evaluating, an adequate understanding of the requirements and access to pertinent background information. The responsibility and authority for reviewing, evaluating, approving the disposition and closing nonconformances shall be specified in procedures. The LES QA Organization is responsible for administering the Nonconformance Process. QA can initiate, recommend, or provide solutions via designated channels. QA will verify the implementation of the corrective actions and QA will assure that procedures are in place to control the installation and use of nonconformances until an acceptable solution has been provided. Further processing, delivery, installation or use of a nonconforming item shall be controlled pending the evaluation and approval of the disposition by authorized personnel.

IDENTIFYING NONCONFORMING ITEMS

Employees of LES and LES contractors have a procedural obligation to identify and document nonconformances. Nonconforming items shall be identified by marking, tagging or other methods that do not adversely affect their end use. The identification shall be legible and easily recognizable. If the identification of a nonconforming item is not practical, the container, package or segregated storage area, as appropriate, shall be identified.

SEGREGATING NONCONFORMING ITEMS

Nonconforming items shall be segregated, when practical, by placing them in a clearly identified and designated hold area until properly dispositioned. If segregation is impractical or impossible due to physical conditions, then other precautions shall be employed to preclude inadvertent use.

DISPOSITION OF NONCONFORMING ITEMS

The disposition, such as "use-as-is," "reject," "repair," or "rework," of nonconforming items shall be identified and documented. The technical justification for the acceptability of a nonconforming item that has been dispositioned "repair" or "use-as-is" shall be documented.

Items that do not meet original design requirements that are dispositioned "use-as-is" or "repair" shall be subject to design control measures commensurate with those applied to the original design. If changes to the specifying document are required to reflect the as-built condition, the disposition shall require action to change the specifying document to reflect the accepted nonconformance. Any document or record change required by the disposition of the nonconformance shall be identified in the nonconformance documentation; and, when each document or record is changed, the justification for the change shall identify the nonconformance documentation. The disposition of an item to be reworked, or repaired shall contain a requirement to reexamine (inspect, test, or nondestructive examination) the item to verify acceptability. Repaired or reworked items shall be reexamined in accordance with applicable procedures using the original process and acceptance criteria unless the nonconforming item disposition has established alternate acceptance criteria.

TRENDING

Nonconformance documentation shall be periodically analyzed by the LES QA organization to identify adverse quality trends in accordance with Section 16, Corrective Action.

SECTION 16 CORRECTIVE ACTION

The elements of the LES QA Program described in this section and associated QA procedures implement the requirements of Criterion 16, Corrective Action, of 10 CFR 50, Appendix B, and the commitment to Basic Requirement 16 of NQA-1-1994 Part 1.

Conditions adverse to quality including activities and services shall be identified promptly and corrected as soon as practical. For significant conditions adverse to quality, the cause of the condition shall be determined and corrective action taken to preclude recurrence. The identification, cause, and corrective action for significant conditions adverse to quality shall be documented and reported to appropriate levels of management. Follow-up action shall be taken to verify implementation of the corrective action. Significant conditions adverse to quality shall be tracked and evaluated so that adverse trends can be identified and appropriate corrective action can be taken.

Procedure(s) shall be issued to establish the CAP which includes the following processes, including closure:

- Prompt identification and correction of conditions adverse to quality;
- Evaluating significant conditions adverse to quality for reportability to the NRC (when required) under 10 CFR 21 Reporting of Defects and Nonconformance, or other applicable reporting requirements and reporting such conditions when warranted;
- Stopping work, if applicable;
- Determining root cause and corrective actions to preclude recurrence for significant conditions adverse to quality; and
- Follow-up actions to verify implementation of corrective actions taken for significant conditions adverse to quality.

IDENTIFYING AND CLASSIFYING CONDITIONS ADVERSE TO QUALITY

Conditions adverse to quality shall be classified in one of two categories in regard to their significance, and corrective actions shall be taken accordingly. The two categories of significance include:

- Conditions adverse to quality
- Significant conditions adverse to quality

Conditions adverse to quality are defined as failures, malfunctions, deficiencies, deviations, defective material and equipment and nonconformances. Conditions adverse to quality shall be documented and reported to the appropriate levels of management.

