

April 9, 2004

MEMORANDUM TO: Martin J. Virgilio, Director
Office of Nuclear Material Safety
and Safeguards

THRU: Robert C. Pierson, Director /RA/
Division of Fuel Cycle Safety
and Safeguards

FROM: William M. Troskoski /RA/
Senior Chemical Engineer
Mixed Oxide Facility Licensing Section
Special Projects Branch
Division of Fuel Cycle Safety
and Safeguards, NMSS

SUBJECT: FOREIGN TRIP REPORT IN OFFICE REVIEW: LOUISIANA ENERGY
SERVICES CLASSIFIED INTEGRATED SAFETY ANALYSIS REVIEW
AND SITE TOUR OF URENCO GAS CENTRIFUGE URANIUM
ENRICHMENT FACILITY

Attached is a trip report for travel to the Urenco gas centrifuge uranium enrichment facility in Almelo, The Netherlands, during March 16-18, 2004, for a plant tour and review of the classified portion of the Louisiana Energy Services' Integrated Safety Analysis (ISA), for the proposed National Enrichment Facility (NEF) to be built in Eunice, New Mexico.

The Division of Fuel Cycle Safety and Safeguards (FCSS) believes that the content of this report is not likely to be of interest to the Commission.

Attachment: Foreign travel trip report with attachments.

cc:
W. Dean, OEDO
J. Dunn Lee, OIP
M. Federline, NMSS
T. Rothschild, OGC
L. Silvious, NSIR/INFOSEC
T. Sherr, NMSS

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Docket: 70-3103

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NRC Foreign Trip Report

Subject

Division of Fuel Cycle Safety and Safeguards (FCSS) Staff Review of Louisiana Energy Services (LES) Classified Integrated Safety Analysis and Tour of Operating Gas Centrifuge Enrichment Facility

Dates of Travel and Countries/Organization Visited

March 14-19, 2004, Urenco Gas Centrifuge Enrichment Facility at Almelo, The Netherlands

Author, Title and Agency Affiliation

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Background/Purpose

Louisiana Energy Services (LES) submitted a license application dated December 12, 2003, to build a gas centrifuge uranium enrichment facility based on Urenco technology. The application included an Integrated Safety Analysis (ISA) Summary. NUREG-1520, "Standard Review Plan for the Review of a License Application for a Fuel Cycle Facility," requires the staff to review the ISA Summary and, if necessary, the ISA and supporting ISA documentation to determine whether there is reasonable assurance that the applicant has performed a systematic evaluation of the hazards and has identified credible accident sequences.

For this license application, LES has conducted two different ISAs, one for classified systems and another for non-classified systems. This approach was deemed necessary because the classified nature of some of the facility design information required the use of personnel with the appropriate national security clearances. The non-classified portion of the ISA was reviewed by the staff at an LES contractor's office in Marlborough, Massachusetts, on March 8-10, 2004. The trip to the Almelo facility allowed the staff to review the classified design material, meet with plant management to discuss facility operating experience, and view many of the actual processes and components that are to be used in the LES facility.

Abstract: Summary of Pertinent Points/Issues:

On March 16-18, 2004, staff from the Division of Fuel Cycle Safety and Safeguards conducted an in-office review of the classified portion of the LES ISA at the Urenco gas centrifuge facility in

Almelo, The Netherlands. The staff also toured the Urenco facility and conducted discussions with plant management concerning the operational history of the cascades. By letter dated December 12, 2003, LES submitted to NRC its license application and ISA Summary for construction and operation of the National Enrichment Facility (NEF), a gas centrifuge uranium enrichment facility, in Lea County, New Mexico, near the city of Eunice. The NEF design is similar to the design of the Claiborne Enrichment Center in Homer, Louisiana, for which LES had submitted a license application in 1991, which it later withdrew in 1998. However, since Subpart H of 10 CFR Part 70 went into effect in 2000, the most significant difference between the two license applications is the ISA.

Discussion

The proposed LES NEF is based on Urenco technology. A significant portion of the ISA was developed through a validation process of the Urenco HAZOPs. This portion of the HAZOP and supporting ISA documentation is considered to be sensitive classified information by the nations hosting the existing Urenco facilities. The NRC staff has previously reviewed the non-classified ISA material at the Framatome offices in Marlborough, Massachusetts, on March 9-10, 2004 (see trip report dated March 25, 2004).

