May 9, 2014

Mr. Dave Sexton
URENCO USA
National Enrichment Facility
P.O. Box 1789
Eunice, NM 88231

SUBJECT: URENCO USA - NUCLEAR REGULATORY COMMISSION INSPECTION REPORT NUMBER 70-3103/2014-201

Dear Mr. Sexton:

The U.S. Nuclear Regulatory Commission (NRC) conducted a routine, announced nuclear criticality safety (NCS) inspection of your facility in Eunice, New Mexico, April 7-10, 2014. The purpose of the inspection was to determine whether operations involving special nuclear material were conducted safely and in accordance with regulatory requirements. Inspection observations and findings were discussed with members of your staff and management throughout the inspection. An exit meeting was conducted at the conclusion of the inspection on April 10, 2014.

The inspection, which is described in the enclosure, focused on the most hazardous activities and plant conditions; the most important controls relied on for safety and their analytical basis; and the principal management measures for ensuring controls are available and reliable to perform their functions relied on for safety. The inspection consisted of analytical basis review, selective review of related procedures and records, examinations of relevant NCS-related equipment, interviews with NCS engineers and plant personnel, and facility walkdowns to observe plant conditions and activities related to safety basis assumptions and related NCS controls. Based on the inspection, your activities involving nuclear criticality hazards were found to be conducted safely and in accordance with regulatory requirements.

In accordance with Title 10 of the *Code of Federal Regulations* Section 2.390 of NRC's "Rules of Practice," a copy of this letter and the enclosure will be made publicly available in the public electronic reading room of the NRC's Agencywide Documents Access and Management System (ADAMS). ADAMS is accessible from the NRC Web site at http://www.nrc.gov/reading-rm/adams.html.

If you have any questions concerning this report, please contact Greg Chapman of my staff at (301) 287-9152, or via email to Gregory.Chapman@nrc.gov.

Sincerely,

Michael X. Franovich, Chief **/RA/**
Programmatic Oversight
and Regional Support Branch
Division of Fuel Cycle Safety
and Safeguards
Office of Nuclear Material Safety
and Safeguards

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

Enclosure:
NRC Inspection Report No. 70-3103/2014-201
w/Attachment: Supplementary Information

cc w/encl: (See page 3)

If you have any questions concerning this report, please contact Greg Chapman of my staff at 301-287-9152, or via email to Gregory.Chapman@nrc.gov.

Sincerely,

Michael X. Franovich, Chief **/RA/**
Programmatic Oversight
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U.S. NUCLEAR REGULATORY COMMISSION
OFFICE OF NUCLEAR MATERIAL SAFETY AND SAFEGUARDS

Docket No.:	70-3103
License No.:	SNM-2010
Report No.:	70-3103/2014-201
Licensee:	URENCO USA
Location:	Eunice, New Mexico
Inspection Dates:	April 7-10, 2014
Inspector:	Greg Chapman, Criticality Safety Inspector Nick Peterka, Fuel Facility Inspector
Approved By:	Michael X. Franovich, Chief Programmatic Oversight and Regional Support Branch Division of Fuel Cycle Safety and Safeguards Office of Nuclear Material Safety and Safeguards

Enclosure

EXECUTIVE SUMMARY

URENCO USA, NATIONAL ENRICHMENT FACILITY
NRC INSPECTION REPORT 70-3103/2014-201

Introduction

The staff performed a routine, scheduled criticality safety inspection at the URENCO USA (UUSA) facility in Eunice, New Mexico (NM), April 7-10, 2014. Staff reviewed the licensee's nuclear criticality safety (NCS) program, administrative, and operating procedures, NCS-related internal events, NCS audits and inspections, the criticality alarm system and plant operations.

Results

- An inspector followup item (IFI) was opened to track corrective actions associated with determining non credibility of backflow into the Multi-Function Decontamination Train (MFDT).
- No safety concerns were identified during review of the NCS event review and follow-up.
- No safety concerns were identified regarding NCS audits.
- No safety concerns were identified during review of the licensee's code validation.
- No safety concerns were identified during a review of the licensee's criticality accident alarm system.
- No safety concerns were identified during walkdowns of plant operations.

REPORT DETAILS

1.0 Plant Status

URENCO USA enriches uranium to a maximum of 6 percent enrichment in its gaseous centrifuge facility near Eunice, NM. Large scale construction activities were underway at the site.

