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Attn: Document Control Desk
Office of Nuclear Material Safety and Safeguards
U.S. Nuclear Regulatory Commission
Washington, D.C. 20555-0001

Louisiana Energy Services, LLC
NRC Docket No. 70-3103

Subject: Revision to License Amendment Request LAR-10-04 to clarify License Requirements for Administrative Control Items Relied on for Safety (IROFS) and removal of IROFSC6 – Modified Version

Reference:
1. Telecommunications between NRC Staff and URENCO USA, Re: LAR-10-04, on May 20, 2010
2. Revision to License Amendment Request LAR-10-04 to clarify License Requirements for Administrative Control Items Relied on for Safety (IROFS) and removal of IROFSC6, May 16, 2010

Based on the agreement reached during the Ref. 1 telecommunications, URENCO USA herewith provides a modified version of the Ref. 2 submittal. This modified version of the proposed LAR-10-04 Revision (Ref. 2) incorporates additional subject matter together with changes to the current text for purposes of clarification, enhancement and consistency, all of which derived from the NRC Staff's feedback (Ref. 1). The integrated changes to the LAR, which are illustrated in Enclosure 1, are identified by change bars in the right margin of the respective pages. The corresponding License Basis Document (LBD) page changes are provided in Enclosure 2.

URENCO USA appreciates the efforts of the NRC Staff in supporting the review of the proposed LAR revision, as modified herein; and looks forward to your timely approval. Should there be questions related to this latest submittal, please contact the undersigned at 575.394.5215 or Gary Sanford, LES Director of Quality and Regulatory Affairs, at 575.394.5407.

Respectfully,

David E. Sexton
Chief Nuclear Officer and Vice President of Operations

Enclosures: 1) Modified Version of Proposed Revision to LAR-10-04
2) Page Changes to the Licensing Basis Documents

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ENCLOSURE 1
Description of Proposed Changes, License Amendment Request (LAR-10-04)
Background, Proposed Changes, Technical Analysis of Proposed Changes, Safety Significance

1 Introduction

1.1 Purpose

This amendment proposes to modify the Quality Assurance Program Description (QAPD), with associated changes in the Safety Analysis Report (SAR), to define and add Support Equipment within the boundary of Administrative Control Items Relied On For Safety (IROFS). There are two basic categories of equipment discussed. The first is Support Equipment that is QA Level 2AC (QL2-AC), which is typically installed process instrumentation and valves. The second is other equipment that is QA Level 3 (QL3) that is typically readily available commercial equipment used for operator action verification. Attributes of other equipment are controlled through the use of applicable management measures and other IROFS requirements as discussed below.

QA Level 2AC Support Equipment has been added to the IROFS boundary for the purpose of identifying some of the specific equipment available to the worker to take action(s) and impose a level of quality control commensurate with worker's reliance on the equipment to function. Though select equipment has been identified as Administrative Control IROFS Support Equipment in this LAR, its failure to function does not represent a substantial safety hazard and, therefore, 10 CFR 21 is not applicable. Loss of this support equipment does not represent the loss of a specified safety function of the IROFS. The safety function is the worker action portion of the Administrative Control IROFS. Other equipment and significant time to evaluate and take action are available should this Support Equipment fail to function. This amendment specifies the applicable quality requirements for this Support Equipment as Quality Assurance Level 2AC, as documented in the proposed changes to the QAPD. As mentioned above and based on discussions with NRC Staff, this amendment also clarifies the extent to which management measures are applied to the attributes only of other equipment that is outside the Administrative Control IROFS boundary and Quality Level 3.

The addition of Support Equipment to the IROFS boundary and use of management measures for other equipment attributes serve to enhance plant safety and the response to postulated accident sequences in the Integrated Safety Analysis (ISA) that rely on worker action. Inclusion of Support Equipment and/or its attributes within the boundary of the Administrative Controls IROFS also ensures that applicable failure tracking, appropriate restrictions on changes, and applicable change requirements for IROFS will be accomplished. Justification for why this graded approach is acceptable for Support Equipment for Administrative Control IROFS is contained in this request.

In addition, this submittal provides the justification for why 10 CFR Part 21 does not apply to Support Equipment. As discussed later in this request, the equipment itself is incapable of creating a substantial safety hazard. An exception to License Condition 20 is also being requested for some of this support equipment that relies on a Programmable Logic Controller (PLC). Note, however, that none of the indication or operated Support Equipment discussed in

this request includes the Plant Control System (PCS). As discussed later in this request the instrumentation associated with Administrative Control IROFS does not have a failure that could result in unacceptable consequences.

This amendment also proposes to remove IROFSC6 which results in IROFSC22 becoming a sole IROFS. Separately, URENCO USA completed a configuration change to incorporate new Administrative Control IROFSC22 for accident sequence EC3-1. This IROFS is being implemented in accordance with URENCO USA processes and was determined to be within LES' approval authority per 10 CFR 70.72. IROFSC22 does not rely on the Plant Control System (PCS) for monitoring or operator action in the event that enrichment control is not functioning as desired. IROFSC22 uses a mass balance that is not dependent on the PCS indication to verify enrichment control. IROFSC22 specifies periodic monitoring to confirm enrichment level and the operator actions to be taken if enrichment levels are not within the allowable range. The Support Equipment included and the details of IROFSC22 are contained in the markups included as part of this request.

Although IROFSC6 is proposed for removal, the actions described therein will continue to be conducted as part of routine operations and good business practice consistent with the URENCO facilities where no criticality event has occurred in over 30 years of operations.

1.2 Background

A license application to construct and operate a uranium enrichment facility (the National Enrichment Facility or URENCO USA Facility) was submitted on December 12, 2003. As part of the license application, LES submitted an Integrated Safety Analysis (ISA) Summary, as required by 10 C.F.R. 70.61 and 70.62(c)(vi). In the ISA Summary, it designated each Administrative Control IROFS necessary to reduce the likelihood of a credible high-consequence event as an IROFS and further demonstrated that each IROFS would be available and reliable to perform its intended function when needed. The ISA Summary committed to defining the boundary of each IROFS (identifying all supporting systems, subsystems and components that are required to ensure the completion of the safety function) upon completion of the final design of the facility, LES submitted its procedure for establishing such boundaries to the NRC. The ISA Summary and related correspondence also indicated that certain monitoring instruments and digital based controls (i.e., supporting components) were not themselves part of the boundary of the IROFS. For Administrative Control IROFS that use monitoring instruments, LES agrees that the IROFS boundary includes (1) the operator actions (based on procedures and training) required to take the administrative action, and (2) the calibration of the instruments that ensure accurate and reliable indication as presented on the docket in May 2004 in Revision 0 of the IROFS Boundary Definition Document procedure. This approach provides reasonable assurance that an appropriate level of nuclear and chemical safety is maintained.

Recently, the NRC Staff notified LES that the boundary of an Administrative Control IROFS should include equipment necessary to perform the administrative worker action. Specifically, for IROFS38, 42 and C6, the NRC has indicated that a set of the monitoring instruments and supporting equipment that could be used by operations personnel to take actions must be categorized as within the boundary of the IROFS and also meet all IROFS requirements unless prior NRC approval is received.

URENCO USA is proposing to implement the actions summarized in this LAR in order to reach a successful conclusion to the above mentioned interactions.

1.3 Additional Changes

The discussions in this submittal only address the Administrative Control IROFS which are necessary for Initial Plant Operations consistent with Chapter 12 of the SAR and Chapter 4 of the Integrated Safety Analysis Summary. In the future, where additional oversight and/or enhancement is deemed worthwhile to address any similar changes to other Administrative Control IROFS (such as IROFS42), LES will address such changes in the same manner as demonstrated in this submittal. Support Equipment and any other equipment for Administrative Control IROFS for future operational phases will be addressed consistent with this request.

2 Proposed Changes

2.1 Summary of Proposed Change

This proposed change enhances the monitoring and worker response associated with Administrative Control IROFS. This is achieved by adding certain Support Equipment to the Administrative Control IROFS boundary and by applying applicable Management Measures to equipment attributes used by the worker.

A commitment has been added to the SAR to identify Administrative Control IROFS Support Equipment, identify the attributes used by the worker, and identify the Management Measures and other requirements applicable to these attributes and Support Equipment, as documented in the Administrative Control IROFS Boundary Definition Documents (BDDs). The SAR was previously revised to reflect which IROFS are necessary for Initial Plant Operations. Section 3.4 of the SAR is being modified in this submittal to identify the Administrative Control IROFS Support Equipment and attributes required for Initial Plant Operation. Support Equipment for remaining Administrative Control IROFS will be added to Section 3.4 of the SAR prior to Readiness Review for the respective IROFS. Other equipment that may be used by the worker that is not within the Administrative Control IROFS boundary is also identified as applicable.

The QAPD has been updated to require a new Quality Level Designation, Quality Level 2AC. The Quality Level 2AC program is being applied to Administrative Control IROFS Support Equipment. Specific attribute(s) utilized for the worker action are identified in Section 3.4 of the SAR. The associated Management Measures used to verify these attributes are documented in the BDDs. The QAPD requires that changes to Management Measures used to verify Support Equipment attributes or changes to Support Equipment quality requirements require NRC approval prior to implementation if the change results in a reduction in commitment.

This amendment also proposes removal of IROFSC6 resulting in IROFSC22 becoming a sole IROFS. URENCO USA completed a configuration change to incorporate new IROFSC22 for accident sequence EC3-1. IROFSC22 uses a mass balance that is not dependent on the Plant Control System (PCS) indication to verify enrichment control. The IROFS specifies periodic monitoring to confirm enrichment level and operator actions taken if enrichment levels are not within the allowable range.

2.2 Modification to Safety Analysis Report

2.2.1 SAR § 3.4.37

Stated that Administrative Control IROFS Support Equipment is defined separately in § 3.4.42.

2.2.2 SAR § 3.4.42

A new Compliance Item Commitment is made for Administrative Control IROFS Support Equipment. At this time this commitment only addresses Administrative Control IROFS necessary for Initial Plant Operations. It is planned that this commitment will also apply to future (post FCOL) defined Support Equipment.

2.2.3 SAR Table 3.4-1

A new Table 3.4-1, Administrative Control IROFS Support Equipment, is added. This table identifies Administrative Control IROFS, monitoring support equipment, operated support equipment, other equipment, and corresponding attributes. Only equipment that is designated as Support Equipment will require QL-2AC requirements to be imposed upon it. Other equipment identified in the table requires attributes in order to perform their functions; however, these are not designated as QL-2AC. Other equipment is typically QL-3. Equipment with safe-by-design attributes which are within the Administrative Control IROFS boundary (e.g., safe-by-design transfer frame for IROFS14a) are not included in this table and are controlled to safe-by-design criteria and quality requirements contained in the existing license.

2.2.4 SAR § 11.0

A paragraph is added to delineate that management measures are applied to Administrative Control IROFS Support Equipment and attributes contained within the IROFS boundary. In addition, various changes are applied throughout Chapter 11 identifying that QL-2AC is applicable to certain sections.

2.3 Modification to Quality Assurance Program

2.3.1 QAPD Section 2

A new sub-section, "QA Level 2AC Requirements", was added. This sub-section defines that Support Equipment within the Administrative Control IROFS boundary is QL-2AC. In addition, the verification of the attributes within the boundary are controlled by the applicable management measures. These attributes are defined in the Administrative Control IROFS Boundary Definition Documents and summarized in Table 3.4-1 of the SAR.

2.3.2 QAPD Section 19

A new sub-section, "10 CFR 21 Applicability for Support Equipment", was added. This sub-section establishes that Support Equipment do not meet the criteria of 10 CFR Part 21. This equipment is defined in the Administrative Control IROFS Boundary Definition Documents and summarized in Table 3.4-1 of the SAR. However, failure of this equipment does not constitute a significant safety hazard as defined in 10 CFR Part 21.

2.3.3 QAPD Section 22

A new Quality Assurance Program is being added establishing the requirements for the QL-2AC program. This section applies only to QL-2AC components. The requirements of this section are intended to provide reasonable assurance that QL-2AC Support Equipment will fulfill their intended function commensurate with worker reliance on the equipment, e.g., accurate and reliable indication or valve closure.

2.4 Modification to Integrated Safety Analysis Summary

2.4.1 ISAS § 3.4.8.5 J.

1) Deleted reference to IROFSC6 ("...controlling the maximum enrichment of the cascade through the use of IROFSC6 and...)

2) Editorial change - deleted "in turn"

2.4.2 ISAS Table 3.7-1

Deleted reference to IROFSC6 and changed Likelihood category from -8 to -5 for accident identifier EC3-1.

2.4.3 ISAS Table 3.7-2

1) Deleted all reference to IROFSC6

2) Changed the action from "... then the associated cascade shall be isolated such that no additional UF_6 can enter or exit the cascade" to "... then feed flow into all cascades of the associated assay shall be isolated such that no additional enrichment can occur".

2.4.4 ISAS § 3.4.8.C6

Deleted section for IROFSC6 enhancement discussion.

2.4.5 ISAS Table 3.8-1

1) Deleted the row containing IROFSC6.

2) Changed the Class for IROFSC22 from "B" to "A" designating it as a sole IROFS.

2.4.6 ISAS Table 3.8-2

Added a row to include IROFSC22 as a sole IROFS.

3 Technical Analysis of Proposed Changes

3.1 Proposed Change

This proposed change adds two new categories of equipment. The first is Support Equipment to be included within the boundary of the identified Administrative Control IROFS and imposes a new graded quality level, QA Level 2AC on that equipment. Support Equipment that is QA Level 2AC, is typically installed process instrumentation or process valves (e.g., IROFS16a, IROFS38, IROFSC22). The second category includes other equipment where the attribute is within the boundary of the Administrative Control IROFS but the equipment is not The second is other equipment that is QA Level 3, which is typically readily available commercial equipment used for operator action verification (e.g., IROFS14a, IROFS31a, IROFS50-series).

This amendment also proposes removal of IROFSC6 resulting in IROFSC22 becoming a sole IROFS. URENCO USA completed a configuration change to incorporate new IROFSC22 for accident sequence EC3-1. IROFSC22 uses a mass balance that is not dependent on the Plant Control System (PCS) indication to verify enrichment control. The IROFS specifies periodic monitoring to confirm enrichment level and operator actions taken if enrichment levels are not within the allowable range.

3.2 Technical Basis for Change

3.2.1 Support Equipment

Administrative Control IROFS are safety functions provided by human actions as discussed in NUREG-1520,

> *In 10 CFR Part 70, an administrative control is an IROFS if it is the human action necessary to meet safety performance requirements, and it is supported by management measures (training, quality assurance, procedures, etc.) that ensure that the action will be taken if needed.*

Administrative Control IROFS Support Equipment and attributes are used by the worker to perform the human actions that meet the safety performance requirements of the administrative control. This proposed change identifies this equipment in SAR Table 3.4-1 and also in the IROFS boundary in the Boundary Definition Document. Other equipment attributes that may be used by the worker are also shown in SAR Table 3.4-1.

