



UNITED STATES
NUCLEAR REGULATORY COMMISSION

REGION II
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ATLANTA, GEORGIA 30303-8931

August 8, 2006

Mr. Philip G. Sewell, Senior Vice President
USEC Inc.
Two Democracy Center
6903 Rockledge Drive
Bethesda, MD 20817

SUBJECT: NRC INSPECTION REPORT NO. 70-7003/2006-001

Dear Mr. Sewell:

This refers to the operational readiness review team inspection conducted from March 13, through July 13, 2006, at the Lead Cascade facility in Piketon, Ohio. The purpose of the inspection was to assess your actions for ensuring safe and efficient turnover, testing, and start-up of Lead Cascade centrifuge machines, equipment, and support systems. A final exit meeting was held on July 13, 2006, during which time observations from the inspection were discussed with members of your staff.

The inspection consisted of facility walk downs; selective examinations of relevant procedures and records; examinations of safety-related structures, systems, equipment and components; interviews with plant personnel; and observations of plant conditions and activities in progress. Throughout the inspection, observations were discussed with your managers and staff. As documented in the attached report, two open items regarding the installation of the fire suppression system for the cylinder feed cart and implementation of a procedure that established compensatory measures prior to removing IROFS from service for maintenance need to be addressed before we can authorize your staff to introduce process gas to the Lead Cascade.

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P. G. Sewell

2

Should you have any questions concerning this letter, please contact us.

Sincerely,

/RA/

Jay L. Henson, Chief
Fuel Facility Inspection Branch 2
Division of Fuel Facility Inspection

Docket No. 70-7003
License No. SNM-7003

Enclosure: NRC Inspection Report

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U.S. NUCLEAR REGULATORY COMMISSION

REGION II

Docket No.: 70-7003

License No.: SNM-7003

Report No.: 70-7003/2006-001

Licensee: USEC Inc.

Location: Piketon, Ohio

Inspection Dates: March 13 through July 13, 2006

Inspectors: David Hartland, Senior Fuel Facility Inspector, Division of Fuel Facility Inspection (DFFI), Region II
Alphonsa Gooden, Senior Fuel Facility Inspector, DFFI, Region II
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Omar Lopez, Fuel Facility Inspector, DFFI, Region II
Richard Gibson, Health Physicist, DFFI, Region II

Approved: Jay Henson, Chief, Fuel Facility Inspection Branch 2, DFFI, Region II

Enclosure

EXECUTIVE SUMMARY

American Centrifuge Lead Cascade

NRC Inspection Report 70-7003/2006-001

This inspection entailed a review of USEC Inc.'s proposed operation of the American Centrifuge Lead Cascade Facility (Lead Cascade) at the Piketon, Ohio site. The overall objectives of the Operational Readiness Review inspection was to determine whether the Lead Cascade facilities and systems, including the Items Relied On For Safety (IROFS), were adequately constructed and tested; met regulatory and licensing requirements; provided reasonable assurance of worker and public health, safety, and security; and, provided high assurance of facility security.

Section 2.3 of the license application stated that the licensee had established specific plans to ensure a safe and efficient turnover, testing, and operation of the Lead Cascade centrifuge machines, equipment, and support systems. This inspection covered the transition from the refurbishment phase to the operations phase of the Lead Cascade.

The inspection evaluated the readiness of USEC Inc. to proceed with the operation of the Lead Cascade, and was structured around the Lead Cascade IROFS. The inspection assessed whether the controls used to mitigate or prevent dominant risks were reliable and available to perform their intended function in three key areas. The key areas were Safety Operations (chemical safety, criticality safety, operational safety, and fire safety), Radiological Controls (radiation protection, environmental protection, transportation, and waste management), and Facility Support (maintenance and surveillance, training, emergency preparedness, and management organization and controls).

In each of these areas, the inspection assessed whether management measures were in place to provide reasonable assurance that the IROFS were available and able to perform their intended functions when required for the Lead Cascade. The inspection team also assessed whether the licensee had implemented the programs and commitments specified in the license application. The inspection identified the following aspects of the licensee's programs as outlined below:

Safety Operations

- Requirements in the license application related to operations procedures and configuration control were being adequately implemented. An issue regarding the absence of a ground detection system on the control circuit power supply for the machine isolation valves (MIVs) was appropriately addressed by the licensee. (Section 2.a)
- Requirements in the license application with regards to nuclear criticality safety (NCS) were being adequately implemented. A deficiency regarding the absence of guidance for responding to off-normal conditions in the NCS training module was addressed by the licensee. (Section 2.b)

- The chemical safety program was being implemented adequately to ensure that operations could be conducted safely. (Section 2.c)
- Discrepancies with the license application and other documentation related to the design basis for the sprinkler system, as well as the inability of the sole IROFS for the battery room ventilation to perform its intended function, were identified. The licensee took appropriate action to address those issues. One inspector followup item (IFI) remained open regarding the installation of a fire suppression system for the cylinder feed cart. (Section 2.d)

