LES-24-092-NRC

Enclosure 2

UUSA Responses to Human Factors Engineering and Environmental RAIs

Human Factors RAI 2-1

Regulatory Basis:
The requirement in 10 CFR 70.61(e) states that applicants shall establish a safety program to ensure that each item relied on for safety (IROFS) will be available and reliable to perform its intended function when needed.

The requirement in 10 CFR 70.62(d) states, in part, that each applicant or licensee shall establish management measures to ensure compliance with the performance requirements of 10 CFR 70.61, that the measures applied to a particular administrative control may be graded commensurate with the reduction of the risk attributable to that control, and that management measures shall ensure that administrative IROFS required by 70.61(e) are designed, implemented, and maintained as necessary to ensure they are available and reliable to perform their function when needed.

The requirement in 10 CFR 70.65(b)(4) states, in part, the Integrated Safety Analysis Summary must include a description of the management measures to be applied to IROFS, as well as information necessary to demonstrate compliance with the performance requirements of 10 CFR 70.61.

NUREG-1520, "Standard Review Plan for Fuel Cycle Facilities License Applications," Revision 2, provides guidance to the staff reviewers who perform safety and environmental impact reviews of applications to construct or modify and operate nuclear fuel cycle facilities. Section 3.4.3.1, "Safety Program and Integrated Safety Analysis Commitments," states, in part, that human factors engineering (HFE) should generally be part of the safety program. Human factors practices should be incorporated into the applicant's safety program sufficiently to ensure that IROFS and management measures perform their functions in meeting the requirements of 10 CFR Part 70.

Description of Issue:
In section 7, "License Commitments and Requirements," of the same procedure, it refers to "Safety Analysis Report, Section 3.4.40, IROFS Requiring Operator Actions." However, the NRC staff reviewed the latest SAR, Revision 50d, and section 3.4.40 is titled, "Administrative Control IROFS."

Information Needed:
Please clarify which version of the SAR this procedure is referencing.

UUSA Response to RAI 2-1

In addressing this question, UUSA notes that NUREG-1520, Standard Review Plan for Fuel Cycle Facilities License Applications, Revision 2, referenced in Human Factors RAI 2-1 is not the Licensing Code of Record for the UUSA facility. The commitment to NUREG-1520, as identified in Integrated Safety Analysis Summary (ISAS) Table 3.0-1, UUSA Licensing Code of Record, is to NUREG-1520, 2002. Although this version is known as the Standard Review Plan for the Review of a License Application for a Fuel Cycle Facility – Final Report (ML020930033), it is considered to be Revision 0 of the NUREG.

Clarification was provided by the NRC to confirm that the procedure that is discussed in this RAI is EG-3-3100-08, Revision 1, Human Factors Engineering Checklist. In this procedure, EG-3-3100-08, Revision 1, Human Factors Engineering Checklist, the reference to the SAR section in Section 7 is incorrectly cited. The procedure should refer to SAR Section 3.4.41, IROFS Requiring Operator Actions, not Section 3.4.40.
This error has been entered into the approved UUSA Corrective Action System for resolution as Event Report EV 165827.

The version of the SAR that the procedure is referencing is Revision 51.

ENVIRONMENTAL

The regulatory basis for each of the four RAIs is the same.

Regulatory Basis:
The NRC staff will prepare an Environmental Assessment (EA) pursuant to Title 10 *Code of Federal Regulations* (10 CFR) Sections 51.21 and 51.30. The NRC's regulations in 10 CFR 51.45(b) and (c) require an applicant to provide information on the environmental considerations and an analysis of the project. In addition, the NRC staff use the guidance in NUREG-1748, "Environmental Review Guidance for Licensing Actions Associated with NMSS Programs," especially chapter 3, to prepare the EA.

Environmental RAI 1-1 - *Recycling Systems*

Description of issue:
The recycling systems and components to be used are directly connected to the present request to install the capacity for enrichment up to 10 weight percent (wt. %). Detailed information about this portion of the increased enrichment process is not provided in the application.

Information Needed:
Explain how increased enrichment operations would affect the recycling systems themselves, as well as the associated wastes, effluents, and emissions.