SAR Table 3.4-1 categorizes the support equipment as follows:

Monitoring Support Equipment
Installed plant instrumentation that provides accurate and reliable indication to the worker performing the safety function. This equipment was identified as used by the worker and included in the boundary of the Administrative Control IROFS. This equipment is QL-2AC. (e.g., *weighing system, including local digital readout for IROFS38*)

Other (Monitoring) Equipment
Readily available commercial grade equipment that may be used to support worker action that is not included in the boundary of the Administrative Control IROFS. This is typically QL-3 equipment. (e.g., *hand held instrument for determining gross ^{235}U content for IROFS14a*)

Operated Support Equipment
Installed plant equipment used by the worker to perform an action related to the safety function. This equipment is QL-2AC and is included in the boundary of the Administrative Control IROFS. (e.g., *valve for securing flow to cylinder for IROFS38*)

Other (Operated) Equipment
Readily available commercial grade equipment used to support a worker action that is not included in the boundary of the Administrative Control IROFS. This is typically QL-3 equipment. (e.g., *landscape equipment for IROFS36g*)

The attributes of the Support Equipment used to monitor or implement operator actions are verified using appropriate management measures to assure reliable use as needed. These attributes are within the Administrative Control IROFS Boundary. Any removal of management measures designed to provide assurance of the attributes used by the worker or reduction in quality for Support Equipment would be considered a reduction in commitment and require regulatory approval prior to implementation. The attributes of other equipment may also be within the Administrative Control IROFS Boundary, though not the equipment itself, to ensure application of appropriate management measures, such as portable equipment calibration. Any removal of management measures designed to provide assurance of these attributes would also be considered a reduction in commitment and require regulatory approval prior to implementation.

3.2.2 Quality Level

Administrative Control IROFS Support Equipment are not "items which are determined to be essential to the function of the IROFS" as there are a number of methods available to the worker to be apprised of plant conditions and to implement actions. Many of the actions are to prevent an event and upon failure of indication availability, actions would be implemented to stop continued operation or not start the operation. Therefore, graded quality and management measures have been applied to these components commensurate with their level of reliance by the worker to perform the safety function.

To enhance worker action and prevent unnecessary challenges to these administrative controls, Support Equipment has been specifically selected and included in the Administrative Control IROFS boundary. Administrative Control IROFS Support Equipment contains attributes used by the worker to perform the actions directed by the administrative control. Monitoring Support Equipment and Operated Support Equipment, as identified in SAR Table 3.4-1, meet Quality Level 2AC requirements. Other equipment identified in the SAR Table typically meets Quality Level 3 requirements.

Quality Levels QL-2AC and QL-3 are defined in the Quality Assurance Program Description (QAPD).

General QA Level 2AC requirements are described in Section 22, Quality Assurance Program for QA Level 2AC. The attributes of Support Equipment are controlled through the applicable

management measures. Current application of management measures to these attributes is defined in the Administrative Control IROFS Boundary Definition Documents. Support Equipment for Administrative Control IROFS are used for preventive measures and, as directed by the Operation Requirements Manual (ORM). If unavailable (such as indication), the associated operation is terminated or not allowed to start. The attributes of other equipment that are identified within the Administrative Control IROFS boundary are controlled through the applicable management measures. Management measures are implemented as described in section 3.2.3 of this submittal.

3.2.3 Management Measures

Management measures are applied to the attributes of Administrative Control IROFS Support Equipment and other equipment attributes. These attributes are listed in SAR Table 3.4-1. Management measures are also applied to Administrative Control IROFS Support Equipment as defined in the Quality Assurance Program Description for QL-2AC equipment.

3.2.4 Materials License Condition 20

Administrative Control IROFS Support Equipment, with the exception of IROFS38 and IROFSC22, meet the requirements of License Condition 20. The Support Equipment is either mechanical, such as the mechanical process system valves which are locally, manually, operated, or a pressure indication for IROFS16a, which only utilizes an analog to digital converter.

For IROFS38 and IROFSC22, an exception from the requirements of License Condition 20 is requested. Weight measurements for station weighing systems and for the cold trap weighing systems utilize four load cells for each scale. The load cells are connected in parallel and are summed at an electrical junction. The summed signal is then amplified and conditioned to display a weight on the digital display. The amplifier also sends the signal to the LCC and PCS. There is no input to the amplifier from the PCS. The exception to License Condition 20 is acceptable as there are no significant safety hazards, as described in Section 4 below.

"Other" (monitoring) equipment listed in SAR Table 3.4-1 includes instrumentation used to monitor gross ^{235}U content in waste storage, hydrogen content in oil, and electronic output from pressure transducers. In all cases, the worker uses this readily available commercial grade equipment that is routinely calibrated to verify a condition prior to performing an action. Other equipment is not within the Administrative Control IROFS boundary and is not installed plant equipment; therefore, it is not subject to the requirements of License Condition 20.

3.2.5 IROFSC6

Currently, IROFSC6 and IROFSC22 are two enhanced administrative controls used as preventive measures for accident sequence EC3-1 (enrichment control criticality). These IROFS verify normal enrichment control is functioning properly and, if not, then the operator takes actions. The removal of IROFSC6 results in IROFSC22 becoming a sole IROFS.

IROFSC22 prevents criticality by ensuring the surveillance is performed sufficiently often to prevent production of a critical mass of material.. IROFSC22 does not rely on the PCS for monitoring or operator action in the event that enrichment control is not functioning as desired. Mass balance is used for detecting changes from planned enrichment. The mass balance is calculated using an approved classified Operations procedure (OP-3-0450-01). The feed

cylinder weight, product cylinder weight, feed purification cold trap weight, and product vent cold trap weight will be determined for the specific enrichment campaign. This data will be used to establish weight trends that will verify acceptable enrichment percentage. The IROFS specifies periodic monitoring to confirm enrichment level and operator actions taken if enrichment levels are not within the allowable range.

The enhanced IROFSC22 administrative control (-3), is based on independent verification of the cascade process mass balance. This enhancement will meet the requirements for independent verification specified in Section 3.8.1 of the Integrated Safety Analysis Summary.

3.3 Conclusions

The inclusion of Support Equipment within the Administrative Control IROFS boundary is to enhance the monitoring and worker response associated with administrative controls. Unlike, passive or active engineered IROFS, human action is essential to meet the safety performance requirements of an administrative control. The Support Equipment is included within the boundary of the IROFS to properly identify all management measures and other requirements to ensure equipment and/or it's provided attributes are maintained and to enhance the quality applied to this equipment. This proposed change enhances the monitoring and oversight of Administrative Control IROFS.

The removal of IROFSC6 as an administrative control will eliminate concerns regarding reliance on the PCS for enrichment control relative to the requirements of License Condition 20. Although IROFSC6 is proposed for removal, the actions described therein will be conducted as part of routine operations as this is the operating practice used in European facilities to verify enrichment control for over 30 years with no criticality event. IROFSC22 will be used to prevent criticality by ensuring the surveillance is performed sufficiently often to prevent production of a critical mass of material.

4 Safety Significance Determination

4.1 Administrative Control IROFS Impacted

4.1.1 Administrative Control IROFS with Support Equipment in the IROFS Boundary

There are three Administrative Control (AC) IROFS required for initial plant operations where worker actions rely on Support Equipment that is within in the IROFS boundary. The Support Equipment included in the IROFS boundary meets QA Level 2AC requirements. Failure of Support Equipment does not constitute a substantial safety hazard as described below, and as such is not subject to Title 10, Code of Federal Regulations, Part 21, Reporting of Defects and Noncompliance.

Some of this Support Equipment includes digital components and therefore require exception to Material License Condition 20 requirements.

4.1.1.1 IROFS16a

IROFS16a: Administratively limit moderator mass (oil and water) in cylinders containing enriched uranic material to ensure subcriticality by allowing no visible oil and by limiting cylinder vapor pressure. This is implemented by allowing no visible oil and by limiting cylinder vapor pressure prior to introducing product, which is based on moderator limitations in the Nuclear Criticality Safety Analyses for product and receiver cylinders. If the acceptance criteria are not met, then product shall not be introduced into the associated cylinder.

Safety Function

The safety function of IROFS16a is to prevent criticality by administratively limiting moderator in a 30B product cylinder prior to filling. The administrative attributes of IROFS16a necessary to perform this safety function are the procedurally-required human actions to verify moderator presence and prevent the use of a cylinder containing moderator. IROFS16a provides the following safety control:

- Controlled Parameter: moderator
- Safety Limit: 0.98 kg of hydrogen (or 8.8 kg of water or equivalent) in a 30B cylinder (ISA Summary, Section 3.4.4.8.1)

Time to Accident Sequence

Accident sequences associated with IROFS16a are not time-dependent, i.e., this monitoring activity must be successfully completed prior to placing a product cylinder into service.

There are two separate verifications required by IROFS16a; visual verification using an endoscope and verification based on cylinder vapor pressure.

Other Equipment (visual verification)

The visual verification is performed using an endoscope passed through an opening in the cylinder to check for oil, water, or other contaminants. The endoscope is a standard QA Level 3

commercial component. Should the endoscope fail, the failure is self-revealing and the operator would immediately be aware of the failure. The operator would take corrective actions to repair or replace the endoscope to allow completion of the visual inspection. If the visual verification cannot be obtained, the ORM prohibits the cylinder from being placed in service until the inspection can be satisfactorily completed. There is no criticality risk, since no product material is present in the cylinder. Safe process conditions are maintained by the operator actions (i.e., prevention of placing the cylinder into service). The endoscope is necessary for implementation of IROFS16a, but does not afford any preventive feature to limit moderator in the cylinder. For the purpose of the ISA and ISA Summary, an IROFS is only considered to fail when it fails to perform its intended safety function. Since the intended safety function is performed by the operator, the failure of the endoscope is therefore not a failure of IROFS. With no safety or risk significance, the classification of the endoscope as QL-3 is appropriate.

Monitored Support Equipment (vapor pressure verification)

The vapor pressure verification is performed by connecting the cylinder to the process piping in the station. The cylinder is evacuated, isolated from the evacuation source, and cylinder vacuum is monitored for 5 minutes to detect a rise due to vapor pressure. The sequence is then repeated. If pressure increases to a pre-determined set point, water is assumed to be in the cylinder.

With the safety limit of 0.98 kg of hydrogen (or 8.8 kg of water or equivalent) for moderator control in the 30B product cylinder, this quantity is sufficiently large to be readily and reliably detectable by visual verification without reliance on the vapor pressure verification, as tests performed in the UK have shown that 50 g of hydrocarbon can readily be seen in a 30B cylinder (ETC4091153-1, June 2009). The visual verification alone is sufficient to maintain safe process conditions through procedurally-required operator actions. Addition of the vapor pressure verification provides a defense-in-depth feature that enhances safety by reducing challenges to IROFS16a. Specifically:

- The vapor pressure verification is redundant to the visual verification, as safe process conditions are maintained through procedurally-required operator actions without reliance on the success of the vapor pressure verification.
- Failure of the pressure indicator would not inhibit the operator from performing the required actions to maintain safe process conditions.
- The pressure indicator is currently used to implementation of IROFS16a, but does not afford any preventive feature to limit moderator in the cylinder.
- The risk of criticality at the license limit of 5% enrichment is very low as discussed in the revised NRC Safety Evaluation Report Section 5.3.6.3 (dated March 3, 2006). The low risk of the facility allows the quality assurance requirements to be graded.
- Calibration of the pressure instrument is in accordance with the LES Calibration Program.

For initial plant operations, the existing local pressure indication will be replaced with a Measuring and Test Equipment (M&TE) indicator for implementation of the IROFS. LES will install a permanent pressure indicator that does not interface with the PCS and meets the requirements of QL-2AC for future implementation of the IROFS.

Monitored Support Equipment Attribute (vapor pressure verification)

The pressure indicator provides an accurate and reliable indication of cylinder pressure.

Monitored Support Equipment Applicable Quality Level, Codes, Standards, 10 CFR 21 (vapor pressure verification)

The M&TE indicator provides pressure indication without reliance on any PCS function. It is a QL-3 component that is periodically calibrated per the requirements of the Maintenance Management Measure. When the permanent pressure indicator is installed, QA Level 2AC requirements will be applied to provide additional assurance that the required attribute (accurate and reliable indication) is maintained.

If either the M&TE or permanent indicator fails, it would be repaired or replaced before the cylinder could be placed in service. 10 CFR 21 is not applicable to the M&TE instrument as it is a standard commercial instrument. 10 CFR 21 would not be applicable to the permanent pressure indicator as its failure does not represent a substantial safety hazard, i.e., the failure mode is highly unlikely, not previously observed, and for normal device failures the operator would not use the product cylinder as directed by the Operating Requirements Manual (ORM) if acceptable indication is not obtained. Industry experience over a significant period has shown this control to be highly reliable as there has never been a criticality event in any European facility of similar design to LES.

License Condition 20 (vapor pressure verification)

License Condition 20 does not apply to the pressure instrument. The pressure instrument determines pressure by measuring the change in capacitance between a moving diaphragm and a dual electrode. The capacitance is then converted to a linear current output via a simple electronic circuit that cannot be manipulated by operators. The signal from the pressure instrument goes to a digital readout display and does not rely on the PCS or any PLC.

4.1.1.2 IROFS38

IROFS38: Administratively limit the cylinder fill mass to ensure cylinder integrity. This is implemented at Tails Low Temperature Take-off Stations, Feed Purification Low Temperature Take-off Stations, Product Low Temperature Take-off Stations, and Product Blending Receiver Stations by verifying that cylinder weight is within specified trending limits once per shift during filling of the cylinder. Weight limit conservative with respect to assuring cylinder integrity. If the acceptance criterion is not met, then fill of the associated cylinder shall be terminated.

Safety Function

The safety function of IROFS38 is to prevent cylinder rupture due to overfilling by administratively trending cylinder mass and comparing the trend to expected values. The administrative attributes of IROFS38 necessary to perform this safety function are the procedurally-required human actions to verify cylinder weight within specified trending and prevent overfilling. IROFS38 provides the following safety control:

- Controlled Parameter: mass
- 30B Safety Limit (solid): 3,268 kg (Ref. CALC-S-00112)
- 48Y Safety Limit (solid): 19,518 kg (Ref. CALC-S-00112)

Time to Accident Sequence

The time required to fill a cylinder from the normal full condition to the potential failure level is at least 36 hours for a 30B cylinder and 46 hours for a 48Y cylinder based on worst case

conditions. Normal operations would require 107 hours for a 30B and 189 hours for a 48Y (Ref. CALC-S-00112). It should be noted that the time above is not the time to cylinder failure, but only the time required to fill the cylinder to the calculated level that could result in a failure. For a cylinder failure to occur, in addition to overfilling, it would then need to be heated to at least 49°C (120°F), which is not an expected temperature condition inside the SBM or on the cylinder storage pad. It is not possible for a cylinder to rupture with the cylinder valve open. As the cylinder fills, the fill rate reduces and the fill material is distributed to the other cylinders on line. The cylinder must be isolated and then heated before cylinder failure is possible.

Monitored Support Equipment

The station weighing system is considered Monitored Support Equipment for IROFS38 and is included in the IROFS boundary. The station weighing system does not rely on the Plant Control System for local weight indication at each individual cylinder station.

Monitored Support Equipment Attribute

The specific attribute of the station weighing system relied on by the IROFS is an accurate and reliable indication of cylinder mass.

Monitored Support Equipment Applicable Quality Level, Codes, Standards, 10 CFR 21

To ensure accurate and reliable indication, the station weighing system is periodically calibrated in accordance with the process used for the Material Control and Accountability (MC&A) Program. For quality, ISO 9000 requirements are imposed and the station weighing system meets QL-2AC quality requirements. Industry experience over a significant period has shown this equipment to be highly reliable.

QA Level 2AC requirements are applied to the station weighing systems to provide additional assurance that the required attribute is maintained. Implementation of the IROFS itself would detect the failure of the weighing system. It is not expected that a weighing system would fail in such a way that the indication would track the expected fill rate while the actual fill rate is higher (or lower). Many thousands of cylinders have been filled in European facilities using the same or similar equipment as that being used at LES. There has never been a cylinder failure due to overfilling. 10 CFR 21 is not applicable to the station weighing systems as failure does not represent a likely occurrence or a substantial safety hazard. As noted above, a very long period of time across multiple operator shifts is available to detect indicator failure. In addition, every cylinder that is removed from a station is then weighed on a separate scale to determine the final Material Control and Accountability (MC&A) weight.

