UNITED STATES
NUCLEAR REGULATORY COMMISSION
REGION II
245 PEACHTREE CENTER AVENUE NE, SUITE 1200
ATLANTA, GEORGIA 30303-1257

April 12, 2018

EA-18-023
EN 52886
EN 53046

Stephen Cowne, Chief Nuclear Officer
and Compliance Manager
URENCO USA
P.O. Box 1789
Eunice, NM 88231

SUBJECT: LOUISIANA ENERGY SERVICES, LLC (LES), dba URENCO USA (UUSA) – NUCLEAR REGULATORY COMMISSION INTEGRATED INSPECTION REPORT 70-3103/2018-002

Dear Mr. Cowne:

This letter refers to the inspections and in-office reviews conducted from January 1 through March 31, 2018, at the URENCO USA facility located in Eunice, New Mexico. The purpose of these inspections were to determine whether licensed activities were conducted safely and in accordance with U.S. Nuclear Regulatory Commission (NRC) requirements. The enclosed report presents the results of these inspections, which were discussed with you and members of your staff on March 29 and April 10, 2018.

These inspections examined activities conducted under your license, as they related to public health and safety, to confirm compliance with NRC rules and regulations and with the conditions of your license. The inspection areas covered Operational Safety, Nuclear Criticality Safety, Maintenance and Surveillance of Safety Controls, and Other Areas. Within these areas, the inspections consisted of examination of selected procedures and representative records, observations of activities, and interviews with personnel.

Based on the results of these inspections an apparent violation (AV) was identified and is being considered for escalated enforcement action in accordance with the NRC Enforcement Policy. The current Enforcement Policy is included on the NRC's Web site at http://www.nrc.gov/about-nrc/regulatory/enforcement/enforce-pol.html. The AV involved the failure to implement administrative criticality controls for a product cylinder as described in Event Notification (EN) 53046, dated October 31, 2017, and Section C.1 of the enclosed inspection report.

In addition, since you identified the violation and based on our understanding of your corrective actions, a civil penalty may not be warranted in accordance with Section 2.3.4 of the Enforcement Policy. The final decision will be based on you confirming on the license docket that the corrective actions previously described to the NRC staff have been or are being taken.

Before the NRC makes its enforcement decision, we are providing you an opportunity to: (1) respond to the apparent violation addressed in this inspection report within 30 days of the date of this letter, or (2) request a Pre-decisional Enforcement Conference (PEC). If a PEC is held, the NRC will issue a press release to announce the time and date of the conference. If you decide to participate in a PEC, please contact Omar López-Santiago at 404-997-4703 within 10 days of the date of this letter. A PEC should be held within 30 days of the date of this letter.

If you choose to provide a written response, it should be clearly marked as a "Response to an Apparent Violation in NRC Inspection Report (70-3103/2018-002); EA-18-023" and should include: (1) the reason for the AV or, if contested, the basis for disputing the AV (2) the corrective steps that have been taken and the results achieved; (3) the corrective steps that will be taken; and (4) the date when full compliance will be achieved. Your response may reference or include previously docketed correspondence, if the correspondence adequately addresses the required response. Additionally, your response should be sent to the NRC's Document Control Center, with a copy mailed to Omar López-Santiago, U.S. NRC Region II, Marquis One Tower, 245 Peachtree Center Avenue N.E., Suite 1200, Atlanta, GA 30303, within 30 days of the date of this letter. If an adequate response is not received within the time specified or an extension of time has not been granted by the NRC, the NRC will proceed with its enforcement decision or schedule a PEC.

If you choose to request a PEC, the conference will afford you the opportunity to provide your perspective on these matters and any other information that you believe the NRC should take into consideration before making an enforcement decision. The decision to hold a PEC does not mean that the NRC has determined that a violation has occurred or that enforcement action will be taken. This conference would be conducted to obtain information to assist the NRC in making an enforcement decision. The topics discussed during the conference may include information to determine whether a violation occurred, information to determine the significance of a violation, information related to the identification of a violation, and information related to any corrective actions taken or planned. In presenting your corrective action, you should be aware that the promptness and comprehensiveness of your actions will be considered in assessing any civil penalty for the apparent violations. The guidance in NRC Information Notice 96-28, "Suggested Guidance Relating to Development and Implementation of Corrective Action," may be helpful.

In addition, please be advised that the number and characterization of AVs described in the enclosed inspection report may change as a result of further NRC review. You will be advised by separate correspondence of the results of our deliberations on this matter.

The enclosed inspection report also documents a licensee-identified non-cited violation (NCV) of NRC requirements for the failure to implement administrative controls prior to operating the small component decontamination train as described in EN 52886, dated August 4, 2017, and Section C.2 of the enclosed inspection report. This violation was being considered for escalated enforcement action but the NRC's safety significance evaluation determined that it would be dispositioned as an NCV in accordance with the NRC Enforcement Policy.

In accordance with 10 CFR 2.390 of the NRC's "Rules of Practice," a copy of this letter, its enclosure, and your response, if you choose to provide one, will be made available electronically for public inspection in the NRC Public Document Room or from the NRC's Agencywide Documents Access and Management System (ADAMS), accessible from the NRC Web site at http://www.nrc.gov/reading-rm/adams.html. To the extent possible, your response should not include any personal privacy, proprietary, or safeguards information so that it can be made available to the Public without redaction.

If you have any questions regarding this matter, please contact Omar López-Santiago, Chief Projects Branch 1, at (404) 997-4703.

Sincerely,

/RA/

Mark S. Lesser, Director
Division of Fuel Facility Inspection

Docket No. 70-3103
License No. SNM-2010

Enclosure:
Inspection Report No. 70-3103/2018002
w/Attachment: Supplemental Information

cc: (See page 3)

cc:

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SUBJECT: LOUISIANA ENERGY SERVICES, LLC (LES), dba URENCO USA (UUSA) – NUCLEAR REGULATORY COMMISSION INTEGRATED INSPECTION REPORT 70-3103/2018-002

DISTRIBUTION:
M. Lesser, RII
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K. Sturzebecher, NMSS
PUBLIC

☒ PUBLICLY AVAILABLE ☐ NON-PUBLICLY AVAILABLE ☐ SENSITIVE ☒ NON-SENSITIVE
ADAMS: ☒ Yes ACCESSION NUMBER:ML18102B168 ☒ SUNSI REVIEW COMPLETE ☒ FORM 665 ATTACHED

OFFICE	RII:DFFI	RII:DFFI	RII:DFFI	RII:DFFI	RII:DFFI	RII:DFFI	DC	RII: DFFI
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NAME	TSippel	JRivera	BAdkins	NPitoniak	KKirchbaum	PStartz	KKirchbaum	OLópez-Santiago
DATE	04/11/2018	04/12/2018	04/5/2018	04/9/2018	04/11/2018	04/10/2018	04/11/2018	04/11/2018
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U. S. NUCLEAR REGULATORY COMMISSION
REGION II

Docket No.:	70-3103
License:	SNM-2010
Report No.:	70-3103/2018002
Licensee:	Louisiana Energy Services (LES), LLC
Facility:	URENCO USA (UUSA)
Location:	Eunice, NM
Inspection Dates:	January 1, through March 31, 2018
Inspectors:	B. Adkins, Senior Fuel Facility Inspector (Section A.2) N. Pitoniak, Senior Fuel Facility Project Inspector (Section A.1) J. Rivera, Senior Fuel Facility Project Inspector (Section C.1 and C.2) T. Sippel, Fuel Facility Inspector (Section C.1 and C.2) P. Startz, Fuel Facility Inspector (Section B.1)
Approved:	M. Lesser, Director Division of Fuel Facility Inspection

Enclosure

EXECUTIVE SUMMARY

Louisiana Energy Services, LLC (LES)
dba URENCO USA (UUSA)
Nuclear Regulatory Commission Integrated Inspection Report 70-3103/2018-002
January 1 – March 31, 2018

Regional inspectors from the U.S. Nuclear Regulatory Commission (NRC) conducted announced inspections during normal shifts and in-office reviews. The inspectors performed a selective examination of licensee activities by direct observation of safety-significant activities and equipment, tours of the facility, interviews and discussions with licensee personnel, and a review of facility records.