Radiological Controls

- The licensee was implementing its radiation protection program in accordance with the license and regulatory requirements. The licensee took appropriate action to address a lack of procedural guidance regarding the implementation of the IROFS for requirements for personal protective equipment when opening systems exposed to uranium hexafluoride. (Section 3.a)
- The licensee was implementing a program for the transportation of radioactive material in accordance with regulatory requirements. (Section 3.b)
- Based on procedures, interviews, equipment walk-downs, and an established environmental network at Portsmouth, the inspectors determined that environmental protection and waste management programs were in accordance with the license and regulatory requirements. (Section 3.c)

Facility Support

- The licensee was implementing a maintenance program that was in accordance with license requirements. Issues regarding testing for MIVs and the vent sampler detector were appropriately addressed. One IFI remained open regarding licensee implementation of a procedure that established compensatory measures prior to removing IROFS from service for maintenance. (Section 4.a)
- The Portsmouth emergency management program provided the Lead Cascade with adequate emergency facilities, equipment, staffing, emergency planning, and procedures to protect workers, the public, and the environment. Issues related to expired training and inadequate signage were appropriately addressed by the licensee. (Section 4.b)
- The inspectors determined that the licensee adequately implemented the training program to ensure that the facility would be operated safely using qualified personnel. (Section 4.c)

- The licensee was implementing management measures and other controls in accordance with license requirements. Issues related to management qualifications, the procedure review process, an adverse trend regarding adherence to procedures, and the rigor of the internal readiness review were appropriately addressed by the licensee. (Section 4.d)

Attachment

List of Persons Contacted
Inspection Procedures Used
List of Items Opened
List of Acronyms Used

REPORT DETAILS

1. Background

The USEC Inc., Lead Cascade is a test and demonstration facility that is located in existing buildings on the site of the Portsmouth Gaseous Diffusion Plant (GDP) in Piketon, Ohio. The Portsmouth GDP is operated by USEC, who leases the property from the Department of Energy. The area within Portsmouth that houses the Lead Cascade is subleased from USEC to USEC Inc.

The facility will possess a relatively small quantity of uranium hexafluoride (UF_6) and will consist of up to 240 full-scale, operating centrifuge machines arranged in a cascade configuration. The cascade will be operated in recycle mode; i.e., no enriched product will be withdrawn from the cascade except for samples taken for laboratory analysis. The facility may enrich uranium up to 10 weight percent of uranium 235 (U^{235}). The licensee's stated goal of the project is to provide reliability, performance, cost, and other data vital to making decisions concerning the deployment of a commercial plant and to reduce the financial risk of the deployment.

2. Safety Operations

a. Operational Safety

(1) Scope and Observations (Temporary Instruction (TI) 2600/003)

Operations Procedures

The inspectors reviewed operations procedures that addressed start-up, operation, and shutdown of plant systems as well as abnormal/alarm procedures and verified that the activities documented by Section 11.4.8 of the license application were adequately covered. The inspectors also reviewed implementing procedures for the following IROFS.

- Integrated Safety Analysis (ISA) 7.3.3.4: vehicle access control
- ISA 7.3.4.2: procedures requiring the use of valve line up checklists prior to machine or cylinder removal and following restoration
- ISA 7.3.4.4: procedure to sample from the centrifuge casing volume of a centrifuge remove from service prior to opening
- ISA 7.3.4.5: procedures for alumina trap media change out
- ISA 7.3.5.3: procedures for use of protective valve caps when transporting cylinders
- ISA 7.3.5.4: hoisting and rigging program for cranes
- ISA 7.3.5.6: handling procedures for loading and unloading feed cylinders from truck
- ISA 7.3.5.8: procedures for making crane lifts over the process building

The inspectors did not identify any safety issues with the procedures reviewed. However, the inspectors noted that some procedures contained checklists used to document verification of IROFS requirements that were designated as "reference use"

instead of “in-hand.” In addition, some procedures did not specifically reference the IROFS requirements that they implemented. In response, the licensee initiated Condition Notification (CN) No. 567 and subsequently revised the affected procedures to address the deficiencies.

Configuration Control

The inspectors reviewed procedures approved to implement the configuration program requirements described in Chapter 11.1 of the license application. The inspectors also reviewed the verification process used to ensure that the design of existing facilities and equipment met license requirements. No issues were identified.

The inspectors also performed a vertical slice review of some IROFS, with a focus on active engineering features (i.e., machine isolation valves and feed cylinder high temperature cut-off) to ensure that the configuration control program was being properly implemented. Documents reviewed included the boundary definition manual, setpoint calculations, procurement records including receipt inspection/testing, engineering service orders, system drawings, and vendor manuals, as applicable. System walkdowns were also performed to ensure that the installations matched the approved drawings.

For the MIV circuitry, the system drawings properly implemented the required logic. All the equipment and devices were applied within their specified ratings. The procurement program was acceptable for Quality Level-2 equipment. The startup test procedure was adequate to demonstrate proper operation of all contacts in the control circuit.

However, portions of the logic were implemented with direct current (DC) devices, which derived their power from power supply modules. The DC portion of the system was an ungrounded or “floating” system. The inspector noted that the design did not include ground detection devices. Therefore, should a significant ground occur on the system, there would be no alarm to inform operators of the presence of the ground.