Responsible management shall investigate and fully identify the condition and document the results. Responsible management shall then utilize investigation results to determine and document corrective action (including remedial action and if appropriate, actions to prevent recurrence). Responsible management shall complete remedial action and document completion of actions in a timely manner.

Significant conditions adverse to quality are defined as:

- A deficiency that would seriously impact an item, activity or service from meeting or

- performing its intended function or output of assuring public health and safety;
- A deficiency in design that has been approved for fabrication or construction where the design deviates extensively from design criteria and bases;
 - A deficiency in the fabrication or construction of, or significant damage to, structures, systems or components that require extensive evaluation, re-design or repair in order to establish the adequacy of the structure, system or component to perform its intended function of assuring public health and safety;
 - A deviation from performance specifications that shall require extensive evaluation, re-design, or repair to establish the adequacy of the structure, system or component to perform its intended function;
 - A significant error in a computer program used to support activities affecting quality after it has been released for use;
 - A deficiency, repetitive in nature, related to an activity or item subject to the LES QA Program; and
 - A condition that, if left uncorrected, has the potential to have a serious negative impact on activities or items subject to the LES QA Program controls.

If a supplier or subtier supplier discovers a defect or noncompliance which the supplier evaluates as a substantial safety hazard, then the supplier shall be required to report the item under 10 CFR 21 Reporting of Defects and Nonconformance, and notify the LES in writing. If the supplier or subtier supplier is unable to determine if the defect/non compliance is a substantial safety hazard then the supplier or subtier supplier is required to report the item to LES for determination of reportability.

Significant conditions adverse to quality shall be evaluated for a stop work condition to determine if stopping work is warranted. If a stop work condition is identified, management shall issue stop work in accordance with the applicable procedure. Upon resolution of the related significant condition adverse to quality, management shall take appropriate action to lift and close (in part or total) the stop work order.

FOLLOW-UP ACTION

The procedure(s) establishing the Corrective Action Program shall include a requirement for management to take follow-up action to verify implementation of corrective action taken to address significant conditions adverse to quality. The QA organization shall be responsible for conducting periodic assessments of these follow-up actions.

TRENDING

The procedure(s) establishing the CAP shall assign organizational responsibility for trending significant conditions adverse to quality and the criteria for determining trends. Reports of significant conditions adverse to quality shall be evaluated to identify adverse quality trends and help identify root causes. Trend evaluation shall be performed in a manner and at a frequency that provides for prompt identification of adverse quality trends. Identified adverse trends shall be handled in accordance with the CAP described here and reported to the appropriate management.

SECTION 17 QUALITY ASSURANCE RECORDS

The elements of the LES QA Program described in this section and associated QA procedures implement the requirements of Criterion 17, Quality Assurance Records, of 10 CFR 50, Appendix B, and the commitment to Basic Requirement 17 and Supplement 17S-1 of NQA-1-1994 Part I.

A QA record is any completed record that furnishes documentary evidence of the quality of items and/or activities affecting quality. Records may include specially processed records such as radiographs, photographs, negatives, microforms and magnetic/electronic media. LES completed QA records that furnish documentary evidence of quality shall be specified, prepared and maintained in accordance with applicable regulatory requirements and applicable procedures. QA Records shall be legible, identifiable, retrievable, and shall be protected against damage, deterioration and loss. Requirements and responsibilities for record transmittal, distribution, retention, maintenance and disposition shall be established and documented in procedures. Retention periods for the various types of records generated under the LES QA Program shall be specified as Lifetime or Nonpermanent according to the criteria provided in this Section. The term "records" used throughout this section is to be interpreted as "Quality Assurance Record," unless otherwise specified.

RECORD MANAGEMENT SYSTEM

LES shall establish a record management system and LES Records Center at the earliest practicable time consistent with the schedule for accomplishing work activities and in compliance with the requirements of this QAPD. The QA records management system shall be defined, implemented and enforced in accordance with written procedures, instructions or other documentation. Records shall be distributed, handled, and controlled in accordance with written procedures.