Safety Operations

- The inspectors reviewed a sample of activities in the Operational Safety area to verify compliance with conditions of the license and regulatory requirements. No violations of more than minor significance were identified. (Section A.1)

- The inspectors reviewed a sample of activities in the Nuclear Criticality Safety area to verify compliance with conditions of the license and regulatory requirements. No violations of more than minor significance were identified. (Section A.2)

Facility Support

- The inspectors reviewed a sample of activities in the area of Maintenance and Surveillance of Safety Controls to verify compliance with license and regulatory requirements. No violations of more than minor significance were identified. (Section B.1)

Other Items

- The inspectors performed follow-up inspection activities for Event Notification (EN) 53046 and the associated written follow-up report (LER 2017-002). An apparent violation (AV) of NRC requirements was identified and is being considered for escalated enforcement action. Inspection items EN 53046 and LER 2017-002 are considered closed to AV 70-3103/2018-002-01, “Wrong IROFS Procedure Followed Prior to Filling Cylinder.” (Section C.1)

- The inspectors performed follow-up inspection activities for EN 52886 and the associated written follow-up report (LER 2017-001). The inspection resulted in a licensee-identified, Severity Level (SL)-IV, non-cited violation (NCV) of NRC requirements. Inspection items EN 52886 and LER 2017-001 are considered closed to NCV 70-3103/2018-002-02, “Administrative Criticality Controls Not Used.” (Section C.2)

Attachment

Key Points of Contact
List of Report Items
Inspection Procedures Used
Documents Reviewed

REPORT DETAILS

Summary of Plant Status

The URENCO USA facility enriches uranium hexafluoride (UF_6) using a gas centrifuge technology. During the inspection period, the licensee conducted routine plant operation of the operating cascades.

A. Safety Operations

1. Operational Safety (Inspection Procedure (IP) 88020)

a. Inspection Scope

The inspectors reviewed site requirements contained in the Safety Analysis Report (SAR) and LES License Application, Chapter 11. The inspectors interviewed staff and reviewed records associated with the Multifunction Decontamination Train (MFDT).

The inspectors reviewed records, interviewed operators and technicians, and observed surveillance activities to verify that items relied on for safety (IROFS) associated with the MFDT and required for system operation per the integrated safety analysis (ISA) were available and reliable.

The inspectors conducted a walk-down of the MFDT with approved system diagrams to verify that the actual equipment status and lineup were in accordance with the approved configuration. The inspectors attended a pre-job brief with two operators and an operations supervisor for sampling the MFDT. The inspectors observed four operators conduct sampling activities to verify the status of IROFS 57a and 57b in accordance with Procedure RW-3-4000-02, “Startup, Operation and Shutdown of the Multi-Function Decontamination Train,” Attachment 5, Revision (Rev.) 10. The inspectors reviewed radiation work permit (RWP) 18-011, associated with the sampling activities to verify the radiological safety requirements during sampling activities.

The inspector reviewed the postings applicable to the tasks being observed to determine if these postings were current, reflected safety controls, and were followed by the operators. The inspectors reviewed training and qualification records for two operators to verify qualifications were current to operate the MFDT.

The inspectors reviewed records to verify ventilation lineups were completed and documented in accordance with Procedure RW-3-4000-02-F-7, “IROFS 24c Verification Data Sheet prior to Conducting MFDT System Operations.”

The inspectors reviewed records and interviewed two chemistry laboratory technicians to verify that IROFS training for the MFDT was current and technicians were knowledgeable of requirements. The inspectors performed independent calculations of the most recent MFDT sampling results for IROFS 56a, 56b, 57a, and 57b to verify these were accurate and met acceptance criteria prior to MFDT system operations.

The inspectors reviewed the most recent operations self-assessment, SA-2017-012, "Shift Operations Self- Assessment," and the licensee's corrective action program (CAP) entries for the past 12 months to verify that deviations from procedures and unforeseen process changes affecting nuclear criticality, chemical, radiological, or fire safety were documented and investigated promptly. Also, the inspectors reviewed the corrective actions associated with the entries related to operational safety to determine the status.

b. Conclusion

No violations of more than minor significance were identified.

2. Nuclear Criticality Safety (IP 88015)

a. Inspection Scope

Criticality Analysis

The inspectors reviewed selected criticality safety evaluations (CSEs) and Criticality Safety Analyses (CSAs) to verify that they were consistent with the commitments in the SAR, including the consideration of the Double Contingency Principle, assurance of subcriticality under normal and credible abnormal conditions with the use of subcritical margin, technical practices and methodologies, and treatment of Nuclear Criticality Safety (NCS) parameters. The criticality safety basis documentation were selected based on factors such as risk-significance, unusually heavy reliance on administrative controls, and operating history (recent events). The CSE/CSA review focused on NCS-CSA-035, "Criticality Safety Analysis of the Multifunction Decontamination Train."

The inspectors reviewed the licensee's generation of accident sequences to determine whether the criticality safety basis documentation systematically identified normal and credible abnormal conditions in accordance with the commitments and methodologies in the SAR for the analysis of process upsets. The inspectors also reviewed the revised process hazards analysis (PHA) for the MFDT as documented in ISA-MEM-0032, "Decontamination System HAZOP and Risk Determination Analysis with Supplemental Information on LECTS," which also identified credible process upsets.

The inspectors verified that there were no changes to the validation report since the last NCS inspection; however, the inspectors were informed that URENCO USA is currently developing a license amendment request (LAR) to support future use of the Monte Carlo N-Particle (MCNP) criticality analysis software.

Criticality Implementation

The inspectors performed walk-downs of the MFDT to determine whether existing plant configuration and operations were covered by, and consistent with, the process description and safety basis in the applicable criticality safety basis documentation. The inspectors reviewed process and system descriptions and specifications to verify that engineered controls were included. The engineered controls reviewed included safe by design (SBD) aspects of the MFDT drip tray, MFDT filter housing, and distance between the MFDT drip tray and filter. The inspectors reviewed applicable portions of operating procedures (e.g. RW-3-4000-02), IROFS boundary definition documents (e.g., NEF-BD-56a/b & NEF-BD-57a/b), and postings to verify that selected administrative controls

established in the CSEs were included. The administrative control review focused on IROFS56a/b and IROFS57a/b. The inspectors interviewed operators and engineers to verify that administrative actions established in the CSEs were understood and implemented properly.

Criticality Operational Oversight

The inspectors reviewed records of recent NCS weekly walkthroughs and accompanied a licensee NCS staff member on the weekly walkthrough of the vacuum pump rebuild workshop (NCSI-18-0013) to determine whether NCS staff routinely assessed field compliance with established NCS controls.

The inspectors reviewed the implementation of IROFS56a/b and IROFS57a/b to verify that the licensee had established controls to administratively limit uranic mass in the disassembly station, spray station, and cleaning baths of the MFDT. Specifically, the inspectors walked down the MFDT and interviewed operations and NCS staff concerning the implementation of these IROFS. The inspectors reviewed assumptions and calculations used in implementing the IROFS to ensure the selected mass limits were sufficient to prevent a criticality.

The inspectors reviewed records (e.g. Work Order (WO) 1000309998) and performed walk-downs to determine if the licensee adequately verified SBD dimensions for the MFDT prior to operations as required by Section 4.2.3 of American Nuclear Society 8.1, "Nuclear Criticality Safety in Operations with Fissionable Material Outside Reactors." The inspectors verified that the SBD features identified in the CSE were consistent with the as-built configuration of the MFDT as documented in MOD-17-0175A, "Multi-Function Decon Train Drip/Catch Basin Modification."

Criticality Programmatic Oversight

The inspectors conducted interviews and reviewed records to determine whether NCS staff reviewed new and/or revised fissile material operations and procedures, including maintenance plans, consistent with program procedures and at a level commensurate with their significance. The inspectors reviewed the selected criticality safety basis documents to verify that they were performed in accordance with NCS program procedures and received appropriate independent review and approval.

The inspectors reviewed SA-2017-002, "UUSA NCS Program Assessment," to verify that assessments of the NCS program were conducted at a frequency consistent with license requirements and with appropriate thoroughness. The inspectors conducted interviews and reviewed CAP entries to verify that audit observations and findings were communicated to licensee management and each were appropriately evaluated and closed. The inspectors reviewed records to verify that personnel participating in assessments had received the required training as required by Section 11.5 of the SAR.