UUSA Response:

The recycling and support systems and processes analyzed or evaluated are:

- Ventilated Room Operations
  - Bulking of waste into 55-gallon Waste Drums
- Decontamination Workshop
  - Multi-Functional Decontamination Train (MFDT)
  - Small Component Decontamination Train (SCDT)
  - Storage Cabinets for UF_6 Sample Bottles and Flex Hoses
- Liquid Effluent Collection and Transfer System (LECTS)
  - Slab Tanks / Bulk Storage Tanks / Totes
- Solid Waste Collection Room
  - 55-gallon Waste Drums Storage

Note: The Gaseous Effluent Vent System (GEVS), which provides ventilation services to LEU+ affected areas, was evaluated for the recycling and support systems in LAR 23-02. That is, the GEVS assessment in LAR 23-02 covered all areas where GEVS services are

required [LES, *Louisiana Energy Services, LLC, Environmental Information* (ML23334A130).

When LAR 23-02 was submitted, the analyses and evaluations of the installed recycling and support systems were not completed. The work to review those systems is now sufficiently complete, so information can be provided. Similar to the production systems described in LAR 23-02, previous Safe-By-Design controls were transitioned to Passive Engineered Items Relied on For Safety (IROFS). Design features were included for combinations of geometry, volume, interaction, or neutron absorption to ensure the Performance Requirements of 10 CFR 70.61 remain satisfied. Additionally, the accident analyses were performed assuming an enrichment limit of 11 weight percent ($^{w}/_{o}$) ^{235}U, approximately one percent higher than the product assay licensed limit.

For the recycling and support systems and removal of the interim controls established for segregation of LEU+ exposed components, four new accident sequences were added, four accident sequences were revised and two temporary accident sequences were deleted. Three new Sole Passive Engineered Control (PEC) IROFS were added (one each for MFDT, SCDT and LECTS Slab Tanks), one Sole IROFS (storage cabinets) was revised and four IROFS were deleted that were related to the temporary accident sequences, as the temporary accident sequences were deleted.

However, the installed recycling and support systems will be operated the same way with LEU+ enrichments as they are currently operated at a lower enrichment limit. Components will be periodically removed from various systems with LEU+ material and will be decontaminated and recycled using the same chemicals and processes as currently licensed and evaluated, just at a higher enrichment limit. It is anticipated that a larger amount of depleted UF_6 will have to be hydrolyzed in the MFDT for down blending of the liquid effluent in the LECTS Slab Tanks to meet the requirements of IROFS55a/b that limits enrichment to ≤ 1.0 $^{w}/_{o}$ ^{235}U in the Bulk Storage Tanks, Release Tanks, and Totes. Despite this change in down blending operations, these same processes are expected to result in no increase in wastes, effluents or emissions when compared with the amounts estimated in the facility expansion Environmental Assessment [NRC, *Environmental Assessment for the Proposed URENCO USA Uranium Enrichment Facility Capacity Expansion in Lea County, New Mexico",* dated 18 March 2015, Table 2-3 (ML15072A279, ML15072A016)].

Environmental RAI 1-2 - *Waste*

Description of Issue:
The application does not address the potential effect of producing U-235 enriched up to 10 wt.% on the generation and storage of depleted uranium hexafluoride (UF_6). Lack of this information prevents the NRC staff from being able to fully describe the potential waste management impacts of the increased enrichment process.

Information Needed:
Describe how the process of increasing enrichment up to 10 wt. % U-235 would affect the generation and storage of depleted UF_6.

UUSA Response:

To produce LEU+ product at a higher enrichment value above the current 5.5 $^{w}/_{o}$ ^{235}U licensed limit, more ^{235}U enrichment of the feed material is necessary to create the higher enrichment product. That is, the feed material is "worked" harder in order to extract sufficient ^{235}U to obtain the higher enrichment desired. By extracting more ^{235}U from the feed material, the amount of tails material subsequently decreases.

If all the product at the UUSA facility were to be LEU+ in the future, the number of depleted UF_6 cylinders being created with the need for storage would decrease when compared to the current production level. With some of the product assay at UUSA being LEU+, a slight decrease in the number of annually filled depleted UF_6 cylinders is anticipated.