GENERATION, CLASSIFICATION AND RETENTION OF QA RECORDS

Applicable LES design specifications, procurement documents, test procedures, operational procedures or other documents and procedures shall specify the records to be generated, supplied or maintained. Documents that are designated to become records shall be legible, accurate and completed appropriate to the work accomplished. LES records shall be classified for retention purposes as lifetime records or nonpermanent records in accordance with the criteria provided below.

- Lifetime records are those that meet one or more of the following criteria:
 - o Those which would be of significant value in demonstrating capability for safe operation;
 - o Those which would be of significant value in maintaining, reworking, repairing, replacing or modifying an item;
 - o Those which would be of significant value in determining the cause of an accident or malfunction of an item; and/or
 - o Those which provide required baseline data for in-service inspections.

Lifetime records are required to be maintained for the life of the particular item while it is installed in the facility or stored for future use.

Nonpermanent records are those required to show evidence that an activity was performed in accordance with the applicable requirements of the LES QA Program but need not be retained for the life of the item because they do not meet the criteria for lifetime records. The retention period for nonpermanent records shall be documented in the applicable procedure.

Procedures shall identify those documents that will become QA records. The individual using the procedure is responsible for ensuring the QA records required by the procedure are submitted to the LES Records Center. Documents that may become records shall be maintained and processed in a prudent manner to avoid unnecessary delay and/or expense in retrieving the record when the record is needed to support other work.

Individuals creating records shall ensure the records are legible, accurate and complete, and shall protect them from damage, deterioration or loss during the time the records are in their possession.

Documents shall be considered valid records only if authenticated (i.e., stamped, initialed or signed and dated complete by authorized personnel). If the nature of the record precludes stamping or signing, then other means of authentication by authorized personnel is permitted. This may take the form of a statement by the responsible individual or organization. Handwritten signatures are not required if the document is clearly identified as a statement by the reporting individual or organization. QA records may be originals or copies. LES contractors shall submit to the LES Records Center those records being temporarily stored by them in accordance with contractual requirements. The timing of the submittal shall be as records become completed, or as items are released for shipment, or as prescribed by QA procedures and procurement documents. Records shall be controlled and submitted to the records management system in accordance with implementing procedures.

RECEIVING QA RECORDS

Each organization responsible for receiving records shall provide protection from damage or loss during the time that the records are in their possession. A receipt control system shall be established by the organization to include the following:

- A method for designating the required records;
- A method for identifying records received;
- Procedures for receipt and inspection of incoming records; and
- A method for submittal of completed records to the storage facility without unnecessary delay; and
- Capability to provide current and accurate status of records during the receipt process.

Records shall be indexed to ensure retrievability. Records and/or indexing systems shall provide sufficient information to permit identification between the record and the item or activity to which it applies. The indexing system shall include:

- The location of the records within the records management system;
- Identification of the item or related activity to which the records pertain; and
- The retention classification of the record.

STORING, SAFEKEEPING, AND PRESERVING QA RECORDS

Records shall be stored and preserved in the LES Records Center in accordance with a procedure that includes the following:

- Assignment of responsibility for enforcing the requirements of the procedure;
- A description of the storage facility;
- A description of the filing system to be used;
- A method for verifying that the records received are in agreement with the transmittal document;
- A method for verifying that the records are those designated and the records are legible and complete;
- A description of rules governing control of the records, including access, retrieval and removal;
- A method for maintaining control of and accountability for records removed from the storage facility;
- A method for filing supplemental information and disposition of superseded records;
- A method for precluding entry of unauthorized personnel into the storage area to guard against larceny and vandalism; and
- A method for providing for replacement, restoration or substitution of lost or damaged records.

Storage methods shall be approved by the organization responsible for storage to preclude deterioration of records in accordance with the following:

- Provisions shall be made in the storage arrangement to prevent damage from moisture, temperature and pressure.
- Approved filing methods shall require records to be firmly attached in binders, or placed in folders or envelopes, for storage in steel file cabinets or on shelving in containers appropriate for the record medium being stored.
- The storage arrangement shall provide adequate protection of special processed records (e.g., radiographs, photographs, negatives, microform and magnetic media) to prevent damage from humidity, temperature, excessive light, electromagnetic fields or stacking, consistent with the type of record being stored.