The inspectors reviewed an NCS staff member's qualification record (E-NCS-CS-QG, "NCS Criticality Support Staff Qualification"), conducted interviews, and inquired into the number of qualified NCS staff available to implement the NCS program to verify that NCS engineers were qualified in accordance with license requirements. Additionally, the inspectors reviewed records and interviewed NCS staff to verify that NCS staff members only performed those functions for which they were qualified.

Criticality Incident Response and Corrective Action

The inspectors reviewed selected NCS-related CAP entries to determine whether anomalous conditions were promptly identified and entered into the CAP, whether they received the appropriate level of investigation consistent with license commitments and procedures, whether proposed corrective actions were sufficiently broad, whether they were prioritized on a schedule commensurate with their significance, and whether they were completed as scheduled and were adequate to prevent recurrence. Additionally, the inspectors reviewed NCS-related CAP entries to assess the need for reporting the issues to the NRC. The CAP entries reviewed included EV109638 and EV121791.

b. Conclusion

No violations of more than minor significance were identified.

B. Facility Support

1. Maintenance and Surveillance of Safety Controls (IP 88025)

a. Inspection Scope

The inspectors interviewed licensee staff, reviewed work control procedures, and evaluated the maintenance programmatic processes to evaluate compliance with paragraphs 4.9, 4.10, 6.0 and 11.2 of the SAR. Work orders were evaluated for adequate review and approval prior to work. The inspectors reviewed maintenance work activities on IROFS, including IROFS 1 & 2, and laboratory analysis and data management functions for IROFS 57/58 A/B. Specifically, the inspectors targeted whether work activities were conducted in accordance with licensee requirements and approved procedures.

The inspectors observed multiple maintenance teams conducting surveillance activities for selected IROFS and other safety-related controls and devices; including IROFS 4, temperature sensor systems (thermocouple/resistance temperature detectors or RTD); IROFS 24a/b/c, gas effluent ventilation system (GEVS); IROFS 57A/B, and 58A/B, laboratory sample analysis processes; a representative fire damper test and fire wall maintenance as required by paragraphs 7.1.4 and 7.3.2 of the SAR, and other selected safety systems to verify that work activities were conducted in accordance with licensee requirements and approved procedures.

The inspectors reviewed maintenance and surveillance WO packages for accuracy and to ensure that test packages challenged and verified operability of IROFS and safety controls as required by paragraph 6.4.3 of the SAR.

The inspectors reviewed the licensee's work control program to verify provisions were in place to ensure pre-job planning and preparation of WOs supporting maintenance and surveillance activities were conducted in accordance with Paragraph 11.1 of the SAR, "Configuration Management," and related operating procedures. The inspectors reviewed maintenance and surveillance WOs and post maintenance testing records for accuracy and to determine if the functionality of IROFS and safety controls were adequately challenged and verified operational in accordance with maintenance

procedures and ISA accident sequences. The inspectors observed several maintenance shift turnover meetings and pre-job briefings for maintenance activities to verify compliance with the work control program requirements.

The inspectors reviewed WOs prior to the commencement of work to verify the work was properly controlled and authorized, including observing the lockout tag out procedures. The inspectors interviewed maintenance staff and supervisors to assess the licensee's ability to safely conduct the work in accordance with license requirements and approved maintenance procedures. Work instructions were reviewed to verify they were accurate, contained the proper level of detail, and that post-maintenance testing and calibrations as specified by the license requirements were adequately performed prior to restoring the equipment to operational status.

The inspectors evaluated the training and qualification programs for maintenance personnel performing work on safety-related equipment, including IROFS. The inspectors reviewed the training and qualification records of maintenance personnel to verify the individuals were qualified to perform their assigned maintenance activities.

The inspectors reviewed selected maintenance-related CAP entries to determine compliance with paragraph 11.6 of the SAR and Section 16 of the Quality Assurance Program Document (QAPD), "Corrective Action." The evaluation determined whether anomalous conditions were promptly identified and entered into the CAP, whether they received the appropriate level of investigation consistent with license commitments and procedures, whether proposed corrective actions were sufficiently broad, whether they were prioritized on a schedule commensurate with their significance, and whether they were completed as scheduled and were adequate to prevent recurrence. Additionally, the inspectors reviewed maintenance-related CAP entries to assess the need for reporting the issues to the NRC.

b. Conclusion

No violations of more than minor significance were identified.

C. Other Areas

1. (Opened) Apparent Violation (AV) 70-3103/2018-002-01, "Wrong IROFS Procedure Followed Prior to Filling Cylinder," associated with Event Notification (EN) 53046 and Written Follow-up Report LER 2017002

a. Inspection Scope

On October 31, 2017, the licensee submitted EN 53046 describing an event involving a heeled cylinder that was inadvertently introduced into the product filling process as a new/clean cylinder. The discrepancy resulted in the completion of the incorrect IROFS for moderator control prior to connecting the cylinder to the filling process. On November 2, 2017, the licensee submitted an update to EN 53046 to address the likelihood of a criticality event based on the liquid sample results for the UF_6 product in the affected cylinder. On December 27, 2017, the licensee submitted a written follow-up report for EN 53046 in accordance with 10 CFR 70.74 (ADAMS ML17363A223), which was identified in NRC Inspection Report 70-3103/2017-005 as event report

LER 2017002 for tracking purposes (ADAMS ML18029A107). The written follow-up report included a detailed risk assessment of the event based on the approved ISA methodology of the facility. Items LER 2017002 and EN 53046 remained open in NRC Inspection Report 70-3103/2017-005 pending the NRC's review of final documentation submitted by the licensee. During the inspection period of January 1 to March 31, 2018, the inspectors performed an in-office review of the licensee's cause evaluation and associated documents to identify the circumstances leading to the event and determine whether a violation of NRC requirements occurred and its significance.

b. Conclusion

Introduction: The inspectors identified an AV of 10 CFR 70.62(d), "Management Measures," for the licensee's failure to implement the appropriate IROFS controls for a credible high-consequence accident sequence included in the ISA Summary document of the facility, which resulted in the apparent failure to meet the performance requirements in 10 CFR 70.61(b).

Description: On September 7, 2017, licensee operators filled a heeled 30B cylinder with enriched UF_6 product under the assumption that it was a new/clean cylinder. Prior to filling the 30B cylinder, operators failed to verify that the cylinder was a heeled cylinder and performed incorrect IROFS activities that corresponded to a new/clean cylinder. Specifically, operators performed a vapor pressure check required by IROFS16a for a new/clean cylinder, instead of a vapor pressure check and independent heel weight checks required by IROFS16e and 16f for a heeled cylinder.

The reported condition was identified by the licensee during an extent of condition review for another heeled 30B cylinder that was incorrectly classified as new/clean, but it was never filled with product. For the 30B cylinder addressed in EN 53046, the licensee's apparent cause evaluation determined that the primary cause was lack of proper verification of IROFS information. Contributing causes were determined to be: (a) lack of communication of changes to the process orders for IROFS16a/16e/16f on the licensee's official software for cylinder logistic operations (Systems, Applications, and Products or SAP), and (b) use of a non-controlled tool for verification of regulatory/IROFS information. Operators were supposed to rely on SAP to confirm the type of cylinder being processed. However, the operating procedure for the implementation of IROFS16a, 16e, and 16f, Procedure OP-3-0420-01, "Product System," did not include specific guidance for using SAP to validate cylinder information. Additionally, the operators over-relied on an unapproved operator tool developed in-house to obtain cylinder information from SAP. The operator aid tool was an Excel® spreadsheet that extracted data from SAP to display cylinder information. Before the event, the licensee implemented certain changes to the "Process Order" that affected the cylinder information shown on the spreadsheet. Consequently, the operators obtained incorrect cylinder data when they used the spreadsheet prior to processing the 30B cylinder and reached the wrong conclusion about the cylinder being new/clean.

The licensee's CAP documented the following corrective actions for the event: (a) evaluation of estimated moderator amount based on liquid sample results for the affected cylinder, (b) revision of the product connect Procedure (OP-3-0420-01) and SAP desktop guide to provide more detailed guidance to positively identify the pedigree of the cylinder and require additional verification by qualified individuals, (c) conduct just-in-time training for all qualified operators of multiple methods of verification based on

changes in SAP, (d) Logistics department to provide additional training regarding IROFS-related SAP Purchase Order changes to applicable personnel, (e) train all operators on the use of a non-controlled tool for information only and not for official verification, (f) further SAP knowledge training to understand the "why" behind routine SAP transactions, and (g) extent of condition evaluation for all IROFS16a surveillances since the change in SAP Purchase Orders occurred for IROFS16e and 16f.