License Condition 20

An exception to License Condition 20 is requested for the station weighing systems. Each station weighing system consists of four load cells which determine the weight of the cylinder using strain gauges. When weight is placed on the frame, the strain gauge converts the deformation (strain) to an electrical signal. Each load cell sends an electrical signal to a Junction Box where the signals are electrically combined in a summing junction to provide a single output signal. This junction box is a very simple device consisting of five terminal blocks, one for each load cell, and one for the output signal. Incoming and outgoing signals from the Junction Box cannot be manipulated. The summed signal is then sent to the SD2100 Weighing Amplifier.

The SD2100 receives the summed signal from the Junction Box, amplifies it, and coverts it to a digital signal so that it can be displayed in an appropriate weight format. The amplified signal from the SD2100 is then sent to the SD2200 CAN-bus Display mounted on the outside of the station. In addition, the amplified signal from the SD2100 is sent to the RS485 bus, which relays the signal to the PCS. The SD2100 has the capability of executing user defined code, but these features are not used in this application.

The Exception to License Condition 20 is acceptable because this equipment has no impact on the IROFS safety function; therefore, this equipment cannot introduce a significant safety hazard. If an abnormal condition were to occur, the worker would detect the anomaly and take action by closing one of several isolation valves. The valves are Support Equipment for this IROFS and are included in the boundary and meet QL-2AC requirements.

Operated Support Equipment

If trending indicates an abnormal cylinder fill rate, as directed by the ORM, the operator takes action to terminate the cylinder fill regardless of whether this is due to an actual condition or a failed or failing indicator. This is accomplished by closing one of several available isolation valves. These valves include (in order of preference) the xA5, xA1, and the cylinder valve (for feed purification system the valves are xA25, xA2, and the cylinder valve). The valves are Support Equipment for the AC IROFS and are included in the IROFS boundaries.

Operated Support Equipment Attribute

The specific attribute of the identified valves is to close on demand.

Operated Support Equipment Applicable Quality Level, Codes, Standards, 10 CFR 21

The valves meet ASME B31.3 or ASME N14.1 standards as applicable and are periodically exercised as part of normal system operations in accordance with plant procedures by trained operators. In addition the valves meet QL-2AC quality requirements, which provide additional assurance that the required attribute is maintained. If a valve fails, another valve (or valves) in the system would be used as an alternate. Overfilling of the cylinder in and of itself does not result in a cylinder failure. The cylinder must then be heated to at least 49°C (120°F) for failure to occur. In addition to the mechanical isolation, additional actions exist (not included in the IROFS boundary) to stop the cylinder filling process, such as turning off the feed heaters or product/tails chillers. Many thousands of cylinders have been filled in European facilities using the same or similar equipment as that being used at LES. 10 CFR 21 is not applicable to the valves as no substantial safety hazard exists, i.e., both an extended period of time and multiple isolation valves and other mechanisms (such as breaker opening) are available to cease cylinder fill operations.

4.1.1.3 IROFSC22

IROFSC22: Administratively perform the cascade process mass balance on a periodic basis to ensure subcriticality. This is implemented by ensuring the mass balance is performed accurately, and the change in mass is consistent with expected changes based on the enrichment settings and consistent with the Nuclear Criticality Safety Analyses to ensure subcriticality within the designed process and analyzed activities.

Safety Function

IROFSC22 prevents criticality by ensuring the surveillance is performed sufficiently often to prevent production of a critical mass of material. The surveillance measures the feed and product mass flow rates and compares them to a curve representing all possible combinations of feed and product mass flow rates corresponding to an enrichment of 6 wt%. If the measured product flow rate is greater than the value on the 6 wt% curve at the measured feed flow rate, then the criterion is met and enrichment is less than 6 wt%. An analysis ensures the surveillance is performed sufficiently often by determining the mass the cascades are capable of producing between surveillances remains subcritical at the most limiting enrichment. IROFSC22 provides the following safety control:

- Controlled Parameter: Enrichment
- Safety Limit: Calculated enrichment and duration to prevent exceeding a safe mass accumulation

IROFSC22 Safety Basis

The accident sequence associated with IROFSC22 requires multiple conditions in addition to a loss of enrichment control to exist before a potential for criticality is possible. Theses conditions include:

- Moderator intrusion into the process system due to air in-leakage without causing plant shutdown in a process environment requiring high vacuum

- Accumulation of a sufficient mass for criticality through the reaction of uranium hexafluoride (UF_6) with moisture resulting from air in-leakage in a process designed to be dry, gaseous and unmoderated

- Formation of a deposit, if any, in the right geometric configuration to cause a criticality rather than the most likely scenario of being spread out over a large area

As stated in the revised NRC Safety Evaluation Report Section 5.3.6.3 (dated March 3, 2006), "Even where UF_6 is accumulated in large 30B cylinders or cold traps, criticality cannot occur without the intrusion of large quantities of moderator, which is prevented by the passive confinement barriers, the fluorinating environment, and the self-protecting nature of uranyl oxyfluoride (UO_2F_2) deposits. The centrifuge and associated equipment, as well as UF_6 cylinders constructed in accordance with ANSI N14.1, "American National Standard for Nuclear Materials - Uranium Hexafluoride - Packaging for Transport" (ANS, 1995), provide the passive barrier. The vigorous reaction of UF_6 with water to form hydrogen fluoride (HF) (in a gaseous state) and UO_2F_2 inherently limits the accumulation of moderator needed to sustain criticality. In addition, these reaction products have been experimentally observed to form a self-sealing layer of UO_2F_2 that tends to limit moderator intrusion to the surface of a deposit. All these factors ensure that the risk of criticality involving large quantities of solid UF_6 is very low." Implementation of IROFS16a also limits moderator intrusion into a 30B cylinder, which further reduces the risk of criticality. In addition to the items listed above, introduction of light gases, reduction of vacuum, and other conditions that would be a result of any introduction of a moderator or impact of mass build up has a significant impact on the operation of the centrifuges. This would result in a loss of efficiency and a shutdown or crash of the cascade.

Defense-in-depth features are provided for IROFSC22 to enhance safety by reducing challenges to this IROFS, but are not credited for meeting the performance requirements of 10 CFR 70.61. These features include:

- Product control valve mechanical stop to maintain a minimum product flow for each cascade
- Product control valve software stop to prevent over-enrichment
- Multiple alarms available to detect upset conditions associated with the cascade header pressure, feed pressure, product pressure, and enrichment
- On-line mass spectrometer, cascade sampling rig and assay sampling rig available for isotopic analysis to verify enrichment

In addition to the failure of IROFS C22 for which this IROFS provides monitoring, additional failures to achieve criticality include failure of the Plant Control System to detect improper flow, pressure, and mass balance, failure of the online mass spectrometer, breach of the system boundary such that moderator is introduced (which is not present near the UF_6 systems), loss of system vacuum to allow moderator introduction and allow continued operation despite insufficient vacuum system shutdown controls, failure of operators to detect multiple product vent system operations (which was previously determined to be a not credible criticality event), and sufficient moderator mass buildup over time without operator recognition or intervention of all these failures to cause a criticality occurrence. With the limitations of the cascades to operate with any in-leakage, the limitations required to support criticality, the margin built into the analysis for a potential criticality condition, the established defense in depth, and the unlikely possibility of operations not recognizing and correcting these conditions, makes the probability of a potential criticality extremely low.

IROFSC22 is used to verify proper enrichment, as its safety function is to prevent criticality due to loss of enrichment control. Although implementation of IROFSC22 is based on the mass balance calculation, it is not a mass control for the following reasons:

- The surveillance frequency is based on enrichment to ensure subcriticality.
- The acceptance criteria are established based on one cascade operating in excess of 6% enrichment, and the remaining cascades operating normally.
- The feed and product flow rates from the mass balance calculation are used to determine if the corresponding enrichment level exceeds the safety limit.

IROFSC22 prevents criticality by ensuring the surveillance is performed sufficiently often to prevent production of a critical mass of material. The surveillance is established by using 6 wt% as an acceptance criteria by calculating the feed and product mass flow rates from the measured mass differences over a given time interval, and comparing them to a QL-1 derived curve representing all possible combinations of feed and product mass flow rates corresponding to a product enrichment of 6 wt%. If the calculated product flow rate is greater than the value on the 6 wt% curve at the calculated feed flow rate, then the criterion is met and enrichment is less than 6 wt%. The curves are generated for operations for each campaign and when ever additional cascades are placed on line for that assay. The curves are generated using a quality

process and verified. A periodicity analysis ensures the surveillance is performed sufficiently often by determining the mass that the cascades are capable of producing between surveillances to remain safely subcritical at the most limiting enrichment.

Periodicity Analysis

The periodicity analysis for the surveillance frequency is based on a conservative set of assumptions including:

- One cascade operating at an enrichment level above 6% and the remaining cascades at the license limit of 5% (5% is bounding for normal cascades)
- Accumulation or deposit of material in a single spot without credit for dispersion over a large area
- Formation of material in a spherical geometry with optimum moderation and full water reflection
- Use of a safe mass at 75% of the critical mass (NUREG-1520, Section 5.4.3.4.2), as double batching of special nuclear material is not possible for the enrichment process, which is not a batch process. Further, enrichment control failing simultaneously on more than one cascade is not credible, as this process deviation requires multiple unlikely human actions or errors for which there is no reason or motive. No external events have been identified as a common mode failure that could credibly cause multiple cascades to continue producing material at an increased enrichment. Note that the minimum critical mass values are taken from POEF-SH-20, *Minimum Critical Masses at the Portsmouth Gaseous Diffusion Plant* (June 1994).
- Use of the worst-case (highest) product flow rate for a given product enrichment over a range of 0.1 to 0.4% tails assay, which adequately and conservatively bounds the normal operating range of 0.2 to 0.34% (SAR, Section 1.1.3.2).

The periodicity analysis establishes the time to reach the safe mass for a given product enrichment above 6%. The surveillance frequency is based on the worst-case (i.e., shortest) time to reach the safe mass to ensure that the safe mass is maintained at all times between two successive surveillances.

The analysis shows that over-enrichment above 6% in an assay can occur only with one or two cascades on line. With three or more cascades running, the assay enrichment is less than 6%, which is bounded by the analyzed conditions for the safe-by-design components. For the case of one cascade on line, the shortest time to reach the safe mass is greater than 20 hr. For two cascades, the time is reduced to 10.6 hr for the worst case with one cascade operating at 7% to 8% enrichment and another operating at 5%. These conditions provided for the highest combination of mass flow and enrichment that remained above the bounding condition of 6% for the total enrichment. Based on this result, the surveillance frequency is conservatively established to provide a safety factor as follows:

- One cascade on line — 12 hr interval (once per shift)
- Two cascades on line — 8 hr interval

- Three or more cascades on line 12 hr interval (once per shift)

Analysis results supporting a previous submittal showed a 15 hour surveillance interval is sufficient for all cascade configurations. Additional analysis identified a more limiting condition with two cascades operating. The previous analysis used bounding conservative assumptions, 100% enrichment at 100% efficiency and no mixing with lower enrichment material, which masked a more limiting condition at a lower enrichment. Using cascade efficiency as a function of enrichment eliminates high enrichment cases from consideration. A more detailed look at lower enrichments found a safe mass could be produced in less time by mixing normal cascade output with a cascade producing enrichments in the range of 7 to 25 wt%. The safe mass at lower enrichments is significantly larger, ~25 kg at a combined enrichment of 6.8% vs. ~1 kg UF_6 at 100% enrichment. An optimally moderated sphere containing ~25 kg of UF6 has a radius of about 15 cm and would not physically fit in product piping.

Uncertainty Evaluation for IROFSC22

License Condition 6B limits the maximum allowable enrichment for the facility to 5 wt% ^{235}U. Any enrichment that is verified to be greater than 5 wt% is a reportable condition in accordance with 10 CFR 74.11. Enrichment control is set at a value under normal conditions (including process uncertainty) that would not exceed 5 wt%. Therefore, IROFSC22 does not need to consider normal variations in process variables.

The equation for determining the product enrichment or concentration is as follows:

$$c_p = (m_f/m_p)(c_f - c_t) + c_t$$

where c_p is the product concentration
c_f is the feed concentration fixed at 0.711%
c_t is the tails concentration normally at 0.2 to 0.34%
m_f is the feed flow rate
m_p is the product flow rate

The above equation is derived from the law of mass conservation for UF_6 and U-235, as shown below:

UF_6 $m_f = m_p + m_t$
U-235 $m_f \cdot c_f = m_p \cdot c_p + m_t \cdot c_t$

The product concentration obviously varies with m_f, m_p, and c_t. The uncertainty associated with the tails concentration is removed by using a maximum product flow rate over a bounding range of 0.1 to 0.4% tails concentration. The remaining two variables m_f and m_p are measured using the station weighing system (load cells) at two different times to obtain the flow rates. The associated uncertainties consist of the time of measurement and load cell weight. The time uncertainty is expected to be negligible.

For the load cell, the uncertainty is conservatively assumed to be as much as $\pm$0.3 kg for the product station and $\pm$1.0 kg for the feed station, even though taking measurements from the same scale basically nullifies any error when the difference of the scale measurements is used. With two feed stations and two product stations in service, the cumulative mass uncertainty is $\pm$0.424 kg for product and $\pm$1.414 kg for feed. Using the surveillance interval of 8 hr, and the most conservative example for a minimum identifiable change in mass flow rate, a change of

5% enrichment to 6% enrichment, results in greater than a factor of 5 between the values for the minimum identifiable change and the uncertainty of the measurements. Therefore, it is reasonable to be able to identify a change in enrichment that would exceed the criteria. The uncertainty in the mass flow rates are relatively small compared to the expected mass flow rates, thus introducing insignificant change in product enrichment. The uncertainty in the product flow rate is adequately compensated by the use of a maximum product flow rate in determining the time required to reach a safe mass and associated surveillance frequency. Further, the feed and product flows tend to compensate each other to maintain a constant enrichment.

IROFSC22 Failure Probability Index

A failure probability index of -3 was selected for IROFSC22. This index corresponds to an enhanced administrative IROFS per Table A-10 of NUREG-1520. IROFSC22 is enhanced by requiring independent verification of the IROFS safety function. This enhancement shall meet the requirements for independent verification identified in ISA Summary, Section 3.8.1. The selection of -3 and independent verification requirements are consistent with other enhanced administrative IROFS. The reliability and availability of IROFSC22 is maintained by applying the generic management measures described in Section 3.1.3 of the Safety Analysis Report.

The mass balance calculation is a simple manual calculation, involving the calculation of the feed and product flow rates based on the mass readings at two different times. The calculated flow rates are then used to verify the acceptability of the enrichment level, based on the feed vs. product flow rate chart developed for each enrichment campaign, which provides the acceptance curve.

With the independent verification requirements for IROFSC22, the likelihood of missing a mass balance calculation is low, because two operators would have to fail to perform the procedurally required action. Even if a mass balance calculation is missed, the likelihood of an inadvertent criticality would still be highly unlikely, because of the safety margin built into the surveillance frequency and multiple conditions required for the potential for a criticality.