During the site visit, the staff toured the facility control rooms and process areas, and observed the equipment and components that are proposed to be used at the NEF. The NRC staff conducted discussions with the plant personnel concerning the operational and maintenance requirements and experience. The staff also received presentations concerning:

1. Uranium Hexafluoride Processing;
2. Equipment Operating Experience;
3. Waste Treatment;
4. Radiation Protection and Regulatory Compliance;
5. Approach to Criticality [Safety] in the NEF Project;
6. Water Consumption.

The uranium hexafluoride presentation covered feed, enriched and depleted uranium process streams, and uranium cylinder receipt, dispatch, and storage activities. The presentation on plant operating history included the decommissioning activities for the SP-1 section of the plant (including "green-field" specifications) and general production activities.

LES bases a significant portion of the ISA risk evaluation upon the operational history of the Urenco facilities at Capenhurst, United Kingdom, Almelo, The Netherlands, and Gronau, Germany. The equipment operating experience presentation covered the 30-years of operating experience related to the equipment and components proposed to be used by LES at the NEF. Urenco officials informed the staff that none of the described accident sequences of concern have ever occurred. It was pointed out that the SP-5 design, proposed to be used by LES, is the product of many upgrades as a result of lessons-learned, and operational improvements. Specific topics covered included: heater control failure; cylinder overfill; uranic releases due to equipment failure; wrong cylinder connections (prevention of connecting a product cylinder to a feed station); criticality in product pumps, cylinders and storage; saturated carbon traps; and, criticality in the gaseous effluent ventilation system.

Urenco officials discussed several operational events and conditions related to the accident sequences developed by LES. One operating event that was discussed included blockage of a cylinder valve in an SP-4 autoclave. The corrective actions that were subsequently applied to the SP-5 design (and to be implemented by LES) improves on the pressure or temperature control with the addition of several independent hardware and software controls. Two events involving a slight overflow of tails cylinders occurred due to a failed load cell. As a result, another type of load cell was installed and an hourly total mass check control was added.

There has been no significant uranium hexafluoride or uranic material releases from a Urenco gas centrifuge facility. No material has been found in the SP-5 gaseous effluent ventilation system. There has been no significant accumulations of uranium in any of the pumping systems. No moderation control problems have occurred in any of the product, donor or receiver cylinders. There has also not been any significant accumulations of uranium mass in the chemical traps, waste treatment and collection tanks, or oil storage.

The information provided concerning radiation protection and waste treatment demonstrated exposure and release levels were low and well within NRC requirements. It was noted that the individuals with the highest exposures were involved with cylinder handling and transport activities.

The criticality safety approach covered the preferred hierarchy of safety design (passive engineered controls, active engineered controls, followed by administrative controls), the double contingency principle, and interactions (Monk8A). Safe geometries are conservatively based on 6 weight percent of U-235. Specific components and systems reviewed included 30-inch product cylinders, the product vent subsystem pump/trap sets, product pumps, the citric acid decontamination tank, and material movement rules. NRC staff also had the opportunity to review several related analysis documents developed by Urenco.

Based on 3MSWU/year, the estimated water consumption for the Almelo plant would be about 15 million gallons annually. This estimate is based on water consumption for the year 2003, which was an extremely warm summer.

Urenco officials also provided the responses to the following staff questions:

- Q 1. Is there anything required to safely shutdown the plant (i.e., vacuum, offsite power)?
A). No, various systems are provided for investment protection only.
- Q 2. Is cooling water required for safety? A) 2. No, it is for investment protection only.
- Q 3. What has been the operating experience with fires? A) 3. There have been several minor smoldering electrical events, but no offsite assistance has ever been required.
- Q 4. When will the IROFS packages be ready? A) 4. An A/E firm is expected to be selected by about June 2004 and the packages are expected to be developed by the end of the year.

The staff found the site visit to be helpful in understanding the technology, plant system operations, and the bases for the accident sequences and process risk assessments contained in the LES application. Valuable safety insights were gained and the potential risks associated with the Urenco technology-based gas centrifuge uranium enrichment plants are better understood.

Pending Actions / Planned Next Steps for NRC

There were no open actions or unresolved problems/issues assigned to NRC. The information received will be used as appropriate during the course of the Staff's review of the LES license application.

Points for Commission Consideration /Items of Interest

The content of this report is not likely to be of interest to the Commission as it involves routine review of ISA documentation used to support the LES license application.

- Attachments:**
1. Meeting agenda
 2. Business Cards
 3. Urenco Presentations

On the Margins

None.