LES RECORDS CENTERS

Originating organizations shall store records in temporary storage while active and required for use; subsequently the records shall be transmitted for permanent storage in accordance with the requirements of this Section and associated procedures.

LES organizations shall provide for temporary storage of records during processing, review or use, until turnover to the LES Records Center for disposition, according to implementing procedures and the following requirements:

- Records shall be temporarily stored in a container or facility with a fire rating of one (1) hour. The temporary storage container or facility shall bear an Underwriters' Laboratories label (UL) (or equivalent) certifying one (1) hour fire protection, or be certified by a person

competent in the technical field of fire protection.

- The maximum time limit for keeping records in temporary storage shall be specified by implementing procedures consistent with the nature or scope of work.

LES QA records permanent storage shall either invoke the alternate single storage facility provision of Section 4.4.2 and/or the dual facilities provision of Section 4.4.4 of Supplement 17S-1 of NQA-1-1994. With either provision used, the LES Records Center shall be constructed and maintained in a manner that minimizes the risk of damage or destruction from the following:

- Natural disasters (i.e., winds, floods or fires);
- Environmental conditions (i.e., high and low temperatures and humidity); and
- Infestation of insects, mold or rodents.

If the alternate single storage facility provision is used, then LES records shall be stored in the LES Records Center in two (2) hour fire rated Class B file containers meeting the requirements of National Fire Protection Association (NFPA) 232-1986 or NFPA 232AM-1986 or both.

If the dual storage facility provision is used for hard copies, then LES records shall be stored with one copy in the LES Records Center and the second copy stored in facility that is sufficiently remote from the Records Center to eliminate the chance of exposure to a simultaneous hazard. If the dual storage facilities provision is used via scanned documents into an electronic records management system, then a back-up tape shall be periodically made of the electronic records management system and its contents and the tape shall be stored in a temporary storage device in a fire-proof safe. This process invokes the dual storage provision as one copy resides on the records management system computer and a second copy of the total records system resides in a remote location with temporary storage being used for records entered in the interim.

RETRIEVING AND DISPOSITIONING QA RECORDS

The records management system shall provide for retrieval of records in accordance with planned retrieval times based upon the designated record type. Access to records storage facilities shall be controlled. A list shall be maintained designating personnel who are permitted access to the records at the LES Records Center.

Records maintained by a supplier at its facility or other location shall be accessible to the purchaser or designated alternate. The supplier's records shall not be disposed of until contractual requirements are satisfied.

Records accumulated at various locations prior to transfer shall be made accessible to LES directly or through the procuring organization. The record-keeper shall inventory the submittals, acknowledge receipt and process these records in accordance with this QAPD. Various regulatory agencies have requirements concerning records that are within the scope of this Section. The most stringent requirements should be used in determining the final disposition. The supplier's nonpermanent records shall not be disposed of until the applicable conditions listed below are satisfied.

- Items are released for shipment, a Code Data Report is signed, or a Code Symbol stamp is affixed.
- Regulatory requirements are satisfied.

- Operational status permits.
- Warranty consideration is satisfied.
- Purchaser's requirements are satisfied.

RETENTION OF QA RECORDS

Lifetime records shall be retained and preserved for the operating life of the particular item while it is installed in the plant or stored for future use. Nonpermanent records shall not be disposed of until the following conditions are met:

- Regulatory requirements are satisfied;
- Facility status allows document disposal; and
- LES QAPD requirements are satisfied

CORRECTING INFORMATION IN QA RECORDS

Corrections shall include the identification of the person authorized to make the correction and the date the correction was made. Corrections to records shall be performed in accordance with implementing procedures, which provide for appropriate review or approval of the corrections, by the originating organization.

REPLACING LOST OR DAMAGED QA RECORDS

Replacement, restoration or substitution of lost or damaged records shall be performed in accordance with implementing procedures, which provide for appropriate review or approval by the originating organization and any additional information associated with the replacement.

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SECTION 18 AUDITS

The elements of the LES QA Program described in this section and associated QA procedures implement the requirements of Criterion 18, Audits, of 10 CFR 50, Appendix B, and the commitment to Basic Requirement 18 and Supplement 18S-1 of NQA-1-1994 Part 1.