Time to accident sequence

Accident sequences associated with IROFSC22 require a relatively long period of time to generate a potential criticality condition once an initiation event occurs. This, coupled with the operator actions to monitor the mass balance within the required periodicity would identify the issue with ample time to correct the condition. A conservative analysis identified that the worst case condition for the accumulation of a minimum critical mass would be 10.6 hours for a single cascade enriching at 7% to 8% and the a second cascade enriching at 5%. These conditions provided for the highest combination of mass flow and enrichment when supplemented with an additional cascade at 5%, remained above the bounding condition of 6% for the total enrichment. For a single cascade, the worst case was greater than 20 hours to accumulate a minimum critical mass, and for 3 or more cascades, the mixed enrichment was less than 6% and bounded by the safe-by-design analysis. Accumulation of a minimum critical mass in the gas centrifuge process system would require other conditions such as moderation and geometric configuration to exist before criticality is possible. Therefore, the time to accident sequence would be significantly longer or effectively infinite as the enrichment process would stop well in advance of a critical condition. Based on this information, the periodicity for the performance of the IROFSC22 activity is conservatively established solely on the basis of a safe

mass at 75% of the minimum critical mass without considering other conditions required for an inadvertent criticality as follows:

- One cascade on line — Once per shift (12 hr interval)
- Two cascades on line — Three times per day (8 hr interval)
- Three or more cascades on line — Once per shift (12 hr interval)

The analyses performed to support the safety basis have not been formalized and upon doing so if alterations are required the NRC will be notified; however, the safe mass criteria will be met.

Monitored Support Equipment

The station weighing systems and cold trap weighing systems are considered Monitored Support Equipment for IROFSC22 and are included in the IROFS boundary. Neither the station weighing systems nor the cold trap weighing systems rely on any PCS function for local weight indication.

Monitored Support Equipment Attribute

The specific attribute is the station weighing systems and cold trap weighing systems provide an accurate and reliable indication of cylinder or cold trap mass.

Monitored Support Equipment Applicable Quality Level, Codes, Standards, 10 CFR 21

Requirements applicable to the station weighing system are described in Section 4.1.1.2 for IROFS38 and restated below. To ensure accurate and reliable indication, the both weighing systems are periodically calibrated in accordance with the process used for the MC&A Program. For quality, ISO 9000 requirements are imposed and the station weighing system meets QL-2AC quality requirements. Industry experience over a significant period has shown this equipment to be highly reliable.

QA Level 2AC requirements are applied to the station weighing systems to provide additional assurance that the required attribute is maintained. Implementation of the IROFS itself would detect the failure of the weighing system. It is not expected that a weighing system would fail in such a way that the indication would track the expected fill rate while the actual fill rate is higher (or lower). Many thousands of cylinders have been filled in European facilities using the same or similar equipment as that being used at LES. As noted above, a very long period of time across multiple operator shifts is available to detect indicator failure. There has never been a criticality at any of the European facilities that use the same or similar equipment as used by LES.

License Condition 20

An exception to License Condition 20 is requested for the station weighing systems and the cold trap weighing systems. The operation of the station weighing system is described in the License Condition 20 section for IROFS38 above. The cold trap weighing system operation is virtually identical, except that the local display is physically located on the SD2100 The Exception to License Condition 20 is acceptable because this equipment has no impact on the

IROFS safety function; therefore, this equipment cannot introduce a significant safety hazard. If an abnormal condition were to occur, the worker would detect the anomaly and take action by closing one of several isolation valves. The valves are Support Equipment for this IROFS and are included in the boundary and meet QL-2AC requirements.

Operated Support Equipment

If mass balance indicates an abnormal enrichment, as directed by the ORM, the operator takes action to prevent additional feed from entering all cascades of the associated assay (regardless of whether the indication is due to an actual condition or a failed or failing indicator). This is accomplished by closing one of several available isolation valves. These valves include the xA10 or xA15. The valves are Support Equipment for the AC IROFS and are included in the IROFS boundaries.

Operated Support Equipment Attribute

The specific attribute of the identified valves is to close on demand.

Operated Support Equipment Applicable Quality Level, Codes, Standards, 10 CFR 21

The valves meet ASME B31.3 or ASME N14.1 standards as applicable and are periodically exercised as part of normal system operations in accordance with plant procedures by trained operators. In addition the valves meet QL-2AC quality requirements. QA Level 2AC requirements are applied to the valve to provide additional assurance that the required attribute (close on demand) is maintained. If a valve fails, another valve (or valves) in the system would be used as an alternate. Only two valves are identified in the IROFS boundary, however, additional valve(s) could be used to stop flow into a cascade. In addition to the valve isolation, additional actions exist to stop the flow into the cascade, such as turning off the feed heaters. Many thousands of cylinders have been filled in European facilities using the same or similar equipment as that being used at LES and there has never been a criticality event. 10 CFR 21 reporting requirements are not applicable to the station weighing systems and cold trap load cells, i.e., as no substantial safety hazard exists, i.e., both an extended period of time and multiple isolation valves and other mechanisms (such as breaker opening) are available to cease cylinder enrichment operations.

As currently written, accident Sequence EC3-1 requires isolation of the affected cascade to prevent any additional UF_6 from entering or exiting the cascade if the acceptance criterion is not met. This is being changed to require feed isolation by closing the feed inlet valve for all operating cascades in the affected assay. This change is acceptable because it effectively prevents the criticality event while providing asset protection. Closing the feed inlet to a cascade causes pressure in the cascades to decrease, which results in the product control valve opening more in an attempt to maintain the set flow rate. In the short term, this action causes increased flow from the cascade which reduces enrichment. In the long term, since no feed is available, the enrichment process stops. Asset protection is provided by effectively evacuating UF_6 from the cascades instead of isolating the cascade with UF_6 still in it, which could result in significant damage to centrifuges.

License Condition 20

License Condition 20 is not applicable to mechanical process system valves which are locally, manually, operated.

4.1.2 Support Equipment 10 CFR 21 Applicability

QA Level 2AC Support Equipment has been added to the Administrative Control IROFS boundary as an IROFS for select equipment available to the worker. This is equipment the worker may rely upon to take action and a level of quality is being imposed to enhance the reliability of this equipment commensurate with its importance to the worker's safety function. Though select equipment has been identified as Support Equipment in this LAR, its failure to function does not represent a *substantial safety hazard* as defined in 10 CFR 21.3.

> Substantial safety hazard *means a loss of safety function to the extent that there is a major reduction in the degree of protection provided to public health and safety for any facility or activity licensed or otherwise approved or regulated by the NRC (under part 70 of this chapter).*

The loss of this Support Equipment does not represent the loss of a specified safety function of the IROFS. The safety function is the worker action portion of the Administrative Control IROFS. Other equipment and significant time to evaluate and take actions are available should Support Equipment fail to function. Additionally, the use of this equipment is a precursor for the worker to take action to meet the safety performance requirements of the administrative control. For example, an endoscope is used by the worker to detect if moderator mass (oil or water) are in a 30B cylinder to meet one of the safety performance requirements of IROFS16a. If the endoscope fails, the worker is unable to see. The result is that the cylinder will not be put into operation until a satisfactory inspection can be completed. Additionally, two vacuum tests are also performed for IROFS16a to determine if unacceptable moisture is in the 30B cylinder subsequent to an acceptable endoscopic inspection. This instrumentation must be accurate and reliable and maintained according to maintenance management measures. Performance of this test two times provides reasonable assurance that a failure of the test M&TE would be detected by the worker. The result is that the cylinder would not be put into operation until two satisfactory pressure tests are completed (along with a satisfactory visual examination) the failure of which must occur twice and "smartly" follow the expected response during draw down and test which is highly unlikely. The safety function of an administrative control is the human action, supported by management measures and Support Equipment. The pressure instrument is identified in SAR Table 3.4-1 as Monitoring Support Equipment, identified in the Boundary Definition Document to within the IROFS16a boundary, and meets QA Level 2AC requirements, including formal calibration of the pressure instrumentation through applicable management measures.

This amendment specifies the applicable quality requirements for this Support Equipment as Quality Assurance Level 2AC, as documented in the proposed changes to the QAPD. This amendment also clarifies that management measures are applied to the attributes only of other equipment that is outside the Administrative Control IROFS boundary as defined in detail in the Boundary Definition Documents (BDDs). Other equipment is typically Quality Level 3. SAR Table 3.4-1 identifies Administrative IROFS Monitoring Support Equipment, Operating Support Equipment, other equipment, and their associated attributes. SAR Section 11 delineates the application of management measures to these attributes.

The addition of Support Equipment to the Administrative Control IROFS boundary and use of management measures for attributes serve to enhance plant safety and the response to postulated accident sequences in the Integrated Safety Analysis (ISA) that rely on worker action. Inclusion of Support Equipment within the boundary of the Administrative Controls IROFS also ensures that applicable failure tracking, appropriate restrictions on changes, and

applicable change requirements for IROFS will be accomplished as defined by the application of Quality Level 2AC.

Instrumentation associated with Administrative Control IROFS does not have a failure that could result in a consequence as discussed below; therefore, 10 CFR Part 21 does not apply to Support Equipment as equipment failure cannot create a *substantial safety hazard.*

4.1.3 AC IROFS with No Support Equipment in the IROFS Boundary

The following AC IROFS have other equipment used by the operator that is not in the IROFS Boundary. This equipment is standard commercial QL-3 equipment. The attribute provided by this equipment is within the Administrative Control IROFS Boundary as described below and includes applicable management measures as described in the Boundary Definition Documents (BDDs). Other equipment is generally portable or hand held monitoring-type equipment (such as the Canberra rad monitoring instruments) or general moveable plant equipment (such as landscape equipment).

4.1.3.1 IROFS14a and IROFS14b

IROFS14a: Administratively restrict proximity of vessels in non-designed locations containing enriched uranic material to ensure subcritical configuration. This is implemented by verifying the use of a safe-by-design transfer frame prior to movement of the associated waste container containing enriched uranic material. The proximity limit, enforced by the safe-by-design transfer frame, is based on assumptions in the Nuclear Criticality Safety Analyses. If the acceptance criterion is not met, then the associated waste container shall not be moved.

IROFS14b: Administratively restrict proximity of vessels in non-designed locations containing enriched uranic material to ensure subcritical configuration. This is implemented by verifying, prior to moving a waste container containing enriched uranic material within 180 cm of the associated storage array, the associated storage array condition is acceptable for storing the associated waste container (i.e., the storage array is the correct array for storage of the associated waste container, no component containing enriched uranic material is stored within 180 cm of the storage array (except in storage array locations), components are correctly stored in the array, and a vacant location is available for storage of the associated waste container) and no component containing enriched uranic material is in movement in the designated area. If the acceptance criteria are not met, then the associated waste container containing enriched uranic material shall not be moved.

Safety Function

The safety function of IROFS14a is the decision to use the safe-by-design transfer frame to transfer waste containers. The safety function of IROFS14b is the decision to conduct an inspection of the proposed storage array.

Other (Monitored) Equipment

The operator decisions are based on indication of instrumentation determining gross ^{235}U content of the non-safe-by-design waste container. These instruments are standard commercial components and not included in the IROFS boundaries.

Other (Monitored) Equipment Attribute

Although the specific instruments are not Support Equipment, they provide an accurate and reliable indication of the ^{235}U content within the container. Vendor documents provided indicate

that the instruments are manufactured in accordance with ISO 9000. To ensure accurate and reliable indication, the instruments are periodically calibrated using a calibration procedure as part of the maintenance management measure. Controlling the calibration of the instrument through the management measures provides an enhancement to safety. If the gross ^{235}U content of the non-safe-by-design waste container cannot be determined, the ORM prohibits movement of the container.

The safe-by-design transfer frame is included in the Safe-by-Design Boundary Definition Document.

4.1.3.2 IROFS30a, IROFS30b, and IROFS30c

IROFS30a: Administratively limit hydrocarbon oil (moderator mass) in enriched uranium product to ensure moderation control assumptions are maintained by controlling the type of oil used in process vacuum pumps. This is implemented by controlling the type of oil used in all process vacuum pumps to only perfluorinated polyether (PFPE) oil, consistent with moderation assumptions in the Nuclear Criticality Safety Analyses. If the acceptance criteria are not met, then action shall be initiated to remove the associated vacuum pumps from process systems.

IROFS30a is an administrative control based on visual inspection and documentation. There is no Support Equipment or other equipment associated with IROFS30a.

IROFS30b: Administratively limit hydrocarbon oil (moderator mass) in enriched uranium product to ensure moderation control assumptions are maintained by verifying, through test prior to addition of oil, that process vacuum pump oil is not hydrocarbon oil. This is implemented by testing the oil prior to addition to any process vacuum pump to verify the oil is not hydrocarbon oil, consistent with moderation assumptions in the Nuclear Criticality Safety Analyses. If the acceptance criteria are not met, then the associated oil shall not be added to the process vacuum pump.

IROFS30c: Administratively limit hydrocarbon oil (moderator mass) in enriched uranium product to ensure moderation control assumptions are maintained by verifying, through test (after oil addition) prior to placing vacuum pumps in process system, that process vacuum pump oil is not hydrocarbon oil. This is implemented by testing the oil in all process vacuum pumps for hydrocarbons after bench testing, but before placing vacuum pumps in process systems to verify lack of hydrocarbon oil. This assures operation consistent with moderation assumptions in the Nuclear Criticality Safety Analyses. If the acceptance criteria are not met, then the associated vacuum pump shall not be placed in the process system.

Safety Function

The safety function of IROFS30b is the worker decision to add oil to a process vacuum pump or not. Similarly, the safety function of IROFS30c is the worker decision to align the process vacuum pump to the system or not.

Equipment

There is no AC IROFS Monitored Support Equipment or other equipment for IROFS30b or IROFS30c. The operator decisions for both IROFS30b and IROFS30c are made based on analysis results of two separate oil samples. The oil analyzer is a standard commercial component and not included in the IROFS boundary.

Other (Monitored) Equipment Attribute

Although the specific oil analyzer is not considered Support Equipment, it provides an accurate and reliable indication of the hydrogen content in the oil. To ensure an accurate and reliable analysis results, the oil analyzer is periodically calibrated using a calibration procedure as part of the maintenance management measure. Controlling the calibration of the oil analyzers through the management measures provides an enhancement to safety. A known standard is analyzed prior to and after the actual oil sample to ensure sample analysis results are accurate. If the oil analysis results cannot be obtained or does not meet the acceptance criteria, the ORM prohibits the pump from being placed in service.

4.1.3.3 IROFS31a, IROFS31b, and IROFS31c

IROFS31a: Administratively limit ^{235}U mass in non-safe-by-design solid waste containers to ensure subcriticality by performing independent sampling and assay analysis. This is implemented by independent sampling and assay analysis of waste container contents for ^{235}U mass and limiting mass to that assumed in the Nuclear Criticality Safety Analyses before enriched uranic material is transferred and bulk stored in solid waste containers. IROFS31a is independent of IROFS31b. If the acceptance criterion is not met, then enriched uranic material shall not be transferred and bulk stored in solid waste containers.

IROFS31b: Administratively limit ^{235}U mass in non-safe-by-design solid waste containers to ensure subcriticality by performing independent sampling and assay analysis. This is implemented by independent sampling and assay analysis of waste container contents for ^{235}U mass and limiting mass to that assumed in the Nuclear Criticality Safety Analyses before enriched uranic material is transferred and bulk stored in solid waste containers. IROFS31b is independent of IROFS31a. If the acceptance criterion is not met, then enriched uranic material shall not be transferred and bulk stored in solid waste containers.

Safety Function

The safety function of IROFS31a and IROFS31b is the worker decision to transfer waste containing enriched uranic material into a non-safe-by-design waste container or not.

Other (Monitored) Equipment

The operator decision is based on indication of instrumentation determining gross ^{235}U content of the non-safe-by-design waste container. These instruments are standard commercial components and not included in the IROFS boundaries.