Analysis: The inspectors determined that the failure to implement IROFS16e and 16f was an AV of 10 CFR 70.62(d), "Management Measures," because the operating procedure for these IROFS did not provide adequate management measures to ensure that the IROFS were implemented and maintained, as necessary, to ensure they are available and reliable to perform their function when needed. The failure to implement the IROFS resulted in the apparent failure to meet the performance requirements in 10 CFR 70.61(b). The inspectors evaluated the non-compliance in accordance with NRC Inspector Manual Chapter (IMC)-0616 and performed an independent risk analysis in accordance with NRC IMC-2606. The inspectors considered the risk assessment information provided by the licensee on December 27, 2017; reviewed procedures and records; and held discussions with licensee staff. The analysis determined that, based on the licensee's ISA, the failure to implement IROFS16e and 16f would result in a risk significance greater than the examples provided in Section 6.2 of the NRC Enforcement Policy for an SL-IV violation. The apparent conditional risk of the violation resulted in the "unlikely" likelihood of a high-consequence accident in accordance with the licensee's ISA methodology. The basis for the preliminary NRC's risk analysis is as follows:

ISA Information

The licensee's ISA Summary document contains accident sequence CP1-3 where the initial failure (initiating event) consists of a heeled 30B cylinder containing excess moderator inside. This failure results in the potential for a criticality event. The combination of conditions that need to be fulfilled to result in a potential criticality event due to moderator being present in a heeled 30B cylinder include the following:

a) During vacuum testing of the cylinder, after connection, the operator must fail to recognize that the increased pressure in the cylinder is not within acceptable limit, due to the presence of moderator (water), and

b) Operator must fail to recognize that the heel weight limit has been exceeded prior to introducing product in the cylinder. This control is applied to detect hydrogenous material with a low vapor pressure that would not be detected by the vapor pressure check; e.g., hydrocarbon lubricating oil.

For the uncontrolled accident sequence, failure of (a) or (b) occurs. A criticality event is assumed to result for the accident sequence when the cylinder is connected to the plant and loaded with product. This event is assumed to result in a high consequence.

The licensee's ISA determined that the frequency index number for the initiating event was (-2) based on the NUREG-1520 criteria that no failures of this type have occurred in this facility in 30 years and historical evidence from similarly designed URENCO European plants, which have a combined plant history of greater than 30 years and have not had a failure of this type. With a frequency index of (-2), the likelihood category of the uncontrolled sequence is (3) based on the licensee's ISA methodology. Because the

ISA assumes that a criticality accident will result in a high-consequence event, the consequence category for the accident sequence is (3). Thus, the Risk Index for the uncontrolled accident is determined to be unacceptable or "Not Unlikely" per the ISA methodology and IROFS are required to meet the performance requirements in 10 CFR 70.61.

In order to control the likelihood of the accident and meet the performance requirements in 10 CFR 70.61, the two preventive IROFS described below are credited to administratively limit moderator mass (both water and other hydrogenous material) in heeled cylinders containing enriched uranic material. The IROFS maintain the likelihood of the accident as "highly unlikely":

a) ***IROFS16e*** – limits cylinder vapor pressure (to protect against water) and heeled 30B cylinder weight to less than or equal to 17 kilograms (kg) (to protect against other hydrogenous materials). If the acceptance criteria is not met, then product shall not be introduced in to the associated cylinder. A failure probability index (FPI) of (-2) was selected for IROFS16e. This corresponds to an administrative IROFS for routine planned operations per NUREG-1520.

b) ***IROFS16f*** – independently limits cylinder vapor pressure (to protect against water) and heeled 30B cylinder weight to less than or equal to 17 kg (to protect against other hydrogenous materials). If the acceptance criteria is not met, then product shall not be introduced in to the associated cylinder. An FPI of (-2) was selected for IROFS16f. This corresponds to an administrative IROFS for routine planned operations per NUREG-1520.

Conditional Risk Assessment as a Result of the Noncompliance

The noncompliance involved the failure to implement both IROFS16e and IROFS16f. Based on the ISA methodology, the failure to implement both of these IROFS results in a risk equivalent to the uncontrolled accident sequence, which is unacceptable risk ("not unlikely") to meet the performance requirements.

*Conditional Risk Assessment Considering Other Safety Control*s

The licensee's written follow-up report, dated December 27, 2017, included a risk evaluation based on the current ISA methodology. While the licensee failed to implement the specific IROFS credited in the ISA, other safety controls were credited to reach the conclusion that a high-consequence accident remained "highly unlikely" as a result of the event. The inspectors reviewed the licensee's risk evaluation for every credited safety control and were unable to fully agree with the licensee's conclusions as discussed in further details in this section.

IROFS16a for New/Clean Cylinder

The licensee credited IROFS16a, which is a preventive IROFS to administratively limit moderator mass (hydrocarbon oil and water) in new/clean cylinders, to ensure subcriticality when the cylinder is filled with enriched UF_6 material. The IROFS ensures there is no visible oil for new and cleaned cylinders and limits the cylinder vapor pressure prior to introducing product. If the acceptance criteria is not met, then product shall not be introduced into the associated cylinder. Because licensee operators

wrongly believed that the cylinder to be processed was a new/clean cylinder, they implemented IROFS16a instead of IROFS16e and IROFS16f. The operators verified that the visual inspection record for hydrocarbon oil was in SAP and performed the vapor pressure test for IROFS16a for water moderator, which is identical to the test performed for IROFS16e and 16f. The FPI of IROFS16a in the ISA is (-3), corresponding to an enhanced administrative IROFS per NUREG-1520. IROFS16a is enhanced by requiring independent verification of the IROFS safety function. Because the licensee implemented the vapor pressure test component of IROFS16a per its corresponding procedure, the inspectors determined that an FPI of (-3) was appropriate for IROFS16a with respect to water intrusion, but no credit could be given to IROFS16a with respect to hydrocarbon oil intrusion in a heeled cylinder.

Shipper's Weight Activities

The licensee also credited the activities performed by the shipper of the heeled cylinder prior to delivering the cylinder to the site. In their submittal, the licensee stated that a heel weight is established by the cylinder shipper, who is required to comply with the ANSI N14.1 standard that limits shipping of heeled cylinders without an overpack to less than 11.3 kg. This uncredited control was assigned a (-1) because the heel weight is administratively controlled by an approved standard, however, no management measures were credited for the process.

The regulations in 49 CFR require licensees to meet the requirements in ANSI N14.1 for limiting the heel weight to less than 11.3 kg for transportation without an overpack, which is below the 17 kg acceptance criterion for IROFS16e and 16f. Additionally, the ISA Summary documents ANSI N14.1 as one of the "Codes of Record" for the licensing of the facility. The inspectors reviewed NRC/Department of Energy (DOE) Form 741 for the cylinder in question and confirmed that the net weight of the cylinder was 1 kg when received on-site. However, licensee procedures and training for receiving cylinders did not contain instructions to ensure that the net weight (or heel weight) established by the shipper is verified against a particular acceptance criterion for criticality safety. Therefore, the licensee's argument that no management measures are applied to this control is accurate.

The inspectors agreed that the ANSI N14.1 standard, which is required by regulation and included in the ISA, provides a safety barrier to prevent the applicable accident sequence, if implemented with the appropriate management measures. While the heel weight information was available in the shipping documentation, there were not sufficient management measures applied to ensure the heel weight was verified during the cylinder receiving activity, and therefore it was not credited in the NRC's risk evaluation.

Logistic Staff Activities

According to the licensee's written follow-up report for the event, a second independent heel weight is established using approved Procedures LO-3-2000-01, "Receipt and Shipment of Cylinders" and LO-3-2000-05, "Weighing of UF6 Cylinders." The report stated that the Logistics organization is required to document the heel weight of receipt cylinders to ensure they comply with the ANSI N14.1 standard that limits shipping of heeled cylinders to less than 11.3 kg. Any heeled cylinder that is greater than 11.3 kg would be quarantined and blocked from usage at UUSA. The licensee considered that the 11.3 kg limit is also significantly lower than the IROFS16e and 16f acceptance

criterion of 17 kg. This process is controlled by approved procedures and performed by trained individuals; however it is not an IROFS process. Therefore the licensee assigned an FPI of (-1) to the heel weight determination as an administrative control in which management measures are not credited in the ISA.