There are no needed changes to the Uranium Byproduct Cylinder (UBC) Storage Pad to support LEU+ production, nor are there any proposed changes to the 25,000 depleted UF_6 cylinder maximum limit for the UBC Storage Pad specified in the Materials License.

Environmental RAI 1-3 – *Waste*

Description of Issue:
The application says: "The implementation of the future License Amendment Request (LAR) to allow for use of recycling systems to decontaminate LEU+ [Low Enriched Uranium Plus] exposed materials and components will not impact waste cylinders." It is not clear whether this means that the implementation of the recycling systems would not affect the quantity, the types, or the storage of waste cylinders.

Information Needed:
State what types of cylinders are used to store what types of waste(s). Indicate whether and how the future implementation of the recycling systems would affect the quantity, types, and storage of waste cylinders.

UUSA Response:

The intent of the referenced statement in the application for waste cylinders are the Type 48Y cylinders used for depleted UF_6, also known as tails. These cylinders are designed, fabricated and shipped in accordance with ANSI N14.1, Uranium Hexafluoride – Packaging for Transport. The future implementation of the recycling systems would not affect the types of cylinders used for depleted uranium or storage of the 48Y cylinders on the Uranium Byproduct Cylinder (UBC) Storage Pad. As identified in the UUSA response to Environmental RAI 1-2, Waste, with the higher enrichment production level, the number of depleted UF_6 cylinders produced over time is anticipated to slightly decrease from the current production rate and will not exceed the maximum number of 25,000 cylinders of depleted UF_6 specified in the Materials License on the UBC Storage Pad.

Other Wastes at UUSA

Hazardous/Mixed Waste
The future use of recycling systems at UUSA is not anticipated to change the amount, type, containers or temporary storage of hazardous or mixed waste. Hazardous and waste will continue to be managed utilizing Best Management Practices as currently employed. UUSA will not conduct on-site treatment and will continue to only temporarily store hazardous waste at the UUSA site for transportation to a licensed off-site hazardous waste facility within the required 90 day timeframe.

Radioactive Waste
The future use of recycling systems at UUSA is not anticipated to change the amount, type,

containers or handling of radioactive waste as these systems are currently in use at the facility for a lower enrichment limit. All solid radioactive waste generated will remain Class A Low Level Radioactive Waste (LLRW). However, liquid radioactive waste is not collected, processed and solidified in amounts described in the facility expansion Environmental Assessment [NRC, *Environmental Assessment for the Proposed URENCO USA Uranium Enrichment Facility Capacity Expansion in Lea County, New Mexico",* dated 18 March 2015, Table 2-3, Footnote d (ML15072A279, ML15072A016)]. Liquid radioactive waste is collected in bulk storage tanks installed in the Liquid Effluent Collection and Transfer System (LECTS) and shipments occur as necessary based on tank volumes. Two liquid waste shipments have occurred during facility operation. Waste is pumped via a transfer system to totes and transferred for disposal. Implementation of LEU+ is not expected to change this process.
Note: GEVS waste filters for LEU+ are addressed in LAR 23-02, Enclosure 8, Sections 4.1 and 5.2 [LES, *Louisiana Energy Services, LLC, Environmental Information* (ML23334A130)]

Non-hazardous waste
The future use of recycling systems at UUSA is not anticipated to change the amount, type, containers for or storage of non-hazardous waste. Non-hazardous waste will continue to be shipped to the licensed off-site Lea County landfill, which has sufficient capacity for the life of the UUSA facility [NRC, *Environmental Assessment for the Proposed URENCO USA Uranium Enrichment Facility Capacity Expansion in Lea County, New Mexico",* dated 18 March 2015, Table 2-3 (ML15072A279, ML15072A016)].

Environmental RAI 1-4 - *Public and Occupational Health*

Description of Issue:
Hydrogen fluoride (HF) emissions are presented as projections and estimates, but it does not appear that actual HF emission data is included for operations to date. To describe potential impacts from emissions associated with the processing U-235 enriched up to 10 wt. %, the NRC staff needs information about current HF emissions.