Other (Monitored) Equipment Attribute

Although the specific instruments are not Support Equipment, they provide an accurate and reliable indication of the ^{235}U content within the container. Vendor documents provided indicate that the instruments are manufactured in accordance with ISO 9000. To ensure accurate and reliable indication, the instruments are periodically calibrated using a calibration procedure as part of the maintenance management measure. Controlling the calibration of the instruments through the management measures provides an enhancement to safety. If the gross ^{235}U content of the non-safe-by-design waste container cannot be determined, the ORM prohibits addition of enriched uranic material into the container.

IROFS31c: Administratively limit ^{235}U mass in non-safe-by-design solid waste containers to ensure subcriticality using bookkeeping procedures. This is implemented by bookkeeping procedures

to limit calculated uranic mass in solid waste containers to that assumed in the Nuclear Criticality Safety Analyses for solid waste bulking operations. The calculated ^{235}U mass in solid waste containers shall be determined using bookkeeping procedures before enriched uranic material is transferred and bulk stored in solid waste containers. If the acceptance criterion is not met, then enriched uranic material shall not be transferred and bulk stored in solid waster containers.

Safety Function

The safety function of IROFS31c is also the worker decision to transfer waste containing enriched uranic material into a non-safe-by-design waste container or not.

Equipment

There is no AC IROFS Monitored Support Equipment or other equipment for IROFS31c. The operator decision is based on verification of the bookkeeping quantity of ^{235}U already in the container. This verification is made based on document reviews, so there is no equipment associated with IROFS31c. If the gross ^{235}U content of the non-safe-by-design waste container cannot be determined, the ORM prohibits addition of enriched uranic material into the container.

4.1.3.4 IROFS36a, IROFS36c, IROFS36f, and IROFS36g

IROFS36a: Administratively limit transient combustible loading in areas containing uranic material to ensure integrity of uranic material components/containers and limit the quantity of uranic material at risk to ensure consequences to the public are low. Transients will be controlled to limit aggregate combustible load (transient and in-situ) in the area of concern.

Safety Function

The safety function of IROFS36a is a visual inspection of areas of concern to ensure compliance with combustible material accumulation requirements.

Equipment

There is no AC IROFS Monitored Support Equipment or other equipment for IROFS36a. The visual inspection is conducted in accordance with approved plant surveillance procedures. If excessive combustible materials are identified, action is taken as directed by the ORM.

IROFS36c: Administratively limit onsite UF_6 cylinder transporters/movers to ensure only use of electric drive or diesel powered with a fuel capacity of less than 280 L (74 gal).

Safety Function

The safety function of IROFS36c is worker decision to allow the use of UF_6 cylinder transporters/movers or not.

Other Equipment

The worker decision is based on visual assurance of an electrical transporter/mover or documentation verifying the fuel tank capacity meets the requirements of the IROFS in accordance with approved plant procedures. Each diesel powered UF_6 cylinder transporters/mover fuel tank is certified to be less than 280 liters (74 gallons). This certification is performed initially before the transporter/mover is used to carry any UF_6 cylinder. The VIN

number of the vehicle is recorded and a certification sticker is attached to the vehicle as part of the management measure.

Other Equipment Attribute

A DOT certified measuring pump is used for certification of diesel powered UF_6 cylinder transporters/mover fuel tank. This one-time measurement ensures that the transporter/mover carries 280 liters or less of fuel, thus maintaining the safety basis assumption with respect to diesel fuel for IROFS36c. If the worker cannot complete the verification, the ORM prohibits use of the cylinder transporter/mover.

IROFS36f: Administratively limit designated routes for bulk fueling vehicles onsite to ensure UBC cylinder integrity. This is implemented by limiting diesel fuel deliveries to designated routes. Diesel fuel delivery vehicles will be prohibited from entering the UBC Storage Pad perimeter road.

Safety Function

The safety function of IROFS36f is the use of the designated route for bulk fuel deliveries.

Equipment

There is no AC IROFS Monitored Support Equipment or other equipment for IROFS36f. This safety function is verified by operations escort of the fuel truck in accordance with approved plant procedures.

IROFS36g: Administratively limit onsite vegetation fire sources to ensure integrity of important targets. This is implemented by requiring clear cutting of vegetation onsite proximate to buildings and cylinders containing uranic material.

Safety Function

The safety function of IROFS36g is monitoring for and removal of potential combustible material, specifically vegetation or accumulated plant debris, from the areas of concern.

Other (Operated) Equipment

There is no AC IROFS Monitored Support Equipment IROFS36g. The monitoring function is a visual inspection. If the visual inspection determines that vegetation growth or accumulation is excessive, then operator action is required to remove the excess material. Although various pieces of the landscape equipment may be required to meet the IROFS safety function, the equipment is not considered Support Equipment for the IROFS and is not included in the IROFS boundary. The landscape equipment is standard commercial equipment. It would be immediately obvious to the operator and there is ample time to obtain replacement equipment for removal of the material.

4.1.3.5 IROFS39a, IROFS39b, IROFS39c, and IROFS39d

IROFS39a: Administratively limit exposure by requiring worker action to evacuate the area(s) of concern to ensure worker consequences of inhalation of uranic material and HF are low. This is implemented by worker evacuation from area(s) of concern in the event of a seismic event consistent with assumptions of the consequence analyses.

IROFS39b: Administratively limit exposure by requiring worker action to evacuate the area(s) of concern to ensure worker consequences of inhalation of uranic material and HF are low. This is implemented by worker evacuation from area(s) of concern in the event of a fire consistent with assumptions of the consequence analyses

IROFS39c: Administratively limit exposure by requiring worker action to evacuate the area(s) of concern to ensure worker consequences of inhalation of uranic material and HF are low. This is implemented by worker evacuation from area(s) of concern in the event of a release consistent with assumptions of the consequence analyses.

Safety Function

The safety function of IROFS39a, IROFS39b, and IROFS39c is the worker evacuation of the area of concern upon detection a seismic event, fire, or chemical (UF_6/HF) release.

Time to accident sequence

The accident sequences associated with IROFS39a, IROFS39b, and IROFS39c are not time-dependent. However, it is assumed that workers will evacuate the area of concern within 2.5 minutes from detection of the event.

Other (Monitored) Equipment

Detection of the event (seismic, fire, or chemical release, respectively) is obtained by any means available including, but not limited to personal detection (ground motion, visual, audible, odor, etc.), radio, PA system, telephone, fire protection system, etc. If necessary, a walkdown of facilities is conducted for notification. No specific notification system is credited for detection.

IROFS39d: Administratively limit exposure by requiring worker action to evacuate the area(s) of concern to ensure worker consequences of inhalation of uranic material and HF are low. This is implemented by worker evacuation from area(s) of concern in the event of severe weather consistent with assumptions of the consequence analyses.

Safety Function

The safety function of IROFS39d is the pre-emptive worker evacuation of the area of concern upon notification of severe weather (tornado, tornado missile, high wind, excessive roof snow load, and roof ponding and site flooding due to local intense precipitation).

Other (Monitored) Equipment

Detection is obtained by any means available including, but not limited to personal detection (visual, audible), radio, PA system, telephone, weather website, etc. If necessary, a walkdown of facilities is conducted for notification. No specific notification system is credited for detection.

4.1.3.6 IROFS50b, IROFS50c, IROFS50d, IROFS50e, IROFS50f, and IROFS50g

IROFS50b: Administratively control proximity of external site preparations vehicles around areas of concern to prevent an impact with areas of concern resulting in a release of UF_6. This is implemented by establishing a temporary barrier of sufficient strength to alert the vehicle operator upon impact with the barrier. The barrier is placed at a minimum distance of 30 feet from areas of concern to allow the vehicle operator sufficient distance to stop or alter course prior to reaching the areas of concern.

IROFS50c: Administratively control proximity of external site preparations vehicles around areas of concern to prevent an impact with areas of concern resulting in a release of UF_6. This is implemented by establishing a second and independent temporary barrier of sufficient strength to alert the vehicle operator upon impact with the barrier. The barrier is placed at a minimum distance of 30 feet from the area of concern to allow the vehicle operator sufficient distance to stop or alter course prior to reaching areas of concern.

Safety Function

The safety function of IROFS50b and IROFS50c is to ensure barriers are in place that will alert external site preparations vehicle operators in the vicinity of facilities containing UF_6 of entry into restricted areas to prevent impact to the facility.

Other (Operated) Equipment

Impact is prevented by providing a physical barrier to alert the operator, the barriers themselves are not considered Support Equipment. The barriers are standard commercial components and are not included in the IROFS boundaries.

Other (Operated) Equipment Attribute

The barriers must be placed and aligned such that they will alert the site preparation vehicle operator if the vehicle approaches the area of concern. To ensure placement and alignment, the barriers are periodically inspected using a surveillance procedure. Some barriers are constructed of concrete while others are water-filled plastic barriers for ease of movement (i.e., the water is drained, the barrier repositioned as require, and refilled at the new location). Because the IROFS requires two rows of barriers, impact to a facility of concern would require that at least two barriers would have to be out of place or empty and that they would have to be in the direct path of the equipment. If the barrier placement and alignment is not adequate, the ORM prohibits movement of site preparation vehicles in the area of concern. If the barriers are not in place and aligned as required, the ORM prohibits movement of site preparation vehicles in the area of concern.

IROFS50d: Administratively control proximity of internal construction vehicles relative to operating process equipment of concern to prevent a release of UF_6 associated with an impact. This is implemented by establishing an appropriate barrier to alter the operator of proximity to operating process equipment of concern.

IROFS50e: Administratively control movement of internal construction vehicles to prevent impact with operating process equipment of concern resulting in a release of UF_6. This is implemented by requiring the use of a spotter to independently monitor and supervise internal construction vehicle movement relative to the operating process equipment of concern.

Safety Function

The safety function of IROFS50d and IROFS50e is to alert internal construction vehicle operators upon entry into a restricted area to prevent impact to process equipment.

Other (Operated) Equipment

Impact is prevented by providing a physical barrier to alert the operator, the barriers themselves are not considered Support Equipment. The barriers are standard commercial products (e.g., barrier tape, cones, etc.) and are not included in the IROFS boundaries.

Other (Operated) Equipment Attribute

Physical barriers along with spotters are used to alert the operator. The barriers are standard commercial products (e.g., barrier tape, cones, etc.). To ensure barriers are provided as required, they are periodically inspected using a surveillance procedure. In addition, training is provided to IROFS50e Spotters to monitor equipment movement and warn equipment operator if the equipment approaches the barrier around areas containing UF_6. If the barriers are not in place as required, the ORM prohibits movement of construction vehicles in the area of concern.

IROFS50f: Administratively control proximity of external construction cranes around the areas of concern to prevent a release of UF_6. This is implemented by establishing a No Swing Zone when the crane is closer than a safe distance from an operating area of concern.

IROFS50g: Administratively control movement of external construction cranes around the areas of concern to prevent a release of UF_6. This is implemented by requiring the use of a spotter to independently monitor and supervise external construction crane movement relative to the operating area of concern.

Safety Function

The safety function of IROFS50f and IROFS50g is to alert crane operators in the vicinity of facilities containing UF_6 of entry restricted areas (including the No Swing Zone) to prevent impact to the facility.

Monitored Support Equipment

Impact is prevented by providing a physical barrier to alert the operator along with spotters. The barriers themselves are not considered Support Equipment. The barriers are standard commercial components and are not included in the IROFS boundaries.

Other (Operated) Equipment Attribute

Physical barriers are used to alert the operator. The barriers are standard commercial products. Barriers for the no-swing zone include, but are not limited to barrier tape; cones, etc., while the barriers for the crane location are the same as used in IROFS50b and IROFS50c. To ensure barriers are provided as required, they are periodically inspected using a surveillance procedure. In addition, training is provided to IROFS50f Spotters to monitor crane movement and warn crane operator if the crane load approaches the barrier around areas containing UF_6. If the barriers are not in place as required, the ORM prohibits the use of cranes in the area of concern.

4.2 Conclusion

Administrative Control IROFS Support Equipment are not "items which are determined to be essential to the function of the IROFS." Administrative Control IROFS Support Equipment contains attributes used by the worker to perform the safety function of the Administrative Control IROFS. This equipment is not essential to a passive or engineered safety feature that must operate without any human interaction; therefore, Administrative Control IROFS Support Equipment is not subject to Quality Level 1 requirements. The attributes of the Support Equipment that are used to monitor or implement operator actions are verified using appropriate management measures to assure reliable use as needed. Support Equipment for

Administrative Control IROFS are used for preventive measures and, if unavailable (such as indication), the associated operation is terminated.

Further, multiple means are available to detect and take actions. The events these actions are designed to prevent, such as cylinder overfill exceeding a safety limit or a criticality have not occurred in URENCO history. Support Equipment was added as an enhancement to the Administrative Control IROFS boundary to provide positive assurance and oversite ensuring that all equipment attributes used by the worker to perform the actions of the administrative control are accurate, reliable, and perform when called upon. Assurance of these attributes is maintained by verifying the attributes utilizing appropriate management measures. Any reduction or change to management measure application designed to provide assurance of the attributes used by the worker would be considered a reduction in commitment and require regulatory approval prior to implementation.

5 Environmental Considerations

There are no significant environmental impacts associated with the changes proposed in this License Amendment Request. The proposed changes do not meet the criteria specified in 10 CRF 5160 (b) (2) since they do not involve a significant expansion of the site, a significant change in the types of effluents, a significant increase in individual or cumulative occupational radiation exposure, or a significant increase in the potential for or consequences from radiological accidents. Consequently, a separate supplement to the Environmental Report is not submitted.

ENCLOSURE 2

Page Changes to the Licensing Basis Documents
Safety Analysis Report and Integrated Safety Analysis Summary and Quality Assurance Program Description
(Revision bars, strikethroughs, and underlines were utilized)

urenco

SAFETY ANALYSIS REPORT

LAR-10-04

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designed, procured, installed, tested, and maintained using the applicable guidance in Regulatory Guide 1.180, "Guidelines for Evaluating Electromagnetic and Radio-Frequency Interference in Safety-Related Instrumentation and Control Systems,". IROFS systems will be designed and maintained consistent with the reliability assumptions in the ISA. Redundant IROFS systems will be separate and independent from each other. IROFS systems will be designed to be fail-safe. In addition, IROFS systems will be designed such that process control system failures will not affect the ability of the IROFS systems to perform their required safety functions. Plant control systems will not be used to perform IROFS functions. Installation of IROFS systems will be in accordance with engineering specifications and manufacturer's recommendations. Required testing and calibration of IROFS will be consistent with the assumptions of the ISA and setpoint calculations, as applicable. For hardware IROFS involving instrumentation which provides automatic prevention or mitigation of events, setpoint calculations are performed in accordance with a setpoint methodology, which is consistent with the applicable guidance provided in Regulatory Guide 1.105, "Setpoints for Safety-Related Instrumentation".

Administrative Control IROFS Support Equipment is defined separately in § 3.4.42.

3.4.38 Should the design of any IROFS require prior NRC approval pursuant to Material License Condition 20 and require operator actions, a human factors engineering review of the human-system interfaces shall be conducted using the applicable guidance in NUREG-0700, "Human-System Interface Design Review Guidelines,", and NUREG-0711, "Human Factors Engineering Program Review Model."

3.4.39 LES will review the topography of the NEF/LES site and surrounding relevant area, out to the boundaries of the drainage basin, for any natural or man made changes. This review will be performed every five years unless significant topography changes are identified between reviews. In the event of changes that could affect the calculation of the maximum possible flood level, LES will re-evaluate the flooding analysis to ensure that all Separations Building Modules (SBMs) abnormal condition calculations are still bounding.