In accordance with the description of the QA organization during the various phases of design, construction, and operation provided in Section 1, Organization, the LES QA Director or QA Manager shall verify LES compliance with all aspects of the LES QA Program and determine QA Program effectiveness by ensuring that planned and scheduled audits are conducted. Elements that have been selected for audit shall be evaluated against specified requirements. An auditing function reports to the LES QA Director/QA Manager and has the organizational independence and authority to execute an effective audit process to meet all requirements of the QA Program. Objective evidence shall be examined to the depth necessary to determine if these elements are being implemented effectively. LES audits are performed in accordance with written procedures or checklists by appropriately trained and qualified personnel who do not have direct responsibility for performing the activities being audited. Audit results are documented and provided to the appropriate management for review and corrective action as applicable. Follow-up actions are taken where indicated.

AUDIT SCHEDULES

Internal or external audits shall be scheduled in a manner to provide coverage, consistency and coordination with ongoing work, and at a frequency commensurate with the status and importance of the work. Internal or external audits shall be scheduled to begin as early in the life of the work as practical and shall be scheduled to continue at intervals consistent with the schedule for accomplishing the work. As a minimum, internal audits of LES QA Level 1 activities shall be at least once per year or at least once during the life of the activity, whichever is shorter. Regularly scheduled internal audits shall be supplemented by additional audits of specific subjects when necessary to provide an adequate assessment of compliance or effectiveness. Internal audits to determine quality assurance program effectiveness shall be performed on selected work products. The audit schedule shall be developed annually and revised as necessary to ensure that coverage is maintained current. Frequency of audits should be based upon evaluation of all applicable and active elements of the LES QAPD applicable to LES workscope. These evaluations should include an assessment of the effectiveness of the applicable and active elements of the LES QAPD based upon previous audit results and corrective actions, nonconformance reports, identified trends, and significant organizational changes.

AUDIT PLANS

A documented audit plan shall be developed for each audit. This plan shall identify the audit scope, requirements for performing the audit, type of audit personnel needed, work to be audited, organizations to be notified, applicable documents, audit schedule, and implementing documents or checklists to be used.

AUDIT TEAMS

The LES QA Director or QA Manager shall select and assign auditors who are independent of any direct responsibility for performing the work being audited. Audit personnel shall have sufficient authority and organizational freedom to make the audit process meaningful and effective. The audit team shall include one or more auditors comprised of representatives from the LES QA organization and any applicable technical organizations. A lead auditor shall be appointed to supervise the team, organize and direct the audit, prepare and coordinate issuance of the audit report and evaluate responses. Technical specialists may be used to assist in assessing the adequacy of technical processes. Before commencing the audit, the lead auditor shall ensure the personnel assigned to the audit team are prepared and collectively have experience and/or training commensurate with the scope, complexity or special nature of the work to be audited. Lead auditors, auditors and technical specialists shall be trained and qualified according to the requirements of Section 2, Quality Assurance Program.

PERFORMING AUDITS

The LES QA Director or QA Manager shall provide written notification of a planned audit to the affected organizations at a reasonable time before the audit is to be performed. The notification should include all relevant information pertaining to the audit, such as schedule, scope and names of audit lead and team members, if known. In addition, the audit team leader shall ensure the following is performed.

- The audit team shall be adequately prepared before starting the audit.
- Audits shall be performed in accordance with written procedures or checklists.
- Elements that have been selected for the audit shall be evaluated against specified requirements.
- Objective evidence shall be examined to the depth necessary to determine if the selected elements are being implemented effectively.
- Audit results shall be documented by auditing personnel, and reported to/reviewed by management having responsibility for the area audited. Conditions requiring prompt corrective action shall be reported immediately to management of the audited organization.
- Identified audit findings shall be documented and the audited organization shall correct the findings according to the requirements of Section 16, Corrective Action. Minor audit findings can be corrected during the conduct of the audit.

REPORTING AUDIT RESULTS

The audit report shall be prepared and signed by the audit team leader and issued to the management of the audited organization in a timely manner after completion of the audit.