The inspectors reviewed Procedures LO-3-2000-01 and LO-3-2000-05 for the Logistics staff weight activities using WOHWA scales and did not identify any objective evidence supporting the statements that: (a) Logistics staff is required to document the heel weight of receipt cylinders to ensure compliance with the ANSI N14.1 limits, and (b) a heeled cylinder exceeding the ANSI N14.1 limits would be quarantined and blocked from usage. Procedure LO-3-2000-05 does apply the limits in ANSI N14.1 for heeled cylinders emptied on-site. Specifically, the procedure requests the Logistics staff to use three-letter weight codes in each cylinder "weight ticket" to identify the type of cylinder and weight being determined. For a cylinder emptied on-site, the procedure requires the use of weight code "EMT" and includes a note stating that the heel weight for a 30B cylinder must be less or equal than 25 pounds (lbs), which corresponds to the 11.3 kg limit in ANSI N14.1. Emptying cylinders on-site is an activity performed as part of authorized plant operations; however it had been performed less than ten times since the plant started operations. The inspectors reviewed weight ticket records for all 30B cylinders emptied on-site to verify that the ANSI N14.1 limits for heel weight were properly applied. The inspectors did not identify any instances where operators failed to meet ANSI N14.1.

For a heeled cylinder received on-site, Procedure LO-3-2000-05 requires the use of weight code "GWR" to identify a cylinder containing material, but the procedure does not instruct the Logistics staff to verify that the 25 lbs (11.3 kg) limit is met. The inspectors reviewed the WOHWA weight ticket for the cylinder involved in the reportable event and it reflected a net weight of 0.6 kg, which was consistent with the 1 kg net weight provided in the shipping paperwork (NRC/DOE Form 741).

Based on additional discussions with the licensee, the licensee stated that Logistics staff is trained by the Department of Transportation (DOT) on the regulatory requirements of 49 CFR and they are capable of identifying that a heeled cylinder with a heel weight greater than 11.3 kg would not be in compliance with ANSI N14.1 and should be quarantined. The licensee provided training attendance records for Logistics staff on 49 CFR training. However the specific training material was not available for NRC inspection.

Taking in consideration the DOT training on 49 CFR and the ANSI N14.1 limits in Procedure LO-3-2000-05 for heeled cylinders emptied on-site, credit can be given to the Logistics staff training/knowledge as a management measure for this control. The licensee's ISA methodology scores administrative IROFS at (-1) or (-2) for an administrative IROFS that must be performed in response to a rare unplanned demand. The ISA also contains five accident sequences where the initiating event is an operator error and is given a (-2) index on the basis that no failures of this type have occurred in the facility in 30 yrs. When supported by adequate training as a management measure, a (-2) index for operator error can be reasonably compared with the FPI of the Logistics staff failure to use their knowledge of ANSI N14.1 to identify a heeled cylinder with heel weight above the ANSI limits. However, because the DOT training information was not available for review and Procedure LO-3-2000-05 did not contain specific operating limits and procedural steps to verify that heeled cylinders received on-site meet ANSI

N14.1, the inspectors determined that an FPI of (-1) is the most reasonable credit that can be given in the risk analysis as it is commensurate with the management measure (training) that was applied.

Station Load Cell Deviation Check (IROFS16a)

The licensee's written follow-up report stated that OP-3-0420-01, "Product System," which implements IROFS16a, 16e, and 16f, provides procedural guidance to verify that product load cells are within a certain tolerance prior to connecting the cylinder. The verification requires the operator to record the empty station load cell weight and the installed cylinder load cell weight which, through SAP comparison with the tare weight, would produce the heel weight. The procedural guidance requires a station with a load cell deviation greater than or equal to 10 kg be taken out of operation until a calibration can be performed. A heeled cylinder has acceptance criterion of 17 kg; which the licensee considers is significantly greater than the 10 kg deviation criterion for load cells. As an uncredited control, the licensee assigned an FPI of (-2) which corresponds to an administrative control with high quality management measures. The licensee considered that management measures should apply to this process because it is contained in an IROFS procedure using IROFS support equipment and the process is documented in the NQA-1 record used to document the IROFS surveillance.

The inspectors evaluated this control from the standpoint of whether the implementation of station load cell deviation check under OP-3-0420-01 (IROFS16a) can be credited for the identification of a heeled cylinder with potentially excess moderator (above the IROFS16e and 16f acceptance criterion of 17 kg). For the scenario involved in the noncompliance, the licensee did not identify any concerns with the heel weight because of the relatively small heel mass in the cylinder (<1 kg).

The inspectors reviewed Procedure OP-3-0420-01 and confirmed that it provided guidance to verify load cell deviation. In the general acceptance criteria section for IROFS16f, the procedure states that if the heel weight is > 12.4 kg, then the operators need to contact Logistics with cylinder information. However, the steps for IROFS16f were not performed because the operators understood that the cylinder was new/clean.

For IROFS16a (new/clean cylinder), OP-3-0420-01 requires the operators to:

a) verify that the cylinder tare weight is available on SAP
b) verify that the empty station weight is within 8 kg from zero prior to weighting the cylinder
c) weigh and record the gross weight with take-off station load cell
d) verify that the weight deviation between the WOHWA and the take-off station load cell is less than 10 kg

The IROFS16a instructions credited by the licensee in Procedure OP-3-0420-01 just determine gross weight deviation between the load cell in the take-off station and the WOHWA scale, and they do not direct operators to calculate a heel weight using SAP data, unless the steps for IROFS16e/f are implemented. The licensee's statement that the comparison of installed cylinder load cell weight with the SAP tare weight would produce a heel weight is accurate, but only if the operator realizes that there is a significant difference between the gross and tare weights, or if the operator is driven by procedure to subtract the SAP tare weight from the gross weight obtained. Moreover,

the combined tolerance of the empty station load cell reading (±8 kg) and the load cell deviation check (<10 kg) is greater than the ANSI N14.1 (11.3 kg) and the IROFS16e/f (17 kg) acceptance limits for heel weight. Thus, the IROFS16a procedure would not directly identify a condition involving a heeled cylinder with a net weight greater than the ANSI N14.1 and IROFS 16e/f limits. Therefore, the NRC's risk evaluation did not give full credit (i.e. FPI = -2) to the implementation of IROFS16a because management measures such as procedures and maintenance (e.g. calibration activities) were not sufficiently applied to this licensee-credited control to assure its availability and reliability to control hydrocarbon (oil) moderator.

Since the operators are trained in the IROFS16 functions, and IROFS16a requires independent load cell deviation check, there is a chance that a discrepancy in weight for a cylinder that is assumed to be new/clean will be identified. In that case, operators will have to recognize that the gross weight and the tare weight are different enough to question the status of the cylinder and suspend further operations. Larger discrepancies between gross weight and tare weight would be easier to identify by direct comparison. In order to not completely discredit operator knowledge, the inspectors determined that an FPI of (-1) would be reasonable for this control consistent with an administrative IROFS that must be performed in response to a rare unplanned demand.

Because the data obtained from the Logistics weighing activity when the cylinder is received (i.e. WOHWA Scale) is used to determine the take-off station load cell deviation check (IROFS16a), the inspectors determined that these two activities, which are presented as separate safety controls in the licensee's risk assessment, should be treated as a single safety control with an FPI of (-2) due to their dependency.

NRC's Conclusion

The NRC staff determined that based on the above information and the actual circumstances of the event, there were no actual safety consequences. The likelihood of an inadvertent nuclear criticality did not significantly increase due to the failure to implement IROFS16e and 16f. However, the low conditional risk of a criticality accident was not fully attributed to the implementation of high quality safety controls; but mainly to the fortuitous circumstance that there was a low amount of heel in the cylinder and no hydrogenous moderator at the time it was filled with product. While the licensee performed a vapor pressure test under IROFS16a that was identical to the test performed for IROFS16e and 16f, the NRC was unable to fully credit the cylinder receiving and weighing activities as adequate safety controls to confirm that the heeled cylinder was within the limits established in ANSI N14.1, IROFS16e, and IROFS 16f. The NRC preliminarily determined that these controls were not sufficient to maintain the likelihood of the applicable high-consequence accident sequence as "highly unlikely." As summarized in the tables below, the preliminary likelihood of a criticality accident as a result of the event was determined to be "unlikely" and apparently not in compliance with the performance requirements in 10 CFR 70.61.