3.4.40 The Product Stations design will be based on ETC4069917-1 design drawings. The internal station design size of approximately 9'7" does not accommodate a 48-inch feed cylinder. Blending donor and receiver station designs do not accommodate 48-inch cylinders. Product cylinders, as designed, cannot physically connect to a feed station. Therefore, potential for re-feeding enriched materials does not exist. Future construction and design efforts will be consistent. Any modification to station designs or product cylinder connection points will be re-evaluated and revised consistent with overall ISA methodology including criticality reviews.

3.4.41 The Assay Sampling Rig shall exhaust to a gaseous effluent ventilation system with safe-by-design attributes. At final design, this rig will be evaluated for criticality concerns and IROFS or other controls will be identified in compliance with 10 CFR 70.61.

3.4.42 Administrative Control IROFS Support Equipment contain attributes that are required by the worker to fulfill the Administrative Control IROFS. The attributes are verified to ensure that the worker can perform the IROFS safety function. Support Equipment is in the Administrative Control IROFS boundary. Many of the actions are

to prevent an event and upon failure of indication, actions would be implemented to stop continued operation or not start the operation. However, to enhance worker action and direction to prevent events, Support Equipment was identified and included in the boundary. The attributes of Support Equipment are controlled through the applicable management measures. For example, the attribute of "accurate and reliable indication" is controlled though the calibration and testing which is part of the Maintenance Functional Testing Program.

Support Equipment is listed in Table 3.4-1, Administrative Control IROFS Support Equipment. This table contains Support Equipment and other equipment, other equipment is not inside the Administrative Control IROFS boundary; normally such equipment is QL-3. Equipment Attributes are in the Administrative Control IROFS boundary.

Management measures are applied to the attributes of Administrative Control IROFS Support Equipment and other equipment attributes. Management measures are also applied to Administrative Control IROFS Support Equipment as defined in the Quality Assurance Program Description for QL-2AC equipment.

Equipment with safe-by-design attributes which are within the Administrative Control IROFS boundary are not included in this table.

Table 3.4-1 Administrative Control IROFS Support Equipment

IROFS	Monitoring Support Equipment	Other Equipment	Equipment Attributes	Operated Support Equipment	Other Equipment	Equipment Attributes
IROFS14a	None	Two independent instruments for determining gross ^{235}U content	Accurate and reliable indication	None	None	None
IROFS14b	None	Two independent instruments for determining gross ^{235}U content	Accurate and reliable indication	None	None	None
IROFS16a	None	Instrument for viewing cylinder internal	None	None	None	None
	None ***(Note 1)**	M&TE Instrument ***(Note 1)**	Accurate and reliable indication	None	None	None
	Pressure instrument ***(Note 2)**	None	Accurate and reliable indication	None	None	None
IROFS30a	None	None	None	None	None	None
IROFS30b	None	Oil analyzer	Accurate and reliable indication	None	None	None
IROFS30c	None	Oil analyzer	Accurate and reliable indication	None	None	None

Table 3.4-1 Administrative Control IROFS Support Equipment

IROFS	Monitoring Support Equipment	Other Equipment	Equipment Attributes	Operated Support Equipment	Other Equipment	Equipment Attributes
IROFS31a	None	Instrument for determining gross ^{235}U content, independent of IROFS31b	Accurate and reliable indication	None	None	None
IROFS31b	None	Instrument for determining gross ^{235}U content, independent of IROFS31a	Accurate and reliable indication	None	None	None
IROFS31c	None	None	None	None	None	None
IROFS36a	None	None	None	None	None	None
IROFS36c	None	Fuel Tank	Fuel Tank Volume	None	None	None
IROFS36f	None	None	None	None	None	None
IROFS36g	None	None	None	None	Landscape Equipment	None
IROFS38	Weigh Scale System including local digital readout from weighing system at the cylinder stations ***(Note 2)**	None	Accurate and reliable indication	Select independent isolation valves ***(Note 2)**	None	Valve closure
IROFS39a	None	None	None	None	None	None
IROFS39b	None	None	None	None	None	None
IROFS39c	None	None	None	None	None	None

Table 3.4-1 Administrative Control IROFS Support Equipment

IROFS	Monitoring Support Equipment	Other Equipment	Equipment Attributes	Operated Support Equipment	Other Equipment	Equipment Attributes
IROFS39d	None	None	None	None	None	None
IROFS50b	None	None	None	None	Barriers	Visible and substantial
IROFS50c	None	None	None	None	Barriers	Visible and substantial
IROFS50d	None	None	None	None	Barriers	Visible
IROFS50e	None	None	None	None	None	None
IROFS50f	None	None	None	None	Barriers	Visible and substantial
IROFS50g	None	None	None	None	Barriers	Visible
IROFSC22	1) Weigh Scale System including local digital readout from weighing system at cylinder station ***(Note 2)**	None	1) Accurate and reliable indication	Select independent isolation valves ***(Note 2)**	None	Valve closure
	2) vent system cold trap load cells ***(Note 2)**		2) Accurate and reliable indication			

***(Note 1)** M&TE will be used for Initial Plant Operations until the in-line process instrumentation is installed. The M&TE is QA Level 3 equipment calibrated in accordance with the Maintenance Management Measure. The permanently installed pressure instrument will meet the requirements for QA Level 2AC.

***(Note 2)** Support Equipment meets the requirements for QA Level 2AC.

11.0 Management Measures

Management measures are functions applied to item(s) relied on for safety (IROFS) and any items which are essential to 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 applied to the attributes of Administrative Control IROFS Support Equipment and other equipment attributes. These attributes are listed in SAR Table 3.4-1 and are defined in the respective IROFS Boundary Definition Document. Management measures are also applied to Administrative Control IROFS Support Equipment as defined in the Quality Assurance Program Description for QL-2AC equipment. Administrative Control IROFS Support Equipment is identified in SAR Table 3.4-1.

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 NRC has evaluated the LES QA Program Description and concluded that the application of QA elements as described in the QA Program Description meets the requirements of 10 CFR 70 (CFR, 2003g) and provides reasonable assurance of protection of public and worker health and safety and the environment (NRC, 2004).

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, Quality Assurance Program Requirements for Nuclear Facilities.

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, Chapter 11 in which the NRC acceptance criteria are presented is summarized below.

11.1 Configuration Management (CM)

This section describes the configuration management program for the National Enrichment Facility (NEF). Configuration management (CM) for the NEF is implemented through the requirements of Appendix A of the Safety Analysis Report, Quality Assurance Program Description (QAPD). Configuration Management is a core Administrative Control implementing Management Measures at the NEF.

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 Board of Managers. The LES organization construction and operation phases, is presented in Chapter 2, Organization and Administration. This organizational structure is implemented for the design, construction and operation of the NEF. Implementation of QA requirements is directed by the LES Quality Assurance Manager.

11.1.1 Configuration Management Policy

CM for the NEF is established in accordance with the requirements of 10 CFR 70.72 and 10 CFR 70.62(d).

Configuration management is maintained throughout facility design, construction, testing, and operation of the NEF. Configuration management is an administrative management measure that establishes and maintains the NEF safety bases by maintaining a technical baseline for the facilities, processes and procedures utilized at the NEF. The level of rigor for CM is established based on risk to the public, worker and environment and is implemented by the QAPD which prescribes Quality Assurance Levels commensurate with risk(s). The QAPD categorizes the safety significance of structures, systems and components (SSCs) as Quality Assurance (QA) Level1, QA Level 1 Graded, QA Level 2AC, QA Level2 and QA Level 3.

During design and construction, the Vice President - Engineering has responsibility for configuration management through established design control process. Documentation for Items Relied On For Safety (IROFS), including the Integrated Safety Analysis (ISA), is controlled under the configuration management system which implements the procedures associated with design control, document control, and records management, etc. Design changes undergo formal review, including interdisciplinary reviews as appropriate, in accordance with these procedures. Interdisciplinary reviews include as a minimum, a review for ISA impacts.

Configuration management provides the means to establish and maintain the essential features of the design basis of Item Relied On For Safety IROFS, including the ISA. As the project progresses from design and construction to operation, configuration management is maintained by the Engineering organization. Responsibility for CM activities is clearly defined for SSCs throughout their life cycle.

Integrated Safety Analysis Summary Section 4.0, Phased Operation, described ongoing construction activities during the operations phase. In addition to the Configuration Management controls specified above for the construction phase, these activities will be reviewed to identify and minimize any adverse effect upon plant operation.

11.2 Maintenance

This section defines the maintenance and functional testing programs to be implemented for the start-up and operations phase of the facility. Maintenance and functional testing implement management measures to ensure IROFS, as identified in the ISA Summary, will be available and reliable to perform their safety functions for start-up and operations.

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

Each of these functions provides important elements of maintaining IROFS as defined in the IROFS Boundary Definitions.

11.2.1 Maintenance Program Description

The Maintenance Program is responsible for all aspects of maintaining SSCs within the IROFS boundaries after turnover of the facility from Construction to Operations. Contractors supporting maintenance activities are subject to the requirements defined in implementing policies and procedures.

The Maintenance Program reports to the Vice President of Operations through the Technical Services Director. The Maintenance Program provides trained and qualified personnel, equipment and procedures for performance of maintenance and functional testing of SSCs at the NEF. The Maintenance organization plans, schedules, tracks, and maintains records for maintenance activities.

11.2.2 Maintenance Interfaces and Functions

Maintenance organizational and functional interfaces provide key elements of IROFS maintenance. Following is a description of key organizational and functional interfaces:

A. Operations - Operations is a primary interface with maintenance operations. Communications regarding status of systems, planned outages, start-up, unexpected degradations and failures and surveillances all require close coordination between these organizations.

B. Quality Assurance - The QA Organization provides the requirements for QA Level(s) associated with SSCs through implementation of the QAPD. QA is an approving function for QA Level 1, QA Level 1 Graded, QA Level 2AC and QA Level 2 activities as defined in the QAPD, for IROFS related activities.

C. Procedures - Procedures associated with IROFS maintenance activities are developed and approved in accordance with LES approved processes as described in Section 11.4 of the Safety Analysis Report (SAR).

never dependent on the performance of an IROFS that has not been tested within its specified testing interval.

Periodic test scheduling is implemented by the Maintenance department. The Maintenance department maintains the periodic test status index on the computer database.

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

- Test #
- Title
- Equipment #
- Work Request # (if applicable)
- Test Frequency
- Structure / System / Component #
- 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 conditions, the responsible department promptly notifies the on-duty Shift Manager and processes the condition in accordance with the CAP. The responsible department lists the earliest possible date the test could be performed and the latest date along with the required system or facility condition. 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, QA Level 1 Graded, QA Level 2AC, and QA Level 2 SSCs are performed in accordance with written procedures.

11.2.6.4.2 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

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 operations phase is defined as the commercial production of enriched material. The training program requirements apply to those plant personnel who perform activities that affect IROFS, or items that are essential to the function of IROFS.

The QAPD provides training and qualification requirements, during the design, construction, and operations phases, for QA training of personnel performing QA levels 1, QA level 1 Graded, QA Level 2AC and QA level 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 facility personnel 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. Employees are provided with 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.

Qualification is indicated by successful completion of prescribed training, demonstration of the ability to perform assigned tasks and the maintenance of requirements established by regulation. Training is designed, developed and implemented according to a systematic approach. A systematic approach may be a graded approach that applies the level of detail needed relative to safety. A graded approach incorporates other acceptable methods to accomplish the analysis, design, development, implementation, and evaluation of training.

11.3.1 Organization and Management of the Training Function

Line managers have responsibility for and authority to develop and effectively conduct training for their personnel. Training responsibilities for line managers are included in position descriptions. 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 procedures establish the requirements for the training of personnel performing activities related to IROFS. Additionally they ensure the training program is conducted in a reliable and consistent manner. Procedures also allow for exceptions from training when justified and properly documented and approved by appropriate management.

Lesson plans or other approved process controlling documents are used for classroom and on-the-job training to provide consistent presentation of 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. During the design and construction phase of this project, initial lesson plans are developed as the material is finalized.

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, 1 Graded, 2AC, and 2.

The Quality and Regulatory Affairs Director is responsible for developing and revising the QA Program and assuring it is in compliance with applicable regulations, codes and standards.

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 Quality and Regulatory Affairs 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 Chief Operating Officer and Chief Nuclear Officer 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 Quality and Regulatory Affairs Director, periodically informs the LES Chief Operating Officer and Chief Nuclear Officer 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 1 Graded, QA Level 2AC, 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 as specified in the QA Program Description. The QA Level 1 QA program shall be applied to those structures, systems, components, and administrative controls that have been determined to be IROFS (except IROFS27e to which QA Level 1 Graded applies), items that are essential to the functions of the IROFS, and items required to satisfy regulatory requirements for which QA Level 1 requirements are applied.

QA Level 2AC Requirements

QA Level 2AC is applied to certain Support Equipment for Administrative Control IROFS. The QA Level 2AC Support Equipment activities shall be identified in applicable QA procedures, implementing documents, and documents specifying quality requirements or prescribing activities affecting quality. These requirements are implemented by LES and LES contractors through the use of approved QA programs and procedures.

Any removal of the management measure designed to provide assurance of the Support Equipment relied upon by the worker, or removal of the Support Equipment quality requirements from the Administrative Control IROFS Boundary, would be considered a reduction in commitment and require regulatory approval prior to implementation.

QA Level 2 Requirements

The QA Level 2 program is an owner defined QA program that uses the ASME NQA 1. 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 Manager.

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, QA Level 1 Graded, QA Level 2AC or QA Level 2.

Any removal of the management measures designed to provide assurance of other equipment attributes, identified in Table 3.4-1 of the SAR, that are used by the worker would be considered a reduction in commitment and require regulatory approval prior to implementation.

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.

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SAFETY ANALYSIS REPORT APPENDIX A

QUALITY ASSURANCE PROGRAM DESCRIPTION

LAR-10-04

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and are thus a high enough level to authorize a stop work. In addition, the Chief Operating Officer and Chief Nuclear Officer is responsible for all procurement quality and technical functions. Since the QA Manager reports to the Quality and Regulatory Affairs Director who is responsible for Performance Assessment and Feedback, The QA Manager has a direct relationship with the Chief Operating Officer and Chief Nuclear Officer for quality concerns with Performance Assessment and Feedback. This ensures the QA Manager has sufficient independence for all issues affecting quality.

The LES QA Manager has been assigned by the COO/CNO to maintain the LES QAPD. The QA Manager is responsible for providing technical support, independent audits, verifications and independent inspections. These responsibilities are defined in approved procedures controlled under the QAPD. These responsibilities are applicable during construction, testing, operation and decommissioning phases of the enrichment facility. The QA organization is sufficiently independent from cost and schedule considerations and has stop work authority. The QA organization also has sufficient authority, access to work areas and organizational freedom to perform quality activities such as:

- Identifying quality problems
- Initiating and recommending solutions to quality problems through designated channels
- Verifying implementation of solutions
- Assuring that further processing, delivery, installation, or use of items is controlled until proper disposition of nonconformances, deficiencies or unsatisfactory conditions has occurred

ORGANIZATIONAL INTERFACES

The organizational interfaces within LES, between the LES organization and 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, QA Level 1 Graded, QA Level 2AC, QA Level 2 and QA Level 3 work activities shall meet the requirements of this QAPD. Responsible managers have the authority to delegate tasks to another qualified

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 QAPD elements required for the particular scope of work are identified in procurement documents.

IDENTIFICATION AND APPLICATION OF QA CONTROLS

QA Level 1 is applied exclusively to IROFS, any items which are determined to be essential to the function of the IROFS, and to items required to satisfy regulatory requirements for which QA Level 1 requirements are applied. 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. The Integrated Safety Analysis 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, any SSC and administrative controls which are determined to be essential to the functions of the IROFS and items required to satisfy regulatory requirements for which QA Level 1 requirements are applied. 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, any items which are determined to be essential to the functions of the IROFS and items required to satisfy regulatory requirements for which QA Level 1 requirements are applied.