The audit report shall include the following information:

- A description of the audit scope.
- Identification of the auditors.
- Identification of persons contacted during the audit.
- A summary of audit results and the documents reviewed, persons interviewed and the specific results of the reviews and interviews (i.e., a summary of the checklist contents).

- Statement as to the effectiveness of the implementation of the QA Program elements audited.
- A description of each reported adverse audit finding in sufficient detail to enable corrective action to be taken by the audited organization.
- A requested date for response by the audited organization.

RESPONDING TO AUDITS

Management of the audited organization or activity shall:

- Investigate adverse audit findings in a timely manner;
- Determine and schedule corrective action, including measures to prevent recurrence;
- Prior to or by the requested response date, notify the LES QA Director in writing of the actions taken or scheduled, according to the requirements of Section 16 Corrective Action.

EVALUATING AUDIT RESPONSES

The LES QA Director or QA Manager is responsible for evaluating audit responses.

FOLLOW-UP ACTION

Follow-up action shall be taken by the LES QA Director to verify that:

- Corrective actions are completed as scheduled according to the requirements of Section 16 Corrective Action.

RECORDS

- Audit records include audit plans and audit reports.
- Written replies and the record of completion of any required corrective actions.

These documents are QA records and shall be submitted to the LES Records Center for retention according to the requirements of Section 17, Quality Assurance Records.

NON-LES AUDITOR QUALIFICATIONS

Non-LES certified auditors may be used to perform audits and surveillances provided the LES QA Director or QA Manager confirms and documents applicable QAPD requirements have been met and the individual has been certified in accordance with the QA procedure on auditor qualification and certification.

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SECTION 19 PROVISIONS FOR CHANGE

This QAPD is reviewed and revised as necessary to reflect any changes that occur during the design, construction, operation, including maintenance and modifications, and decommissioning phases. In addition, this QAPD is revised when corrective actions, regulatory, organizational, or work scope changes warrant changes to the LES QA Program. The LES QAPD is maintained current through design, construction, operation and decommissioning of the facility. The LES QAPD is kept current as the design, construction, operation, and decommissioning activities progress, and appropriate changes are made based on any of the following:

- Lessons learned from audit and assessment findings,
- Program improvements identified from analysis of trends, and
- Changes due to regulations, commitments, reorganizations, revised project schedule, or program improvements from continuous review of assessment results and process improvement initiatives.

Changes to the LES QA Program shall be incorporated in this QAPD and submitted to the NRC within 30 days of implementation prior to and after NRC issuance of the License. Any changes that reduce commitments in the approved QAPD, including those commitments that address the safety program and integrated safety analysis regulatory requirements, as well as the QA Level requirements in this QAPD, will be submitted to the NRC for review and approval prior to implementation.

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SECTION 20

QUALITY ASSURANCE PROGRAM FOR QA LEVEL 2 ACTIVITIES

This section outlines the owner defined Quality Assurance Program for QA Level 2 activities. For contractors, the QA Level 2 program shall be described in documents that must be approved by LES. The QA Level 2 program shall be applied to owner designated structures, systems, components, and activities. An International Organization for Standardization (ISO) 9000 series QA program is acceptable for QA Level 2 applications provided it complies with LES QAPD requirements and the ISO program is reviewed and approved by the LES QA Director.

Requirements for QA Level 2 are defined below. QA Level 2 requirements shall not be applied to IROFS or items that may affect the functions of the IROFS.

ORGANIZATION

The organization, lines of responsibility and authority are clearly established and documented.

PERSONNEL QUALIFICATIONS

Measures are established to provide for indoctrination and training of personnel to ensure suitable proficiency is achieved and maintained. Where specific qualifications are required by codes and standards, measures shall be taken to document the qualifications.

PROCEDURES

Work activities are performed in accordance with written procedures. Procedures shall contain the appropriate criteria for determining that prescribed activities have been satisfactorily accomplished.

DOCUMENT CONTROL

Procedures are established to ensure that appropriate documents are properly initiated, changed, and controlled to prevent use of incorrect or superseded documents.

DESIGN CONTROL

The design shall be defined, controlled, and verified. Applicable design inputs shall be appropriately specified on a timely basis and correctly translated into design documents. Design interfaces are identified and controlled. Design adequacy is verified by persons independent of those who performed the design. Design changes are governed by control measures commensurate with those applied to the original design. Design of systems, structures or components may be verified by the development and service testing of hardware similar to the equipment to be used in the facility. Installation and use of this type of equipment requires approval of LES management.