RISK ASSESSMENT SUMMARY				
	Licensee's Risk Assessment of Other Safety Controls (Dated December 27, 2017)		**NRC's Risk Assessment of Credited Safety Controls**	
Accident Identifier	CP1-3 (Water)	CP1-3 (Oil)	CP1-3 (Water)	CP1-3 (Oil)
Initiating Event Index	-2	-2	-2	-2
Preventive IROFS 1 or safety control Failure Index	(IROFS16a) -3	Shippers Weight -1	(IROFS16a) -3	Shippers Weight (No Credit)
Preventive IROFS 2 or Safety Control Failure Index		Logistics Weight (WOHWA Scale) -1		Logistics Weight (WOHWA Scale) AND Load Cell Deviation Check -2
Preventive IROFS 3 or Safety Control Failure Index		Load Cell Deviation Check -2		
Mitigation IROFS Failure Index	N/A	N/A	N/A	N/A
Likelihood Index T	-5	-6	-5	-4
Likelihood Category	1 (Highly Unlikely)	1 (Highly Unlikely)	1 (Highly Unlikely)	2 (Unlikely)
Consequence Category	3	3	3	3
Risk Index (h=f x g)	3	3	3	6
Compliance with Performance Requirements in 10 CFR 70.61	Yes	Yes	Yes	No

ISA Risk Matrix with Risk Index Values			
	Likelihood of Occurrence		
	Likelihood Category 1 Highly Unlikely (1)	Likelihood Category 2 Unlikely (2)	Likelihood Category 3 Not Unlikely (3)
Consequence Category 3 High (3)	Acceptable Risk 3	Unacceptable Risk 6	Unacceptable Risk 9
Consequence Category 2 Intermediate (2)	Acceptable Risk 2	Acceptable Risk 4	Unacceptable Risk 6
Consequence Category 1 Low (1)	Acceptable Risk 1	Acceptable Risk 2	Acceptable Risk 3

Enforcement: Based on the NRC's preliminary risk assessment results, this AV is being considered for escalated enforcement in accordance with the NRC Enforcement Policy. The NRC staff will make a final enforcement determination based on the licensee's response to the Choice Letter included in the cover letter of this inspection report. This

AV will be tracked as AV 70-3103/2018-002-01, "Wrong IROFS Procedure Followed Prior to Filling Cylinder." Inspection items EN 53046 and LER 2017-002 are considered closed to AV 70-3103/2018-002-01.

2. (Opened and Closed) Non-cited Violation (NCV) 70-3103/2018-002-2, "Administrative Criticality Controls Not Used," associated with EN 52886 and Written Follow-up Report LER 2017001

a. Inspection Scope

On October 17, 2017, the NRC issued inspection report 70-3103/2017-004 (ADAMS ML17290A081) which included the initial review of EN 52886 reported by the licensee on August 4, 2017. The reported event involved the failure to implement criticality controls IROFS54a and 54b for the operation of the small component decontamination train (SCDT). Additionally, on September 26, 2017, the licensee submitted a written follow-up report for EN 52866 in accordance with 10 CFR 70.74 (ADAMS ML17272A136). On January 10, 2018 the licensee submitted a supplement to the original written follow-up report to provide additional information on the risk and safety significance of the event (ADAMS ML18024A157). NRC inspection report 70-3103/2017005 discussed follow-up inspection activities for the event and opened item LER 2017001 to track the review of this issue. Item LER 2017001 remained open pending the review of final licensee documentation submitted to the NRC. During the inspection period of January 1 to March 31, 2018, the inspectors completed an in-office review of the licensee's cause evaluation and associated documents to identify the circumstances leading to the event and determine whether a violation of NRC requirements occurred and its significance.

b. Conclusion

Introduction: The inspectors' review resulted in a licensee-identified, SL-IV, NCV of 10 CFR 70.62(d), "Management Measures," for the failure to implement IROFS controls for a high-consequence accident sequence described in the ISA.

Description: On July 27, 2017, recycling technicians were conducting pH adjustment activities on Slab Tank #2 in the liquid effluent collection and transfer system (LECTS). The slab tanks are safe-by-design components and receive liquid effluent with uranic material from different plant processes, including the SCDT. The SCDT is an enclosure designed to safely clean and decontaminate small items used for routine plant operations. All the liquid effluent generated from the SCDT is transferred to the slab tanks. The slab tank pH adjustment is facilitated via acid/base addition tanks connected directly to the slab tanks. During the pH adjustment evolution, the technicians identified a leak from the line connecting the addition tanks with the slab tanks. At the time the leakage was identified, the content of the addition tanks consisted of a sodium hydroxide (NaOH) solution with residual uranic material. The technicians stopped the ongoing work and decided to collect the content of the addition tanks in a five gallon bottle and drain it into the SCDT. The technicians collected and drained two batches of solution into the SCDT using the same 5 gallon bottle. After draining the second batch, the technicians identified that the SCDT drain had clogged and initiated a work request to correct the condition. During the routine process of reviewing WOs prior to implementation, NCS personnel reviewed the work order for correcting the SCDT clog and identified that the technicians failed to implement the procedures for IROFS54a and 54b prior to adding the solution into the SCDT.

IROFS54a and 54b are designed to administratively and independently limit the uranic mass inventory in the SCDT (≤ 730 grams of Uranium-235) to ensure a subcritical mass using bookkeeping procedures and by performing measurements. The uranic mass shall be determined prior to introducing uranic material into the SCDT. If the acceptance criterion is not met, then uranic material shall not be introduced to the SCDT. IROFS54a and 54b are the only safety controls credited in the ISA for an accident sequence involving the introduction of excess uranic material in the SCDT.

The licensee entered the issue in its NRC-credited CAP and performed a root cause evaluation for the event and concluded that the primary cause was that the SCDT operation Procedure RW-3-4000-01, "Startup, Shutdown, and Operation of the SCDT," did not drive the technicians to perform IROFS surveillances. Contributing causes were determined to be: a) management communications and enforcement of the standards, specifically procedure use, was inadequate allowing too much interpretation by the recycling technicians and management, and b) equipment issues challenged recycling technicians' ability to use procedures. The licensee implemented corrective actions to revise Procedure RW-3-4000-01 to ensure that the SCDT is not operated without the implementation of IROFS54a and 54b.

Analysis: The inspectors determined that the failure to implement IROFS54a and 54b prior to introducing the NaOH solution with uranic material in the SCDT was a violation of 10 CFR 70.62(d) because the operating procedure for the SCDT did not provide adequate management measures to ensure that the IROFS were implemented and maintained, as necessary, to ensure they are available and reliable to perform their function when needed. The inspectors evaluated the non-compliance in accordance with IMC-0616 and determined that it was more than minor because based on the licensee's approved ISA methodology, the failure to implement the IROFS would result in a safety significance greater than the examples provided in Section 6.2 of the NRC Enforcement Policy for a SL-IV Violation.

The licensee's supplement to the event written follow-up, dated January 10, 2018, described the conditional risk of the non-compliance using the approved ISA methodology. In the licensee's risk analysis, the licensee credited the design of the SCDT as a passive engineering control to prevent a criticality accident and maintain the likelihood of the accident as "highly unlikely." The inspectors performed an independent risk analysis of the conditional risk of the violation in accordance with IMC-2606. The inspectors reviewed nuclear criticality safety analysis LES-018-NCS-002, "Nuclear Criticality Safety Analysis for the Small Component Decontamination Train," its assumptions, methodology, and results and confirmed that the SCDT design and the analyzed scenarios bound the circumstances of the reported event. The inspectors also reviewed licensee procedures and confirmed the type of management measures that were applied to the design of the SCDT. The inspectors noted that changes to the SCDT design would be subject to Procedure EG-3-4-4100-02, "Plant Modifications," and EG-3-2100-01, "Configuration Change." Both procedures implement the management measure of "Configuration Management" to meet NRC's regulatory and licensing requirements. Therefore, the inspectors concluded that it was reasonable to credit the SCDT's design as a passive engineering control to prevent a criticality accident commensurate with the management measure of "configuration management" applied to the SCDT.