The QA Level 1 Graded program description is provided in Section 21, Quality Assurance Program for QA Level 1 Graded. The QA Level 1 Graded program applies exclusively to IROFS27e structures. IROFS27e structures whose failure has been analyzed to result in consequences that exceed the 10 CFR 70.61 performance requirements. The QA Level 1 Graded program applies to:

- Separation Building Modules (SBMs) with the exception of slab on grade or supports for internally housed QA Level 1 IROFS that are required to perform a safety function for a seismic event.

- Cylinder Receipt and Dispatch Building (CRDB) superstructure with the exception of the Bunkered Area structure which is designated QL-1. The non-bunkered area foundation is designated QL-1G; slab on grade is designated QL-3.

The QA Level 2AC (QL-2AC) program description is provided in Section 22, Quality Assurance Program for QA Level 2AC of this QAPD. QA Level 2AC is applied to Administrative Control IROFS Support Equipment for Administrative Control IROFS. The QA Level 2AC Administrative Control IROFS Support Equipment activities shall be identified in applicable QA procedures, implementing documents, and documents specifying quality requirements or prescribing

activities affecting quality. These requirements are implemented by LES and LES contractors through the use of approved QA programs and procedures.

The QA Level 2 program description is provided in Section 20, Quality Assurance Program for QA Level 2 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 and SSCs that minimize public, worker, and environmental risks 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. This evaluation may also include nuclear industry precedent in the application of augmented QA requirements. The QA Level 2 SSCs which support normal operations shall be identified in applicable QA procedures and implementing documents and documents specifying quality requirements or prescribing activities affecting quality.

The QA program is established at the very earliest aspects of the project. It is comprised of ~~four~~ five levels defined as follow:

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, items that are essential to the functions of the IROFS, and to items required to satisfy regulatory requirements for which QA Level 1 requirements are applied.

QA LEVEL 1 GRADED

The QA Level 1 Graded QA program applies exclusively to IROFS27e structures. IROFS27e structures are structures whose failure has been analyzed to result in consequences that exceed the 10 CFR 70.61 performance requirements. The QA Level 1 Graded program is applied to design, procurement, construction and other activities as described in Section 21. The QA Level 1 Graded program applies to:

- Separation Building Modules (SBMs) with the exception of slab on grade or supports for internally housed QA Level 1 IROFS that are required to perform a safety function for a seismic event.

- Cylinder Receipt and Dispatch Building (CRDB) superstructure with the exception of the Bunkered Area structure which is designated QL-1. The non-bunkered area foundation is designated QL-1G; slab on grade is designated QL-3.

QA LEVEL 2AC REQUIREMENTS

Administrative Control IROFS are safety functions provided by human actions as discussed in NUREG-1520,

In 10 CFR Part 70, an administrative control is an IROFS if it is the human action necessary to meet safety performance requirements, and it is supported by management measures (training, quality assurance, procedures, etc.) that ensures the action will be taken if needed.

Administrative Control IROFS Support Equipment are not "items which are determined to be essential to the function of the IROFS." Administrative Control IROFS Support Equipment is used by the worker to perform the actions of the Administrative Control IROFS. This equipment is not essential to a passive or active engineered safety feature that must operate without any human interaction.

The QA Level 2AC Program is applied to Administrative Control IROFS Support Equipment Components. The worker utilizes Administrative Control IROFS Support Equipment to perform the human action of the administrative control. This equipment is specified in Table 3.4-1 of the Safety Analysis Report. In addition, the QL requirements applicable for this equipment are specified in Section 22 of this QAPD.

Any removal of the management measure designed to provide assurance of the Administrative Control IROFS Support Equipment used by the worker, or removal of the Administrative Control IROFS Support Equipment quality requirements from the Administrative Control IROFS Boundary, would be considered a reduction in commitment and require regulatory approval prior to implementation. Current application of management measures to this Administrative Control IROFS Support Equipment and/or attributes is defined in the administrative control IROFS Boundary Definition Documents.

General QA Level 2AC requirements are described in Section 22, Quality Assurance Program for QA Level 2AC. An International Organization for Standardization (ISO) 9000 series QA program may be acceptable for QA Level 2AC applications provided it complies with applicable LES QAPD requirements and the contractor's QAPD is reviewed and accepted by the LES QA Manager.

QA LEVEL 2 REQUIREMENTS

The QA Level 2 program is an LES defined QA program that uses the ASME NQA 1 standard as guidance to identify and manage activities that do not meet the requirements for inclusion in the QA Level 1 ~~or~~, QA Level 1 Graded, or QA Level 2AC program, but have elements or characteristics that may warrant control under a quality program more detailed than the QA Level 3 program. General QA Level 2 requirements are described in Section 20, Quality Assurance Program for QA Level 2. For contractors, the QA Level 2 program shall be applied to LES 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 contractor's QAPD is reviewed and accepted by the LES QA Manager. The QA Level 2 SSCs which support normal operations shall be identified in applicable QA procedures and implementing documents and documents specifying quality requirements or prescribing activities affecting quality.

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, QA Level 1 Graded, QA Level 2AC, or QA Level 2.

Any removal of the management measures designed to provide assurance of other equipment attributes, identified in Table 3.4-1 of the SAR, that are used by the worker would be considered a reduction in commitment and require regulatory approval prior to implementation.

QUALITY ASSURANCE TRAINING

Personnel who are assigned to perform QA Level 1 activities receive LES QA Indoctrination Training. This training includes general criteria, such as an introduction to applicable codes, standards, QA Procedures, QAPD elements and job responsibilities and authorities. Personnel assigned to perform QA Level 1 and QA Level 1 Graded 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 QAPD and job specific QA procedures prior to an employee beginning QA Level 1 and QA Level 1 Graded work. Supervision is responsible for ensuring that personnel performing work under their supervision are appropriately trained. LES will also include a version of QA Indoctrination Training as part of the general employee training for those individuals required to take the training.

The Training Manager provides the support function for coordinating this QA training. Plant Support provides centralized training support 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 and QA Level 1 Graded activities. Retraining is performed and documented, when applicable, shall occur in order to maintain proficiency or when changes to work methods, technology, or job responsibilities occur.

MANAGEMENT ASSESSMENTS

The Chief Operating Officer & Chief Nuclear Officer is responsible for ensuring that management assessments are conducted annually to determine if the LES QA Program is effective. Recommendations are provided to the Chief Operating Officer & Chief Nuclear Officer for action. Functional Managers and the QA Manger conduct assessments annually of QA activities under their control. The managers report the results to the Chief Operating Officer & Chief Nuclear Officer 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 ~~and~~, QA Level 1 Graded, and QA Level 2AC activities shall be certified in accordance with LES procedures that meet the requirements of 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 ~~or~~, QA Level 1 Graded, or QA Level 2AC activities shall be certified in accordance with LES procedures that meet the requirements of 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 or QA Level 1 Graded activities shall be certified in accordance with LES procedures that meet the requirements of 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 19 PROVISIONS FOR CHANGE

The LES QAPD is kept current as the design, construction, operation, (including maintenance and modification) and decommissioning activities progress. Appropriate changes to the QAPD 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 QAPD that do not reduce NRC license commitments, shall be incorporated in this QAPD and submitted to the NRC within 30 days of implementation. 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.

10 CFR 21 APPLICABILITY FOR SUPPORT EQUIPMENT

QA Level 2AC Support Equipment is included in the Administrative Control IROFS boundary. Support Equipment is identified in SAR Table 3.4-1. This is equipment the worker may rely upon to take action with a level of quality commensurate with its importance to the worker's safety function. If the equipments failure to function does not represent a *substantial safety hazard* as defined in 10 CFR 21.3, then 10 CFR Part 21 requirements do not apply.

> Substantial safety hazard *means a loss of safety function to the extent that there is a major reduction in the degree of protection provided to public health and safety for any facility or activity licensed or otherwise approved or regulated by the NRC (under part 70 of this chapter).*

The loss of this Support Equipment must not represent a loss of a specified safety function of the IROFS. The safety function must be the worker action portion of the Administrative Control IROFS. If such Support Equipment should fail to function, then other available equipment and sufficient time to evaluate and take actions must be available to the worker. Additionally, the use of this equipment must be a precursor for the worker to take action to meet the safety performance requirements of the administrative control. Failure of this equipment would generally result in the failure of a precursor action and the evolution would be terminated before an accident could take occur. For example, UF_6 should not be introduced into an empty cylinder (IROFS16a), the filling of a cylinder should be terminated (IROFS38), feed flow should be secured to the cascade (IROFSC22).

SAR Table 3.4-1 identifies Support Equipment. Support Equipment meets QA Level 2AC requirement. The addition of Support Equipment to the Administrative Control IROFS boundary and use of management measures serve to enhance plant safety and worker response to postulated accident sequences in the Integrated Safety Analysis. Instrumentation or operated Support Equipment associated with Administrative Control IROFS must not have a failure that

could result in a consequence which meets the criteria of a *substantial safety hazard*; otherwise, 10 CFR Part 21 would apply to Support Equipment.

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 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 Manager and has the organizational independence and authority to execute an effective audit process to meet all requirements of the QAPD. 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 ~~and,~~ QA Level 1 Graded, and QA Level 2AC 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 determination of the effectiveness of the QAPD. Internal audits to determine QAPD 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 -QAPD applicable to LES workscope. These evaluations should include an assessment of the effectiveness of the applicable and active elements of the QAPD based upon previous audit results and corrective actions, nonconformance reports, identified trends, and significant organizational changes. Audits maybe supplemented by QA Surveillances conducted in accordance with approved procedures to ensure that QA is providing sufficient oversight of important QAPD activities. These surveillances are performed by the QA organization.

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.

SECTION 20 QUALITY ASSURANCE PROGRAM FOR QA LEVEL 2

This section outlines LES defined Quality Assurance Program for QA Level 2 requirements. For contractors, the QA Level 2 program shall be described in documents that must be approved by LES.

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 ISO program is reviewed and approved by the LES QA Manager.

QA Level 2 program activities are those activities that do not meet the requirements for inclusion in the QA Level 1 ~~or~~, QA Level 1 Graded, or QA Level 2AC program, but have elements or characteristics that may warrant control under a quality program more detailed than the QA Level 3 program. QA Level 2 requirements may be applied to activities and SSCs for the following reasons:

- To minimize the adverse consequences of radiation to the worker, public and the environment after initiation of accidents involving licensed material or their byproducts.
- To minimize the adverse consequences of hazardous chemicals produced from licensed material, such as UF_6, to the worker, public and the environment after initiation of releases or accidents.
- Other items/processes that management decides are a good practice.

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

SECTION 22 QUALITY ASSURANCE PROGRAM FOR QUALITY ASSURANCE LEVEL 2AC

This section outlines the requirements for the QL-2AC Program. This section applies only to QL-2AC components. The requirements of this section are intended to provide reasonable assurance that QL-2AC components will fulfill their intended function, e.g., accurate and reliable indication or valve closure. The QL-2AC Program is based upon the following:

Management measures will be identified for QL-2AC components in accordance with LES procedures.

Activities for QL-2AC components, to ensure reliability and accuracy, include initial calibration and periodic inservice calibration checks.

QA Level 2AC program activities are those activities that do not meet the requirements for inclusion in the QA Level 1 or QA Level 1 Graded. QA Level 2 AC apply to the Administrative Control IROFS Support Equipment identified in Table 3.4-1 of the Safety Analysis Report.

SECTION 22.1 ORGANIZATION

The organization, lines of responsibility and authority are established and documented.

SECTION 22.2 QUALITY ASSURANCE PROGRAM

The program will provide for indoctrination and training, as necessary, of personnel performing activities affecting quality to assure that suitable proficiency is achieved and maintained.

LES will assess the adequacy of that part of the program for which QL-2AC applies to assure its effective implementation.

SECTION 22.3 DESIGN CONTROL, DESIGN DOCUMENTATION AND RECORDS

LES will specify applicable design requirements for QL-2AC components. QL-2AC components will be identified in applicable design documents.

SECTION 22.4 PROCUREMENT

QL-2AC components will be procured in accordance with the LES QL-3 procurement process. In order to remain consistent with past procurement of QL-2AC items or where additional quality management measures are desired, vendors who are certified to an International Organization for Standardization (ISO) 9000 series QA program may be acceptable for QA Level 2AC applications provided the ISO program complies with LES QAPD requirements identified for the respective item and it is reviewed and approved by LES QA Manager.

SECTION 22.5 INSTRUCTIONS, PROCEDURES, AND DRAWINGS

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 and to the level of detail necessary.Work activities are performed in accordance with written procedures. Procedures will contain the actions, acceptance criteria,

and methods for evaluation to ensure prescribed activities have been satisfactorily accomplished.

SECTION 22.6 DOCUMENT CONTROL

Documents that furnish documentary evidence of quality of critical elements are specified, prepared, and maintained. Documents will be legible, identifiable, and retrievable. Documents are protected against damage, deterioration, and loss. Requirements and responsibilities for document transmittal, distribution, retention, maintenance, and disposition are established.Requirements for the identification, generation, and control of Quality Assurance Documents for the QL-2AC components will be in accordance with the requirements of Section 6 of the QAPD.

SECTION 22.7 CONTROL OF PURCHASED MATERIAL, EQUIPMENT AND SERVICES

Measures are established to ensure conformance with procurement specifications and documents.

LES will define critical elements applicable to the components and material.

SECTION 22.8 IDENTIFICATION AND CONTROL MATERIALS, PARTS AND COMPONENTS

The controls necessary to ensure that only correct and accepted items are used or installed will be required and specified in implementing procedures, including requirements for identification of materials, parts and components.

SECTION 22.9 CONTROL OF SPECIAL PROCESSES

This section is not applicable to QL-2AC components.

SECTION 22.10 INSPECTION

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.

SECTION 22.11 TEST CONTROL

Procedures will provide management controls for testing of QL-2AC components. Documents generated utilizing these procedures will contain controls such as hold points, activity checklists, and in many cases, step-by-step sign-offs which indicate the status of testing.

SECTION 22.12 CONTROL OF MEASURING AND TEST EQUIPMENT

Processes affecting quality of items or services are controlled. 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.

For calibration of components that have Material Control and Accounting calibration requirements imposed on them, the MC&A calibration is considered equivalent.

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.

SECTION 22.13 HANDLING, STORAGE, AND SHIPPING

Handling, storage, cleaning, packaging, shipping and preservation of QL-2AC components is controlled in accordance with requirements of work control documents, shipping instructions or other specified documents, as applicable, to prevent damage or loss and to minimize deterioration.

Measures will be established for marking and labelling for the packaging, shipping, handling and storage of items, as necessary, to adequately identify, maintain and preserve QL-2AC components. Markings and labels will indicate the presence of special environments or the need for special controls, if necessary.

SECTION 22.14 INSPECTION, TEST, AND OPERATING STATUS

This section establishes requirements for LES to identify the status of inspection and test activities associated with QL-2AC components. 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 travellers, stamps, inspection records or other suitable means). The authority for application and removal of tags, markings, labels and stamps are specified. Status indicators will also provide for indicating the operating status of systems and components of the facility (i.e., tagging valves and switches) to prevent inadvertent operation.

Procedures will provide management controls for installation, testing or repair of QL-2AC components. Documents generated utilizing these procedures will contain controls, such as, hold points, activity checklists, and in many cases, step-by-step signoffs which indicate the status of installation, inspections, and tests. 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 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.