CONTROL OF PURCHASED ITEMS AND SERVICES

Measures are established to ensure conformance with the specified requirements. Measures are established to ensure suppliers of materials, equipment, or services are capable of supplying these items to the quality specified in the procurement documents. This may be done

by evaluation and approval of the supplier's products and facilities or audits of the supplier's quality program.

CONTROL OF PROCESSES, MEASURING AND TEST EQUIPMENT

Processes affecting quality of items or services are controlled. Special processes such as welding, heat treating, and nondestructive examination shall be performed by certified personnel using certified procedures in accordance with specified requirements. To maintain accuracy within specified limits, the LES QA Program requires that devices (e.g., tools, gauges, instruments), and measuring and test equipment including process-related instrumentation and controls that are used in activities affecting the quality of items, are properly controlled, calibrated, and adjusted at specified periods in accordance with written procedures.

INSPECTIONS

Inspections required to verify conformance of an item or activity to specified requirements are planned and executed. Characteristics to be inspected and inspection methods to be employed are specified. Inspection results are documented. Inspections for acceptance are performed by persons other than those who performed the work being inspected.

NONCONFORMANCES AND CORRECTIVE ACTION

Measures are established so conditions adverse to required quality are promptly identified and corrected. Controls are established to prevent inadvertent installation or use of items that do not conform to specified requirements.

RECORDS

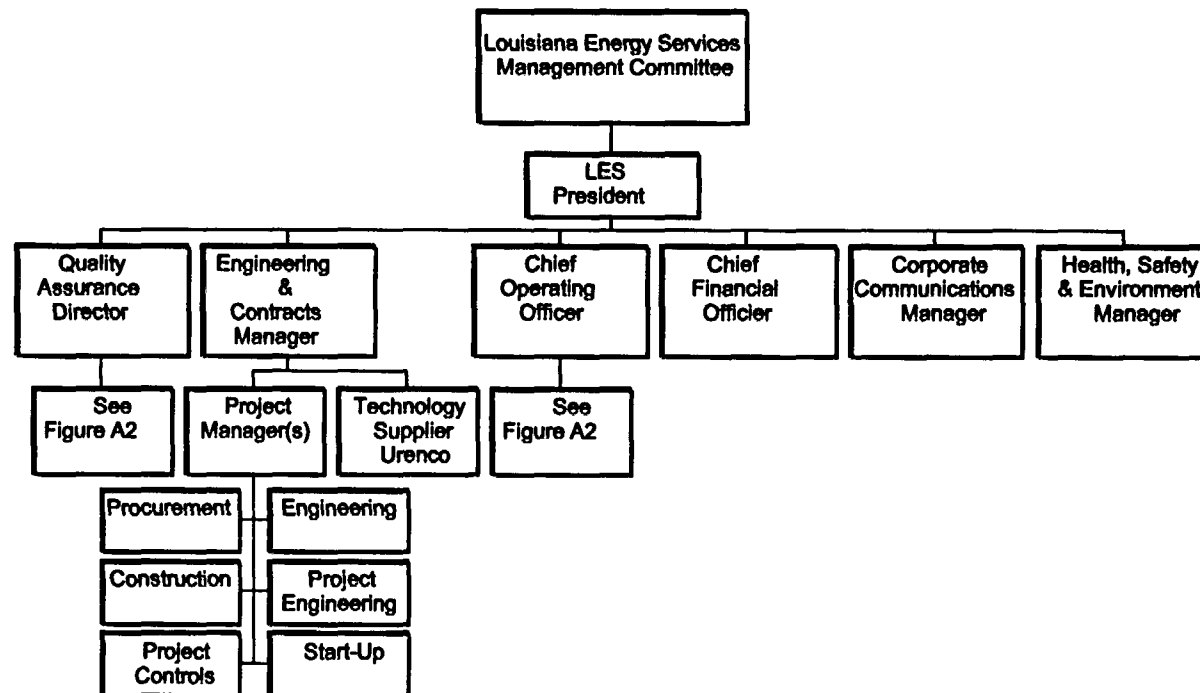
Records that furnish documentary evidence of quality are specified, prepared, and maintained. Records shall be legible, identifiable, and retrievable. Records are protected against damage, deterioration, and loss. Requirements and responsibilities for record transmittal, distribution, retention, maintenance, and disposition are established and documented.