Information Needed:
If HF emissions data is collected, provide HF emissions data for the timeframe since 2015 to confirm the estimates in the 2015 EA (similar to format provided in the "UUSA Occupational TEDE" table). Otherwise, discuss whether the 2015 EA estimates are accurate representations of HF emissions since 2015 and provide a basis.

UUSA Response

UUSA notes that in LAR 23-02, Section 5.3.1, Non-radiological Impacts, a description of various Radiological Assessment System for Consequence Analysis (RASCAL) were performed across multiple ^{235}U enrichments, including up to 20 $^{w}/_{o}$ ^{235}U, and the forecast HF emissions remain unchanged across the various enrichments, demonstrating that UF_6 enrichment does not impact HF generation [LES, *Louisiana Energy Services, LLC, Environmental Information* (ML23334A130).

All UUSA facility Gaseous Effluent Vent Systems (GEVS) have continuous HF monitors upstream and downstream of the installed filters and in the exhaust stack with high level alarms to inform operators of HF emissions within the plant GEVS. Additionally, a continuous HF monitor is provided in the exhaust stack of the Centrifuge Test and Post Mortem Facility Exhaust Filtration System.

However, UUSA does not collect and retain HF monitoring data from all GEVS exhaust stacks. UUSA does collect GEVS exhaust stack monitoring data from two Separations Building Modules (SBMs) and the Cylinder Receipt and Dispatch Building (CRDB). The data from SBM-1001, SBM-1003 and CRDB exhaust stacks are collected in the Utility Plant Control System (PCS) and retained for approximately 10,000 hours. Table RAI 1-4-1 identifies the building and the associated HF monitor for the building which monitors HF in specific locations and supplies data to the Utility PCS:

Table RAI 1-4-1 UUSA HF Monitors				
Building	**System**	**Description**	**Monitor Number**	**Data Collected?**
SBM-1001	Operating Pumped Extract GEVS	HF Concentration Before Filter Trains	1001-565-1MA1	Yes
		HF Concentration After Filter Trains	1001-565-1MA2	Yes
		HF Concentration in Stack	1001-565-1MA3	Yes
CRDB	Operating Local Extract GEVS	HF Concentration Before Filter Trains	1100-565-1MA1	Yes
		HF Concentration After Filter Trains	1100-565-1MA2	Yes
		HF Concentration in Stack	1100-565-1MA3	Yes
	Operating CRDB Fume Hood GEVS	HF Concentration Before Filter Trains	1100-565-2MA1	Yes
		HF Concentration After Filter Trains	1100-565-2MA2	Yes
		HF Concentration in Stack	1100-565-2MA3	Yes
SBM-1003	Operating 1003 Pumped Extract GEVS	HF Concentration Before Filter Trains	1003-565-1MA1	Yes
		HF Concentration After Filter Trains	1003-565-1MA2	Yes
		HF Concentration in Stack	1003-565-1MA3	Yes
	Operating 1003 Local Extract GEVS	HF Concentration Before Filter Trains	1003-565-2MA1	Yes
		HF Concentration After Filter Trains (Same stack as 1003 pumped extract)	1003-565-1MA2	Yes
		HF Concentration in Stack (Same stack as 1003 pumped extract)	1003-565-1MA3	Yes
SBM-1005	Operating 1005 Pumped Extract GEVS	HF Concentration Before Filter Trains	1005-565-1MA1	No
		HF Concentration After Filter Trains	1005-565-1MA2	No
		HF Concentration in Stack	1005-565-1MA3	No

Table RAI 1-4-1 UUSA HF Monitors				
Building	**System**	**Description**	**Monitor Number**	**Data Collected?**
	Operating 1005 Local Extract GEVS	HF Concentration Before Filter Trains	1005-565-2MA1	No
		HF Concentration After Filter Trains (Same stack as 1005 pumped extract)	1005-565-1MA2	No
		HF Concentration in Stack (Same stack as 1005 pumped extract)	1005-565-1MA3	No

Reference: Procedure OP-3-0660-01, Revision 25, Gaseous Effluent Vent System

As the retained data set is quite limited in scope and duration and does not extend to the 2015 timeframe when the facility expansion Environmental Assessment (EA) was completed, UUSA performed an assessment to determine the maximum HF concentration that could be emitted from the UUSA facility and remain at or below the 2015 EA projection of annual HF emissions of 1,200 grams (2.6 lbs.) HF at 10 MSWU/yr [NRC, *"Environmental Assessment for the Proposed URENCO USA Uranium Enrichment Facility Capacity Expansion in Lea County, New Mexico"*, dated 18 March 2015, Table 2-3] (ML15072A279, ML15072A016). The calculated maximum HF concentration can be compared to the existing GEVS monitored data for the buildings' effluent to determine results.