Controls will be established for changing the sequence of inspections, tests, and other activities which require the same controls as the original review and approval.

SECTION 22.15 NONCONFORMING ITEMS

Controls for the Nonconforming Items for the QL-2AC components will be in accordance with the requirements of Section 15 of the QAPD.

SECTION 22.16 CORRECTIVE ACTION

Corrective Action requirements for the QL-2AC components will be in accordance with the requirements of Section 16 of the QAPD.

SECTION 22.17 QUALITY ASSURANCE RECORDS

Requirements for the identification, generation and control of Quality Assurance Records for the QL-2AC components will be in accordance with the requirements of Section 17 of the QAPD.

SECTION 22.18 AUDITS

Auditing requirements for the QL-2AC components will be in accordance with the requirements of Section 18 of the QAPD.

SECTION 22.19 PROVISIONS FOR CHANGE

Any removal of management measures designed to provide assurance of the Administrative Control IROFS Support Equipment used by the worker, or removal of the Administrative Control IROFS Support Equipment quality requirements, would be considered a reduction in commitment and require regulatory approval prior to implementation.

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INTEGRATED SAFETY ANALYSIS SUMMARY

LAR-10-04

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G. Tails Take-off System

3.4.8.5 Design and Safety Features

This system is designed and constructed to provide safe operation for plant personnel as well as the general public. Principal design features are as follows:

A. All piping, vessels and pumps in the Contingency Dump System operate at subatmospheric UF_6 pressure.

B. Piping is all welded construction and process valves are bellow sealed.

C. Before carrying out any disconnections or connections of equipment, the piping is evacuated and nitrogen purged. Flexible exhaust hoses connected to the Pumped Extract GEVS via a temporary local extract cross-connection, during initial plant operations, remove any releases from the work area.

D. Before discharge to the Pumped Extract GEVS, all gases flow across activated carbon and aluminum oxide to remove any traces of UF_6 and HF via the Contingency Dump System Vacuum Pump/Chemical Trap Set.

E. Monitoring of fill level of NaF trap when charging the NaF trap.

F. Hydrocarbon lubricants are not used. The rotary vane vacuum pumps are lubricated with perfluorinated polyether (PFPE) oil, a fully fluorinated synthetic oil.

G. The potential for capture of UF_6 and HF in the NaF traps is maximized by operation of the Contingency Dump System in a passive mode. In passive evacuation mode the flow of UF_6 from the cascade is restricted to the NaF traps and buffer volume by valving.

H. The main electrical supply is supported by a Standby Diesel Generator System for electrical services essential to equipment protection. In the case of a power failure the UF_6 valves will retain their position because their control is via a 24 VDC uninterruptible power supply (UPS). On loss of the UPS the valves will revert to a fail-safe position.

I. Compressed air has a high reliability in normal operation with sufficient capacity at the pressure reservoir for a safe shut down. To protect against a compressed air failure, all air driven valves are fitted with check valves to ensure that the valve retains a position of at least 50% for six hours.

J. The potential for a criticality arising in the systems and components associated with a cascade dump (e.g., Tails LTTS, 48Y cylinder, NaF traps buffer volume, piping, etc.) is prevented by ~~controlling the maximum enrichment of the cascade through the use of IROFSC6 and performing a mass balance through the use of IROFSC22~~enrichment control, which ~~in turn~~ limits the upper bound for the average enrichment of the assay (1.5%). The systems and components associated with a cascade dump are bounded by this average cascade enrichment and the criticality safety approvals for the items are granted based on 1.5% ^{235}U.

Table 3.7-1 Accident Sequence and Risk Index

Accident Identifier	Initiating Event Index	Preventive Safety Parameter 1 or IROFS 1 Failure Index	Preventive Safety Parameter 2 or IROFS 2 Failure Index	Mitigation IROFS Failure Index	Likelihood Index T Uncontrolled (U) / Controlled (C)	Likelihood Category	Conseq. Category (Type of Accident)	Risk Index (h=f x g) Uncontrolled (U) / Controlled (C)	Comments and Recommendations
	(a)	(b)	(c)	(d)	(e)	(f)	(g)	(h)	
EC3-1	-2	IROFSC22~~(IROFS C6)~~ -3	N/A~~IROFSC22 -3~~	N/A	-~~5~~8 (C)	1	3 (CR)	3 (C)	Acceptable Risk
EC4-1	-2	N/A	N/A	N/A	-2 (U)	3	3 (T)	9(U)	IROFS Required
EC 4-1	-2	N/A	N/A	(IROFSC21) (Failure, -3)	-5 (C)	1	3 (T)	3 (C)	Acceptable Risk
EC4-1	-2	N/A	N/A	(IROFSC21) (Success)	-2 (C)	3	1 (T)	3 (C)	Acceptable Risk
TP8-1	-2	N/A	N/A	N/A	-2 (U)	3	3 (T)	9 (U)	IROFS Required
TP8-1	-2	(IROFSC15) -2	(IROFSC16) -2	N/A	-6 (C)	1	3 (T)	3 (C)	Acceptable Risk
TP8-2	-2	N/A	N/A	N/A	-2 (U)	3	1(T)	3(U)	Acceptable Risk
CHEM RELEASE-WORKER EVAC	-2	N/A	N/A	N/A	-2 (U)	3	3 (T)	9 (U)	IROFS Required
CHEM RELEASE-WORKER EVAC	-2	N/A	N/A	IROFS39c -3	-5 (C)	1	3 (T)	3 (C)	Acceptable Risk
CHEM RELEASE – WORKER EVAC – CAB	-2	N/A	N/A	N/A	-2 (U)	3	2 (T)	6 (U)	IROFS Required
CHEM RELEASE – WORKER EVAC – CAB	-2	N/A	N/A	IROFS39c -2	-4 (C)	2	2 (T)	4 (C)	Acceptable Risk
LOSS OF SAFE-BY-DESIGN ATTRIBUTE	-5	N/A	N/A	N/A	-5 (U)	1	3(CR)	3(U)	Acceptable Risk

Table 3.7-2 Accident Sequence Descriptions

Accident Identifier: EC3-1

The initial failure (initiating event) is failure of criticality enrichment control by failing to properly control the UF_6 enrichment process. The maximum enrichment of a single cascade is limited by mechanical enrichment control devices. This failure is initiated by the improper setting of the cascade enrichment control devices. In addition, other failures are assumed to occur such as (1) a leak must exist within the product system to cause breakdown build-up in an otherwise safe by geometry component, or allow moderator into the product cylinder and (2) a significant period of time is required to allow a significant build-up of product, breakdown and/or moderator. The combination of these conditions is assumed to result in a criticality event.

For the uncontrolled accident sequence there is a failure of criticality enrichment control by failing to properly control the UF_6 enrichment process. A criticality event is assumed to result for this accident sequence. A criticality event is assumed to result in a high consequence to the worker and public.

For the controlled accident sequence, the preventive measure is to ~~s are: (1): calculate and set the cascade enrichment control device in accordance with the calculation to ensure < 5 $^{w}/_{e}$ ^{235}U enrichment to ensure sub criticality within the designed process (IROFSC6), and (2)~~ perform the cascade process mass balance on a periodic basis to ensure subcriticality, in accordance with the nuclear criticality safety analysis (IROFSC22). If the acceptance criterion is not met ~~and the cascade enrichment control device setting has not been changed, then the cascade enrichment control device setting shall not be changed. If the acceptance criterion is not met and the cascade enrichment control device setting has been changed,~~ then feed flow into all cascades of the associated assay~~cascade~~ shall be isolated such that no additional ~~UF_6 can enter or exit the cascade~~enrichment can occur.

The frequency index number for the initiating event was determined to be (-2). The NUREG-1520 criteria – no failures of this type in this facility in 30 yrs – applies. This failure frequency index was selected based on evidence from history of similarly designed Urenco European plants, which have a combined plant history of greater than 30 yrs, and have not had a failure of this type.

~~A failure probability index of (-3) was selected for IROFSC6. This corresponds to an enhanced administrative IROFS per NUREG-1520. IROFSC6 is enhanced by requiring independent verification of the IROFS safety function. The IROFS justification for enhanced administrative control is discussed in Section 3.8.3.~~

A failure probability index of (-3) was selected for IROFSC22. This corresponds to an enhanced administrative IROFS per NUREG-1520. IROFSC22 is enhanced by requiring independent verification of the IROFS safety function. This IROFS justification for enhanced administrative control is discussed in Section 3.8.3.

(4) Sufficient time is available for the site to detect the event and notify workers to evacuate the area(s) of concern.

3.8.3.45 IROFS45 Basis for Enhanced FPIN

The enhanced (i.e., Index of "-3") administrative control to ensure subcritical geometry, by verifying that the stored cylinders containing enriched uranium in the CRDB and Blending and Liquid Sampling Areas are in a horizontal, co-planar (i.e., non-stacked), condition and that no other cylinder containing enriched uranium is in movement in the associated area, is based on the following factors:

The failure to ensure that the required conditions are met for subcritical geometry will be precluded by independent verification prior to moving a cylinder containing enriched uranium in the CRDB or the Blending and Liquid Sampling Area. This enhancement shall meet the requirements for independent verification identified in Section 3.8.1.

~~3.8.3.C6 IROFSC6 Basis for Enhanced FPIN~~

~~The enhanced (i.e., Index of "-3") administrative control to calculate and set the cascade enrichment control device in accordance with the calculation to ensure ^{235}U enrichment < 5 $^{w}/_{e}$ to ensure subcriticality within the designed process and analyzed activities is based on the following factors:~~

~~Exceeding the ^{235}U enrichment license limit of 5 $^{w}/_{e}$ will be precluded by independent verification of the cascade enrichment control device setting calculation prior to changing the cascade enrichment control device setting and independent verification of implementation of the enrichment control device setting within 1 hour after changing the cascade enrichment control setting. This enhancement shall meet the requirements for independent verification identified in Section 3.8.1.~~

3.8.3.C22 IROFSC22 Basis for Enhanced FPIN

The enhanced (i.e., Index of "-3") administrative control, to perform the cascade process mass balance on a periodic basis to ensure subcriticality in accordance with the nuclear criticality safety analysis, is based on the following factors:

Subcriticality will be ensured by independent verification of the cascade process mass balance. This enhancement shall meet the requirements for independent verification identified in Section 3.8.1.

3.8.3.50a IROFS50a Basis for Enhanced FPIN

The enhanced (i.e., Index of "-3") administrative IROFS to control proximity of a site construction vehicle relative to the UBC Storage Pad is based on the use of a physical device (barrier of sufficient strength to alert the operator). However, the index is increased by an order of magnitude for conservitism.

3.8.3.50b IROFS50b Basis for Enhanced FPIN

Table 3.8-1 Items Relied On For Safety (IROFS)

IROFS	Accident Sequence	Type of Accident	Type (1)	Class (2)	Description of Safety Function	FPIN (3)	FPIN Basis (4)
IROFS47a	*PB3-3 * (See Table 4.1-3)	Chemical	PEC	B	Flow restriction to ensure, in the event of postulated release, worker consequences of inhalation of uranic material and HF are low. This is implemented by a valve, on the suction of the vacuum pump, with a maximum flow rate that is less than the flow rate assumption of the consequence analyses.	-3	N/A
IROFS47b	*VR1-5 * (See Table 4.1-3)	Chemical	PEC	B	Flow restriction to ensure, in the event of postulated release, worker consequences of inhalation of uranic material and HF are low. This is implemented by a valve, on the suction of the vacuum pump, blocked such that the maximum flow rate is less than the flow rate assumption of the consequence analyses.	-3	N/A
~~IROFSC6~~	~~EC3-1~~	~~Criticality~~	~~AC~~	~~B~~	~~Administratively calculate and set the cascade enrichment control device in accordance with the calculation to ensure ^{235}U enrichment < 5 $^{w}/_{0}$ to ensure subcriticality within the designed process and analyzed activities.~~ ~~This is implemented by ensuring the calculation performed accurately, and the associated cascade enrichment control device setting is implemented in accordance with the calculation. The 5 $^{w}/_{0}$ limit is based on the NEF Materials License limit and consistent with the Nuclear Criticality Safety Analyses to ensure subcriticality within the designed process and analyzed activities. If the acceptance criterion is not met and the cascade enrichment control device setting has not been changed, then the cascade enrichment control device setting shall not be changed. If the acceptance criterion is not met and the cascade enrichment control device setting has been changed, then the associated cascade shall be isolated such that no additional UF_6 can enter or exit the cascade.~~	~~-3~~	~~3.8.3.C6~~

Table 3.8-1 Items Relied On For Safety (IROFS)

IROFS	Accident Sequence	Type of Accident	Type (1)	Class (2)	Description of Safety Function	FPIN (3)	FPIN Basis (4)
IROFSC22	EC3-1	Criticality	AC	A~~B~~	Administratively perform the cascade process mass balance on a periodic basis to ensure subcriticality. This is implemented by ensuring the mass balance is performed accurately, and the change in mass is consistent with expected changes based on the enrichment settings and consistent with the Nuclear Criticality Safety Analyses to ensure subcriticality within the designed process and analyzed activities	-3	3.8.3.C22
IROFSC15	TP8-1	Chemical	AEC	B	Automatic trip of the Centrifuge Test Facility feed/take-off vessel Huber Unistat 815 heater unit on high temperature to ensure feed/take-off vessel integrity. This is implemented with a thermocouple temperature sensor for automatic, hardwired, fail-safe, high temperature trip of the Centrifuge Test Facility feed/take-off vessel Huber Unistat 815 heater unit. Setpoint based on centrifuge integrity calculation.	-2	N/A
IROFSC16	TP8-1	Chemical	AEC	B	Automatic trip of the Centrifuge Test Facility feed/take-off vessel Huber Unistat 815 heater unit on high temperature to ensure feed/take-off vessel integrity. This is implemented with a RTD temperature sensor for automatic, hardwired, fail-safe, high temperature trip of the Centrifuge Test Facility feed/take-off vessel Huber Unistat 815 heater unit. Setpoint conservative with respect to assuring feed/take-off vessel integrity.	-2	N/A
IROFSC21	PT5-1	Chemical	PEC	A	Flow restrictions to ensure in the event of a release that worker consequences of inhalation of uranic material and HF are low. This is implemented by a passive engineered flow restriction device on the suction of the vacuum pump such that the maximum flow rate is less than the flow rate assumption of the consequence analysis.	-3	N/A

Table 3.8-2 Sole Items Relied On For Safety (IROFS)

IROFS Identifier	Accident Sequence	Type of Accident	Type of IROFS	Title
IROFS39d	EE-CHEM RELEASE-WORKER EVAC-CAB EE-TORNADO MISSILE – SBM – CRDB SHELL & BUNKER WORKER (T)	Chemical	AC	Administratively limit exposure by requiring worker action to evacuate area(s) of concern to ensure worker consequences of inhalation of uranic material and HF are low.
IROFS45	PB1-3 RD1-1	Criticality	AC	To ensure subcriticality geometry, prior to moving a cylinder containing enriched uranium in the CRDB or the Blending and Liquid Sampling Area, verify that the stored cylinders containing enriched uranium in these areas are in a horizontal, co-planar (i.e., non-stacked), condition and that no other cylinder containing enriched uranium is in movement in the associated area.
IROFSC22	EC3-1	Criticality	AC	Administratively perform the cascade process mass balance on a periodic basis to ensure subcriticality.
IROFSC21	PT5-1	Chemical	PEC	Flow restriction to ensure in the event of a release that worker consequences of inhalation of uranic material and HF are low.
IROFSC21	TT3-1 EC4-1	Chemical	PEC	Flow restriction to ensure in the event of a release that worker consequences of inhalation of uranic material and HF are low.