2.0 Nuclear Criticality Safety Program (Inspection Reports [IPs] 88015 & 88016)

a. Inspection Scope

The inspectors reviewed the licensee's NCS program and analyses. The inspectors evaluated the adequacy of the program and analyses to assure the safety of fissile material operations. The inspectors reviewed selected NCS analyses to determine that criticality safety of risk-significant operations was assured through engineered and administrative controls, with adequate safety margin and preparation and review by qualified staff. The inspector interviewed licensee criticality engineers, operators, and managers regarding operations, equipment and controls. The inspectors reviewed selected NCS-related items relied on for safety (IROFS) to determine that the performance requirements have been met for selected accident sequences. The inspectors accompanied NCS and other technical staff on walkdowns of NCS controls in selected plant areas. The inspectors reviewed selected portions of the documents listed in Section 2.2 of the Attachment.

b. Observations and Findings

The inspectors determined that evaluations were independently reviewed by qualified NCS engineers, that subcriticality of the systems and operations was assured through appropriate limits on controlled parameters, and that double contingency was assured for each credible accident sequence leading to inadvertent criticality.

The inspectors reviewed the Criticality Safety Evaluation for the MFDT in which some confusion was present as an accident sequence (back flow of enriched uranium solution into the spray station) was listed as a credible abnormal condition and discussed as being not credible. Upon further investigation, 1 had identified nine events/barriers that were considered unlikely to occur and were the basis for determining the accident sequence was not credible. URENCO USA's informal criteria for a determination of non credibility involved listing at least five barriers or unlikely events for an accident sequence. The inspectors determined that four of the listed barriers were all associated with a single diaphragm pump (the outlet pump seal, the inlet pump seal, and two separate interlocks with sensors that would initiate the pump). It was not clear if the diaphragm pump would operate if the seals were damaged nor if back flow sufficient to damage the outlet seal would be sufficient to damage the inlet seal. Other barriers, such as mass limits in the Small Component Decontamination Train (SCDT), overflow piping with an associated catch pan and sensor/alarm, were not considered in the basis and the determination of the accident sequence being not credible was not in question. However, the current basis for non-credibility identified all four of the pump related

barriers as being independent but did not provide justification and it was not apparent to inspectors that they were independent. URENCO USA initiated a site Event Report (ER), 2014-513, to address the independence of non-credible basis barriers for the affected Integrated Safety Analysis (ISA). URENCO USA is also considering additional programmatic adjustments to clarify their guidance for independence of barriers/controls and criteria for determining non-credibility of accident sequences. **IFI 70-3103/2014-201-01** is being opened to track corrective actions associated with determining non credibility of backflow into the MFDT.

The inspectors determined that NCS controls for equipment and processes ensured the safety of the operations; with the licensee relying primarily on safe-by-design components for criticality prevention. The NCS analyses and supporting documents reviewed demonstrated adequate identification and control of NCS hazards to assure operations within subcritical limits.

c. Conclusion

A programmatic weakness was identified with respect to licensee practice regarding independence of barriers/controls and criteria when determining non-credibility of accident sequences.

3.0 Nuclear Criticality Safety Audits and Inspections (IP 88015)

a. Inspection Scope

The inspectors reviewed licensee internal audit procedures, records of previously completed walkdowns/inspections, records of previously completed audits of fissile material operations, and records of NCS infractions. The inspectors accompanied licensee NCS engineers on a routine weekly walkdown of a cylinder inspection (IROFS 16). The inspectors reviewed selected portions of the documents listed in Section 2.3 of the Attachment.

b. Observations and Findings

The inspectors observed that NCS walkdowns/inspections were conducted in accordance with written procedures. The inspectors noted that NCS audits were focused on determining that plant operations requirements conform to those listed in the applicable NCS specification documents. The inspectors confirmed that deficiencies identified during the audit were appropriately captured in the licensee's corrective action program and resolved in a timely manner.

During the weekly walkdown/inspection, inspectors noted that operators implemented independent inspection of the cylinders (IROFS 16a and 16b) by separating the initial and verification inspection so that one operator was not present at the inspection area while the other was performing the inspection. This was consistent with the separation by time and space requirement for independence of these two IROFS. The area supervisor stated that documentation was performed on separate papers to minimize influencing the verification.