The inspectors also reviewed design aspects of the slab tanks addition tanks, SCDT operating procedures, and pH adjustment procedures for the slab tanks to determine if these could receive credit in the risk evaluation as safety controls that limit the amount of uranic material that can be transferred into SCDT. The inspectors also reviewed licensee calculations for the estimated maximum mass of uranic material that could have been transferred from the slab tanks into the 5 gallon bottles and ultimately into the SCDT. However, the inspectors' conditional risk analysis could not credit these controls for preventing a criticality in the SCDT.

The inspectors risk analysis for the violation determined that based on the design of the SCDT, the management measures applied to it, and the approved ISA methodology, the risk of a high-consequence criticality accident remained "highly unlikely" as a result of the violation. Therefore, the violation was characterized as an SL-IV consistent with example 6.2.d.1 of the NRC Enforcement Policy because without crediting the SCDT design (a non-IROFS), the requirements of 10 CFR 70.61, "Performance Requirements," would not be met, but the risk analysis under IMC-2606 determined that the resulting risk was acceptable and did not meet the risk criteria for a SL I, II, or III violation. There were no actual safety consequences as a result of this event.

Enforcement: 10 CFR 70.62(d) states in part that the management measures shall ensure that administrative controls that are identified as IROFS pursuant to 10 CFR 70.61(e) are designed, implemented, and maintained, as necessary, to ensure they are available and reliable to perform their function when needed.

Contrary to this requirement, on July 27, 2017, the "Procedures" management measure for IROFS54a and 54b did not ensure that these IROFS, which are identified in the ISA Summary as IROFS needed to comply with the performance requirements of 10 CFR 70.61, were implemented and maintained, as necessary, to ensure they were available and reliable to perform their function when needed. Specifically, Procedure RW-3-4000-01, "Startup, Shutdown, and Operation of the SCDT," did not provide adequate guidance to ensure that IROFS54a and 54b were always implemented prior to introducing uranic material into the system. Consequently, recycling technicians carried and drained two partially full bottles of NaOH solution into the SCDT without recognizing the potential for residual uranium in the solution and the need to perform IROFS54a and 54b. The NRC determined this was an SL-IV violation consistent with example 6.2.d.1 of the Enforcement Policy because under 10 CFR Part 70, Subpart H, the licensee failed to meet the requirements of 10 CFR 70.61 when the required IROFS were not implemented; however further evaluation in accordance with NRC IMC-2606 determined that the high-consequence criticality event remained "highly unlikely." The violation is dispositioned as non-cited because the inspectors determined that the licensee met the criteria in Section 2.3.2.a of the Enforcement Policy. For administrative tracking purposes, inspection items EN52886 and its associated written follow-up report, LER 2017001, are considered closed to NCV 70-3103/2018002-2, "Administrative Criticality Controls Not Used."

3. (Opened) Unresolved Item (URI) 70-3103/2018-002-01, Review of Safety Basis for MFDT Modifications

a. Inspection Scope

The inspectors reviewed modifications to the MFDT to support enriched operations. This included technical review and approval of the modifications, operator and maintenance personnel training and qualification, and procedure revisions.

b. Conclusions

Introduction: An URI was identified in regards to modifications performed to the MFDT to support the processing of enriched material.

Description: The licensee implemented a modification that installed holes in the MFDT drip tray to limit the slab height in the drip tray in the event of a line rupture inside the tray. The modification was performed because the tray's height was greater than the new safe-by-design height established for the operation of the MFDT with enriched material. The inspectors noted that the licensee was not able to provide documentation with the technical basis for the modification, including the basis for the holes diameter and the number of holes to ensure that the safe slab height would not be exceeded. The licensee documented the issue in the CAP as EV 123529. The inspectors determined that more information on the technical basis of the modification was required to determine if this issue constitutes a noncompliance. This URI will be tracked as 70-3103/2018-002-03, “Technical Safety Basis for MFDT Drip Tray Modification.”

D. Exit Meeting

The inspection scope and results were presented to members of the licensee’s staff at various meetings throughout the inspection period and were summarized on March 29 and April 10, 2018, to Mr. Stephen Cowne, and other members of the staff. Proprietary information was discussed but not included in the report.

SUPPLEMENTAL INFORMATION

1. KEY POINTS OF CONTACT

Name	Title
J. Blackshear	Decontamination & Recycling Manager
A. Blackshear	Engineering Specialist/NCS Support Staff
S. Cowne	Chief Nuclear Officer (CNO) and Compliance Manager
C. Gonzalez	Maintenance
H. Harvey	Chemistry Supervisor
S. McGill	Maintenance
R. Medina	Senior Licensing Specialist
J. Rickman	Licensing Specialist
A. Riedy	Senior ISA Engineer/NCS Support Staff
C. Sanders	Criticality Safety Engineer (Consultant)
D. Sexton	Managing Director UUSA and President & CEO of LES, LLC
R. Shaefer	Operations Manager
N. Wells	QA Program Manager
R. Williams	Maintenance

2. LIST OF REPORT ITEMS

Item ID	Type	Description	Status
70-3103/2018-002-01	AV	Wrong IROFS Procedure Followed Prior to Filling Cylinder (Section C.1)	Opened
70-3103/2018-002-02	NCV	Administrative Criticality Controls Not Used (Section C.2)	Opened & Closed
70-3103/2018-002-03	URI	Technical Safety Basis for MFDT Drip tray Modification (Section C.3)	Opened
52886	EN	Administrative Criticality Controls Not Used (Section C.2)	Closed
53046	EN	Wrong IROFS Procedure Followed Prior to Filling Cylinder (Section C.1)	Closed
2017001	LER	Licensee Follow-up Written Report for EN 52886: Administrative Criticality Controls Not Used (Section C.2)	Closed
2017002	LER	Licensee Follow-up Written Report for EN53046: IROFS 16a Implemented Instead of IROFS 16e/f for a Heeled Product Cylinder (Section C.1)	Closed

3. INSPECTION PROCEDURES USED

88020	Operational Safety
88015	Nuclear Criticality Safety
88025	Maintenance and Surveillance of Safety Controls

4. DOCUMENTS REVIEWED

Records:

Analysis, uranium, URENCO Lab I.D. 57B-3B50-18-0212, dated February 16, 2018
Analysis, uranium, URENCO Lab I.D. 57A-2BS0-18-0212, dated February 15, 2018
Certificate of Reference Material, SPEXertificate, Catalog PLU2-2Y, 2% HNO3, 1001 ug/ml Uranium, used for U concentration analysis.
Chemistry data for IROFS 57a and 57b
CC-RW-2015-003, Update LBD to Support MFDT Enrichment Decontamination Operations, Rev. 1
DWG LES01100-P-PID-625-001-01 MFDT
ISA-MEM-0032, Decontamination System HAZOP and Risk Determination Analysis with Supplemental Information on LECTS, dated February 3, 2017
LES-1100-C-ARC-004-04-6, Architectural Cylinder Receipt & Disposition Building Bunkered Area Door and Finished Schedule, Rev. 6, dated August 23, 2013
NCS-CSA-035, Criticality Safety Analysis of the Multifunction Decontamination Train, Rev. 0
NCSI-18-0013, Vacuum Pump Rebuild Workshop, dated March 28, 2018
NEF-BD-56a, Administratively Limit Uranic Mass in the Disassembly and Spray Stations of the MFDT, Rev. 0
NEF-BD057a, Administratively Limit Uranic Mass in the Degreaser, Citric Acid, Neutralization and Demineralization Baths of the MFDT, Rev. 0
New Brunswick Laboratory Report of Analysis, used for uranium isotope ratio.
MA-6-2670-01, Fire Damper Testing 1500-667-1U1, Rev. 4.
MOD-17-0175A, Multi-Functional Decon Train Drip/Catch Basin Modification, dated October 27, 2017
ORM 56 a-b, Administratively Limit Uranic Mass in the Disassembly and Spray Station of the MFDT, Rev. 0
RW-3-4000-02, Attachment 5, RWP 18-011.SA-2017-002, UUSA NCS Program Assessment, dated October 30, 2017
TPE254TPE03I00/4100R. for Williams; Training Documentation/Qualification Card for maintenance mechanic qualified for maintenance on IROFSLES-1001-E-EQP-008-02, IROFS 1&2&3&4 Component Layout, Rev. 2, dated October 12, 2010
TPE254TPE03I00/4100R. for Gonzalez-Rincon; Training Documentation/Qualification Card for maintenance mechanic qualified for maintenance on IROFSLES-1001-E-EQP-008-02, IROFS 1&2&3&4 Component Layout, Rev. 2, dated October 12, 2010
Work Order 1000309998, SBD Verification (SBDV-2017-0031) Perform MA-3-1000-29 SBD Verification MFDT, dated December 18, 2017
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AD-3-1000-01-F-4, Temporary Procedure/Task Instruction Change for OP-3-0420-01, dated December 13, 2017
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CA-3-1000-09, Assessment Program, Rev. 12
CR-3-1000—03, NCS Weekly Walkthroughs and Periodic Assessments, Rev. 1
E-NCS-CS-QG, NCS Criticality Support Staff, Rev. 0
EG-3-2100-01, Configuration Change, Rev. 24