AUDITS AND ASSESSMENTS

Measures are established to verify compliance with the LES QA Program and to determine its effectiveness. The results are documented and reported to and reviewed by responsible management. Follow-up action shall be taken where indicated.

FIGURES

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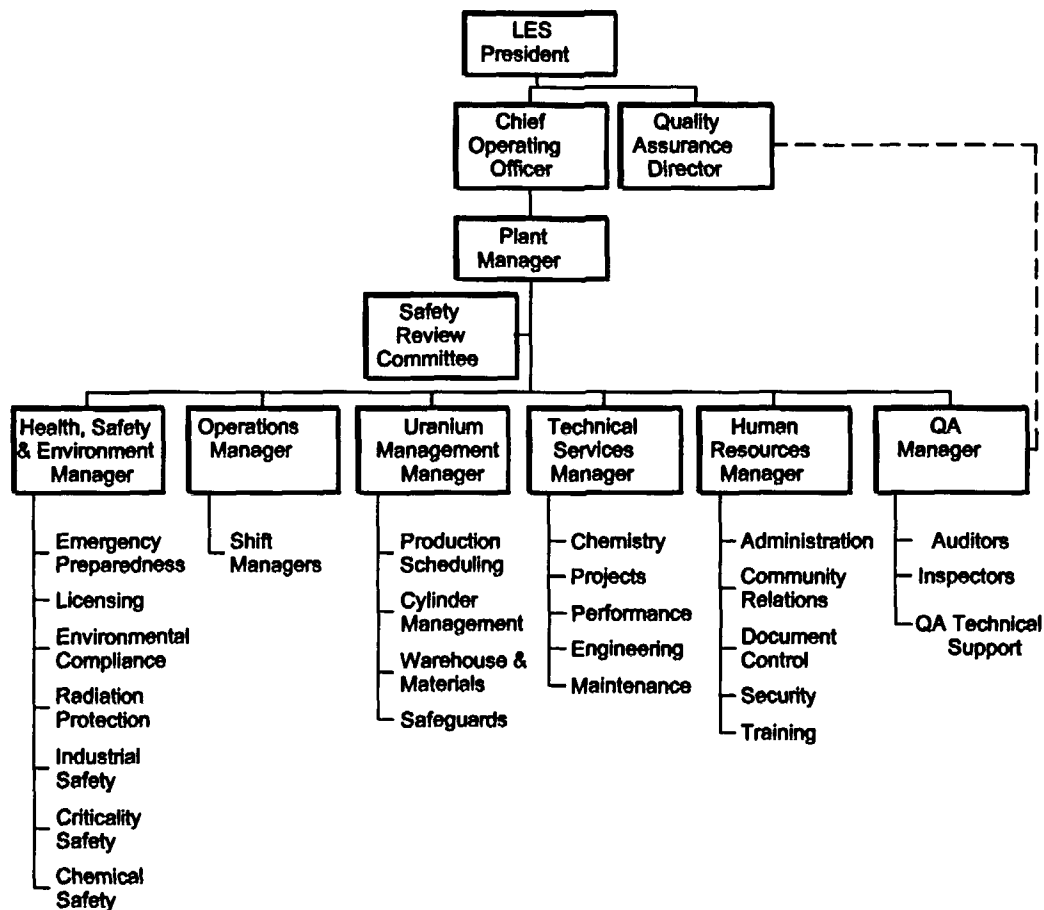
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Figure A1.dwg



FIGURE A1

LES CORPORATE, DESIGN AND CONSTRUCTION
ORGANIZATION

REVISION DATE: DECEMBER 2003



REFERENCE NUMBER
Figure A2.dwg



FIGURE A2

LES NATIONAL ENRICHMENT PLAN
OPERATING ORGANIZATION

REVISION DATE: DECEMBER 2003