Inspectors also observed that the procedure, CR-3-1000-03, Rev. 11, "NCS Weekly Walkthroughs and Periodic Assessments," contains a requirement to ensure that the areas listed in Attachment 1 are inspected at least every two years. However, the NCS inspection paperwork does not explicitly tie back to the areas indicated in Attachment 1 making verification of this requirement problematic. URENCO USA staff agreed and stated that area descriptions in Attachment 1 would be utilized in the future.

c. Conclusions

No safety concerns were identified regarding licensee NCS audits and inspections.

4.0 Nuclear Criticality Safety Event Review and Follow-up (IP 88015 & 88016)

a. Inspection Scope

The inspectors reviewed the licensee response to a selection of recent internally-reported events. The inspectors reviewed the progress of investigations and interviewed licensee staff regarding immediate and long-term corrective actions. As a special focus area, inspectors also reviewed two change packages relative to criticality safety. The inspectors reviewed selected portions of the documents listed in Section 2.4 of the Attachment.

b. Observations and Findings

The inspectors reviewed selected licensee internally reported events. The inspectors determined that the licensee adequately evaluated whether or not these events were reportable to the U.S. Nuclear Regulatory Commission. The inspectors observed that internal events were investigated in accordance with written procedures and appropriate corrective actions were assigned and tracked.

While there are two open events related to open violations from a previous inspection, these were not evaluated during this inspection as the licensee response was still in process.

c. Conclusions

No safety concerns were identified during a review of recent licensee investigation of internal NCS related events; reportability determinations, and corrective actions.

5.0 Validation (IP 88016)

a. Inspection Scope

The inspectors reviewed the licensee's most recent validation report, verified that only validated analytical methods are used in NCS analyses and that any new analytical methods are validated in accordance with the license, verified that the appropriate bias and bias uncertainty was applied to the NCS analyses reviewed, and verified that NCS

analyses incorporate an approved subcritical margin for all normal and credible abnormal conditions. The inspectors reviewed selected portions of the documents listed in Section 2.5 of the Attachment.

b. Observations and Findings

The inspectors observed that analytical methods used in NCS analyses were consistent with those described in the licensee's validation report. The inspectors verified that NCS analyses incorporated conservative methods and practices consistent with the licensing basis for the justification of subcritical margin. For the NCS analyses reviewed, the inspectors verified that the appropriate or conservative total uncertainty from the licensee's validation report was applied. The inspectors verified that the neutronics computer codes used to perform NCS analyses were periodically verified by reviewing the required preventative maintenance (PM) action that the licensee maintains. This PM requires sample input decks to be run periodically to check results against expected results, possibly identifying issues.

c. Conclusion

No safety concerns were identified during review of the licensee's code validation.

6.0 Criticality Alarm Systems (IP 88017)

a. Inspection Scope

The inspectors reviewed documentation of criticality accident alarm detector coverage, interviewed engineering and maintenance staff, and performed facility walkdowns to determine the adequacy of the licensee criticality alarm system. The inspectors reviewed selected portions of the documents listed in Section 2.6 of the Attachment.

b. Observations and Findings

The inspectors reviewed criticality accident alarm system placement calculations to determine the adequacy of models, assumptions, and results during document reviews and visually inspected detector configuration during walkdowns. The inspectors reviewed source placement for the criticality alarm analysis. The inspectors verified that the licensee's placement of criticality accident alarm detectors has been established in accordance with the criteria described in the license and Title 10 of the *Code of Federal Regulations* Section 70.24

c. Conclusions

No safety concerns were identified during review of the licensee's criticality alarm system.

7.0 Plant Activities (IP 88015)

a. Inspection Scope

The inspector performed plant walkdowns to review activities in progress and to determine whether risk-significant fissile material operations were being conducted safely and in accordance with regulatory requirements. The inspectors interviewed operators, NCS engineers, and process engineers both before and during walkdowns. The inspectors reviewed selected portions of applicable documents listed for other sections, such as the Nuclear Criticality Safety Evaluation (NCSE) and Nuclear Criticality Safety Analysis (NCSA) listed for Section 2.0, before walkdowns.

b. Observations and Findings

The inspector performed walkdowns in Mini Halls 1A and 1B, the uranium hexafluoride handling area, the Cylinder Receipt and Dispatch Building, Separation Building Modules 1001 and 1003, the Decontamination Workshop, and the control room complex. The inspectors reviewed IROFS 14 (check list for cylinder movement), 16 (cylinder inspection for moderators), and 54 (mass logs for the SCDT) and observed operators during implementation of IROFS 16.