EG-3-4100-02, Plant Modifications, Rev. 16
LO-3-2000-01, Receipt and Shipment of Cylinders, Revs. 12 and 13
LO-3-2000-02, On-Site Handling of UF6 Cylinders, Rev. 7
LO-3-2000-05, Weighing UF6 Cylinders, Rev. 11
MA-3-1000-01, Preventative Maintenance/Surveillance Implementation and Change Process (SAP Order Type PM2), Rev. 12
MA-3-1000-02, Calibration and Control of Measuring and Test Equipment, Rev. 9
MA-3-2826-02, IROFS35 Fire Door Inspections, Rev. 9
MA-3-3400-04, IROFS4 Station Heater High Temperature Trip – RTD Surveillance, Rev. 8, OP-3-1000-01, Conduct of Operations, Rev. 28
OP-3-0420-01, Product Systems, Revs. 39, 40, 42 and 43
OP-3-0430-01, Tails System, Rev. 31
OP-3-0470-01, Liquid Sampling System, Rev. 26
OP-3-0490-05, Sample Container Operations, Rev. 17
RP-3-4000-29, Operation of the Ludlum Model 375 Area Radiation Monitor, Rev. 2
RW-3-2000-01, LECTS Slab Tank Operations, Rev. 8
RW-3-2000-05, Small Component Decontamination Train Uranium Waste Mass Bookkeeping, Rev. 8
RW-3-4000-01, Startup, Shutdown, and Operation of the SCDT, Revs. 3 and 5
RW-3-4000-02, Startup, Operation and Shutdown of the Multi-Functional Decontamination Train, Revs. 9 and 10
WC-3-1000-02, Work Package – Initiation through Closure (SAP Order Types PM1/PM3), Rev. 24

CAP Reports Written as a Result of the Inspection:
EV123483, EV123495, EV123508, EV123509, EV123510, EV123525, EV123527, EV123529, EV123530, EV123532, EV123533, EV123534, EV123535

CAP Reports Reviewed:
CA-3-1000-03-F-2, Root Cause Evaluation Report for EV 120009, September 2017
EV 120009, Procedure violation of IROFS 54 A/B, dated August 3, 2017
CA-3-1000-02-F-1, Apparent Cause Evaluation for ER 120386, dated September 17, 2017
EV 120386, 30B Heeled Cylinder Connected Incorrectly, dated September 17, 2017
EV 121801, IROFS 16e&f Not Performed on Heeled 30B Cylinder, dated October 30, 2017
EV 121799, BCI UUSA Improper IROFS Surveillance Performed on a Heeled 30B, dated October 30, 2017
EV 122271, Potential Violation for EN 52886 – Failure to Perform IROFS54a/b, dated February 14, 2017
EV 122272, Potential Violation for EN 53406 – Failure to Perform IROFS16e/f, dated December 14, 2017
EV132169, EV132170, EV132171, EV132172, EV132173, EV132174, EV134757, EV121984, EV131574, EV131575, EV131576, EV131577, EV131578, EV131579, EV131580, EV131581, EV131582, EV109638, EV123442, EV 117501, EV 117360, EV 123235, EV 117501, EV 117558, EV 119120, EV 119735, EV 120052, EV 120223, EV 120240, EV 120303, EV 120476, EV 122021, EV 122265, EV 122745.

Other Documents:
17-C-0714, RW-3-2000-05-F-2, Master SCDT Bookkeeping Log, Performed on July 14, 2017

55A-17-0717, RW-3-2000-01-F-1: LECTS Slab Tank Traveler Tag – IROFS55a, July 2017
55B-17-0717, RW-3-2000-01-F-1: LECTS Slab Tank Traveler Tag – IROFS55a, July 2017
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GWIROFSQC, Training Material for IROFS training
Integrated Safety Analysis Summary, Rev. 28
LES-018-NCS-002, Nuclear Criticality Safety Analysis of the Small Component Decon Train, Rec. 1
LES-17-00160-NRC, 60 Day Follow-up Report for Event Notification 53046, dated December 27, 2017
LES-18-00003-NRC, Supplement to 60-Day Written Follow-up Report for Event Notification 52886, dated January 10, 2018
Logistics Personnel Training Record Matrix: S. Antillon, C. Owens, G Poortman, Y. Vasquez,
MC-3-5000-01-F-6, Static Inventory Form – Waste Containers, Performed on January 27, 2016
MC-3-6000-01-F-1, URENCO USA Universal Nuclear Material Transaction Records for Item IDs UREU010237, UREU010216, UREU010242, UREU010275, UREU010276, and UREU010277
NCS-CSA-016, Criticality Safety Analysis of 30B Cylinders, Rev. 3
NCS-CSA-031, Nuclear Criticality Safety Analysis of the SCDT, Rev. 0
NCSI-17-0044, IROFS16a/e/f, dated November 16, 2017
NE IROFS Training Transcript for J Brink, E. Camp, M. Mason, J. Urrutia, and R. Williams
NEF-BD- 16e, Administratively Limit Moderator Mass in a Heeled 30B Cylinder, Rev. 1
NEF-BD- 16f, Administratively Limit Moderator Mass in a Heeled 30B Cylinder, Rev. 1
NEF-BD-16a, Administratively Limit Moderator Mass in a New or Cleaned 30B Cylinder, Rev. 9
NEF-BD-54b, Administratively Limit the Calculated SCDT Uranic Mass Inventory, Rev. 2
Operations Shift Log – Verification of IROFS 16a, dated November 12, 2017
Operations Shift Log – Verification of IROFS 16e/f dated, December 1, 2017
Operations Shift Log – Verification of IROFS 16e/f, dated December 8, 2017
Operations Shift Log – Verification of IROFS 16e/f, dated November 20, 2017
Operations Shift Log – Verification of IROFS 16e/f, dated November 28, 2017
ORM 16e & 16f, Administratively Limit Moderator Mass in a Heeled 30B Cylinder, Rev. 1
OSIROFSQC00100, IROFS and Operating Requirements Manual (ORM) Qualification Guide for J. Thomason, dated December 23, 2016
OSIROFSQC00100, Items Relied On For Safety (IROFS) and Operating Requirements Manual (ORM), Rev. 6
Root Cause Evaluation Report - EV120009, dated September 13, 2017F-BD-16e, Administrative Limit Moderator Mass in a Heeled 30B Cylinder, Rev. 1
RW-3-4000-01-F-1, IROFS54a for Uranium Waste Mass Determination by Conservative Estimate – Campaign 17-A-1127, Completed on November 27, 2017
RW-3-4000-01-F-1, IROFS54a for Uranium Waste Mass Determination by Conservative Estimate – Campaign 17-A-1129, Completed on November 29, 2017

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Shift Operations IROFS Qualifications Matrix
TQ-3-0100-12-F-2, Attendance Record for Training Course EV120386: Determining 30B Type Using SAP and Other Tools, October 1, 2017
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TQ-3-0100-12-F-2, Attendance Record for Training Course EV120386: Determining 30B Type Using SAP and Other Tools, September 21, 2017
TQ-3-0100-12-F-6, Certification/Evaluation Form for Recycling Operators (J. Abney, D. Foster, J. Purvis), dated May 15, 2016
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Weight Ticket Numbers: 154487, 155624, 158266, 159136, 176372, 176372, 176372, 147076
WO 1000287709, Dispose of Davies Gray Waste, dated March 14, 2017
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