In order to perform this assessment, UUSA acquired manufacturer maximum design flow information for the installed GEVS fans, as well as the planned, but not yet constructed, SBM-1007 and SBM-1009 GEVS fans. The future SBM-1007 and SBM-1009 were also included in the facility expansion EA in 2015. The Centrifuge Assembly Building Centrifuge Test Facility (CAB CTF) is also included in the assessment. The assumption was made that all GEVS fans would be in continuous service for the entire year at the maximum design volumetric flowrate at the calculated HF concentration. The data was entered into a spreadsheet in order to calculate the maximum HF concentration to be at, or below, the projected HF emissions on an annual basis. The HF concentration calculation to meet the parameter of 1,200 grams/year (2.6 lbs/year) is 0.0023 mg/m^3. Slight differences in calculational values and presented values in the following table are due to slight rounding of the results. The inputs and results of this assessment are included in Table RAI 1-4-2 and can be compared to the retrieved data for the monitored GEVS HF exhaust paths.

Table RAI 1-4-2
HF Concentration to be at, or below, Projected HF Annual Emissions for a 10 MSWU Facility

Location of GEVS	Flow Rate (cfm)	Flow Rate (m^3/hr)	Duration (hr)	Volume Released (m^3)	Concentration (mg/m^3)	Mass (mg)	Mass (g)
CRDB	26000	44174	8760	386964240	0.00233165	902255.6	902.25
CAB CTF	4000	6796	8760	59532960		138808.6	138.80
CRDB Local	1000	1699	8760	14883240		34702.2	34.70
SBM-1001 Pumped	380	645.6	8760	5655361		13186.8	13.18
SBM-1003 Local	400	679.6	8760	5953296		13880.9	13.88
SBM-1003 Pumped	400	679.6	8760	5953296		13880.9	13.88
SBM-1005 Local	400	679.6	8760	5953296		13880.9	13.88
SBM-1005 Pumped	400	679.6	8760	5953296		13880.9	13.88
SBM-1007 Local	400	679.6	8760	5953296		13880.9	13.88
SBM-1007 Pumped	400	679.6	8760	5953296		13880.9	13.88
SBM-1009 Local	400	679.6	8760	5953296		13880.9	13.88
SBM-1009 Pumped	400	679.6	8760	5953296		13880.9	13.88
Total HF (grams/yr)							1,200

Conversions used:

1. 1.699 cfm to $m^{3/}$hr
2. 8760 hrs/yr

Figure RAI 1-4-1 provides the logarithmic plot of HF trend data from 21 May 2023 to 11 July 2024 that was captured by the Utility PCS for the following HF monitors from Table RAI 1-4-1:

- 1001-565-1MA3
- 1003-565-1MA3
- 1100-565-1MA3
- 1100-565-2MA3

It is reasonable to expect that similar HF concentrations exist at the other operating GEVS at UUSA.

The solid blue horizontal line in Figure RAI 1-4-1 represents an approximate value of the maximum HF concentration from Table RAI 1-4-2 that results in annual HF emissions at, or below, the projected emissions from the 2015 EA, which assessed emissions from an in-service 10 MSWU facility, considering operation of the yet-to-be constructed and operated SBM-1007 and SBM-1009.

It is reasonable to conclude that by making conservative assumptions about the operating GEVS at UUSA regarding volumetric flowrate, continuous operation, normal operating parameters and a limited data set, that the projected HF emissions considered in the 2015 Environmental Assessment for facility expansion remain bounded by assessed current and future operation at the UUSA facility.

Reviewed and determined to be UNCLASSIFIED.
This review does not constitute clearance for public release.

Derivative Classifier: D. McDonald/5075/ Plant Ref.
(Name/personal identifier and position title)

Date: 11 July 2024