One of the items inspectors specifically attempted to verify included IROFS 15 which was an administrative control proposed to ensure that enriched materials were not introduced to the MFDT. However, the method of implementation of this IROFS had not been determined at the time of the inspection.

c. Conclusions

No safety concerns were identified regarding plant operations.

8.0 Exit Meeting

The inspector communicated observations and findings to the licensee's management and staff throughout the week of the inspection and presented the final results to the licensee's management, including Steve Cowne, during an exit meeting held on April 10, 2014. The licensee's management acknowledged the results of the inspection and understood the findings presented.

SUPPLEMENTARY INFORMATION

1.0 List of Items Opened, Closed, and Discussed

Item Number	Status	Description
IFI 70-3103/2014-201-01	Opened	Track corrective actions associated with determining non credibility of backflow into the MFDT

2.0 Key Documents Reviewed

Inspectors reviewed selected aspects of the following documents. Documents that apply to multiple sections are listed in the section that is most applicable.

2.1 Plant Status

Not Applicable

2.2 Nuclear Criticality Safety Program (IP 88015 & 88016)

- AD-3-1000-01, Rev. 17, "Requirements for Program Documents," dated January 30, 2014.
- CR-3-1000-01, "Implementation of NCS Evaluations and Analysis," Rev. 6, dated November 4, 2013.
- CR-3-1000-02, Rev. 5, "Criticality Safety Postings," dated November 4, 2013.
- EG-3-3100-01, Rev. 7, "Integrated Safety Analysis Impact Evaluation," dated October 18, 2013.
- EG-3-3200-01, Rev. 6, "Nuclear Criticality Safety Evaluations," dated October 18, 2013.
- LS-3-1000-05, Rev. 7, "Notifications and Event Reporting," dated November 7, 2012.
- MA-3-2000-08, Rev. 5, "Internal Inspection of New or Clean Product Cylinders," dated October 31, 2013.
- NCS-CSA-020, Rev. 0, "Determination of Safe-by-Design Mass for Various Enrichments," dated October 24, 2012.
- NCS-CSE-021, Rev. 3, "Movement of Components," dated March 24, 2014.
- NCS-CSE-032, Rev. 2, "NCSE of the Safe by Design Slab Tanks," dated March 24, 2014.
- NCS-CSE-033, Rev. 1, "NCSE of the Decontamination Workshop," dated April 1, 2014.
- NCS-CSE-034, Rev. 1, "Nuclear Criticality Safety Evaluation of the LECTS Room," dated March 24, 2014.

- NCS-CSE-037, Rev. 0, “Nuclear Criticality Safety Evaluation of the MFDT,” dated March 21, 2014.
- SA-2013-005 (NCSAS-13-0001), “URENCO USA Criticality Safety Assessment Report,” dated December 19, 2013.
- WEF-BD-16a, Rev. 7, “Administratively Limit Moderator Mass in Cylinder,” dated February 13, 2014.

2.3 Nuclear Criticality Safety Inspections, Audits, and Investigations (IP 88015)

- CR-3-1000-03, Rev. 11, “NCS Weekly Walkthroughs and Periodic Assessments,” dated November 11, 2013.
- NCSI-13-0042
- NCSI-13-0043
- NCSI-13-0044
- NCSI-13-0045
- NCSI-14-0001
- NCSI-14-0004
- NCSI-14-0005
- NCSI-14-0006
- NCSI-14-0007
- NCSI-14-0008
- NCSI-14-0009
- NCSI-14-0010
- NCSI-14-0011
- NCSI-14-0012
- NCSI-14-0013
- NCSI-14-0014

2.4 Nuclear Critically Safety Event Review and Follow-up (IP 88015 & 88016)

- ER-2013-2233, “Question on application of IROFS30a/b/c to TRIAC D16 pump in SBM-1003 On-Line Mass Spectrometer,” dated November 14, 2013.
- ER-2013-2236, “Chemistry procedures (CH-) did not receive Criticality Safety reviews,” dated November 15, 2013.
- ER-2013-2257, “Trend Related to the Integration of Nuclear Criticality Safety Evaluations and Analyses into ISA,” dated November 19, 2013.
- ER-2013-2425, “Tracking ER - HAZOP change,” dated December 11, 2013.
- ER-2014-208, “Work Conducted Without a Work Order,” dated February 13, 2014.

- ER-2014-320, “Update Procedure, OP-3-0490-04, Helium Leak Test, to show certain steps are credited for a series of unlikely events or errors to support a Not Credible determination of a postulated accident sequence,” dated March 7, 2014.
- ER-2014-428, “Discrepancy between the Important Dimensions table in NCS-CSE-025 and as-built dimensions of decontamination cabinets LES-SK-0001 and LES-SK-0003,” dated March 26, 2014.
- ER-2014-461, “IROFS54a/b Master Log not completed correctly,” dated April 2, 2014
- CC-LS-2013-0004, Rev. 0, “The elimination of Criticality Safety Officer and Fire Protection Officer,” dated August 27, 2013.
- CC-OP-2011-0014, Rev. 0, “Cascade Criticality Credibility,” dated September 7, 2011.

2.5 Validation (IP 88016)

- EG-5-3200-01-F-1, Rev. 4, “MONK 8A Verification for Computer ID NEF-DD4937B1,” dated March 6, 2014.
- EG-5-3200-01-F-1, Rev. 4, “MONK 8A Verification for Computer ID URLDAF722536,” dated March 6, 2014.
- NCS-REP-001-00, Rev. 4, “MONK 8A Validation and Verification,” dated March 19, 2009.

2.6 Criticality Alarm Systems (IP 88017)

- CALC-S-00107, Rev. 1, “Immediate Evacuation Zone Calculation,” dated December 16, 2010.
- CALC-S-00109, “Evaluation of CAAS [criticality accident alarm system] placement in the SBM,” Rev. 0, dated January 8, 2010.
- CALC-S-00132, Rev. 1, “Evaluation of CAAS Placement in the CRDB – Bunkered Area,” dated December 08, 2011.
- Maintenance Work Order: 1000090215, 1Y: SBM 561 CAAS MAINT, dated March 28, 2013.
- MA-3-3561-01, Rev. 0, “CAAS Periodic Testing,” dated February 10, 2011.
- OP-3-0560-01, Rev. 2, “Criticality Accident Alarm System,” dated February 16, 2012.
- RP-3-4000-29, Rev. 1, “Operation of the Ludlum Model 375 Area Radiation Monitor,” dated October 28, 2013.

2.7 Plant Activities

- Documents listed in other sections were reviewed related to facility walkdowns.

2.8 Exit Meeting

Not Applicable

3.0 Inspection Procedures Used

IP 88015	Nuclear Criticality Safety Program
IP 88016	Nuclear Criticality Safety Evaluations and Analyses
IP 88017	Criticality Alarm Systems

4.0 Key Points of Contact

LES

S. Magill	Operations Manager
S. Cowne	Head of Compliance
D. Greenwood	Head of Operations
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J. Rickman	Licensing
M. Conley	ISA/Criticality Safety
A. Riedy	ISA/Criticality Safety
R. Shaffer	Chief of Staff
J. Muth	QA
W. Brunkow	Recycling Manager
B. Graham	Licensing
C. Pantoya	PCSS Supervisor
B. McKenzie	ISA/Criticality Safety
A. Bridges	ISA/Criticality Safety
A. McGee	ISA/Criticality Safety
Q. Newell	ISA/Criticality Safety

NRC

Greg Chapman,	Criticality Safety Inspector, NRC HQ
Nick Peterka	Fuel Facility Inspector, NRC R2

All attended the exit meeting on April 10, 2014.

5.0 List of Acronyms and Abbreviations

ACE	apparent cause evaluation
CAB	Centrifuge Assembly Building
CAAS	criticality accident alarm system
CR	Condition Report

CRDB	Cylinder Receipt and Dispatch Building
CSO	Criticality Safety Officer
CTF	Centrifuge Test Facility
DACE	detailed apparent cause evaluation
ETC	Enrichment Technology Corporation
ETUC	Enrichment Technology US
GEVS	gaseous effluent ventilation system
HS&E	health, safety, and environment
IEZ	immediate evacuation zone
IFI	Inspection Follow-up Item
IROFS	items relied on for safety
ISA	integrated safety analysis
LAR	license amendment request
MFS	Medium Frequency System
NCS	nuclear criticality safety
NCSA	nuclear criticality safety analysis
NCSE	nuclear criticality safety evaluation
NSR	nuclear safety release
ORR	operational readiness review
PCS	plant control system
PLC	programmable logic controller
QA	quality assurance
SAR	Safety Analysis Report
SBD	Safe-by-Design
SBM	separation building module
SNM	special nuclear material
URI	Unresolved Item
VSR	ventilated storage room