Industry experience with DC systems has shown that the lack of capability to detect grounds created potential degradation of safety system performance. Two grounds could have occurred on the system during the period of time between surveillance tests. Depending on the location of these grounds and their resistance values, the possibility existed that the MIVs would not close even though the conditions existed for their automatic closure.

To address this issue, the licensee initiated CN No. 388 and installed a solid ground on the negative power supply terminal such that, if a ground was to develop on the positive side of the relay coils, machine isolation would be initiated due to low voltage on the relays. The inspectors reviewed the licensee’s actions to address the issue and have no further issues.

The inspectors reviewed documentation related to the design and configuration control related to the feed cylinders (ISA 7.3.4.1), the feed cylinder unit heater (ISA 7.3.3.1), location of Lead Cascade away from the shell of the process building (ISA 7.3.5.1), and the process building steel structure providing resistance to vehicle impact (ISA 7.3.5.7).

The inspectors also walked down the process lines in Cascade Number I to ensure that there was not any abandoned piping from the previous process that could have presented a safety problem to the new process. No safety issues were identified.

(2) Conclusions

Requirements in the license application related to operations procedures and configuration control were being adequately implemented. An issue regarding the absence of a ground detection system on the MIV control circuit power supply was appropriately addressed by the licensee.

b. Criticality Safety

(1) Scope and Observations (Inspection Procedure (IP) 88020)

The inspectors reviewed approved plant procedures that implemented the NCS program requirements as described in Chapter 5 of the license application including NCS personnel safety responsibilities, adherence to nuclear criticality safety approval (NCSA) requirements, review and approval of fissile material operations, posting and labeling requirements, response to NCSA violations, and NCS training requirements. The inspectors verified that the procedures adequately addressed the program elements and that the procedures were being properly implemented.

The inspectors noted that a single NCSA had been properly approved and implemented and that it had defined the entire Lead Cascade and support activities as a single fissile operation. However, the inspectors noted that the NCSA did not provide a complete description of all support activities, most notably maintenance. In response, the licensee issued CN No. 465 to document the deficiency and subsequently revised the NCSA to include those activities.

The inspectors verified that adequate procedural controls were in place to implement the controls that were credited. The controls included maintaining an inventory of less than 250 kilograms of UF_6 , which included a limit of 700 grams enriched U-235 at a maximum of 10 percent assay.

The inspectors also verified that plant personnel were properly trained on NCS program requirements. However, the inspectors noted that the NCS training module did not include a discussion on how to respond to off-normal conditions, as required by Section 11.3.7 of the license application. Personnel were required to be specifically trained that, unless a specific procedure addressed the off-normal situation, they should take no action until NCS personnel had evaluated the situation and provided recovery guidance. In response, the licensee issued CN No. 466, issued a training bulletin, and subsequently revised the training module to include the required response to off-normal conditions.

(2) Conclusions

Requirements in the license application with regards the nuclear criticality safety were being adequately implemented. A deficiency regarding the absence of guidance for responding to off-normal conditions in the NCS training module was addressed by the licensee.

c. Chemical Safety

(1) Scope and Observations (IPs 88056-88066)

The inspectors reviewed the following programs to verify that they were in place: lock out/tag out, confined space entry, safety and health work permit, hot work, personal protective equipment, signs/labeling/tagging, and safety training. The inspectors reviewed implementation procedures for those programs and did not identify any issues. The inspectors also reviewed several hot work and safety and health work permits and did not identify any issues.

The inspectors walked down a lock out/tag out permit to verify implementation of the procedure requirements. The inspectors noted an instance where personnel used a tag on a device that should have been locked instead. During followup, the inspectors noted during interviews with licensee personnel that they did not clearly understand the requirements for when locks were required. As immediate corrective action, the licensee applied the lock as required, re-issued the permit, and evaluated all other active permits for similar deficiencies. No others were found. In addition, the licensee issued a training bulletin to affected personnel regarding lock out/tag out requirements.

The inspectors reviewed the Material Safety and Data Sheets (MSDSs) for the chemicals to be used in the process. The inspectors noted that the licensee maintained current copies of the MSDSs accessible for personnel use. Based on interviews with licensee personnel, the inspectors also verified that operators were familiar with the MSDSs and their location.

The inspectors interviewed licensee personnel and reviewed lesson plans for the following training: HAZCOM, general employee, see-n-flee, and the UF₆ operator training. The inspectors noted that chemical hazards were identified and communicated to plant personnel.

(2) Conclusions

The inspectors determined that the chemical safety program was being implemented adequately to ensure that operations could be conducted safely.

d. Fire Protection

(1) Scope and Observations (IP 88055)

The inspectors reviewed the inspection, testing, and maintenance of fire protection systems to verify that they were in accordance with the license requirements. The fire protection systems reviewed included sprinkler systems, fire pumps and water distribution systems, fire alarms, hydrants, manual pull stations, post indicator and sectional valves, and smoke detectors.

The inspectors reviewed Procedure AC4-PS-I 01, "Surveillance of the Fire Suppression System in Service Module and Process Building." The inspectors noted that the procedure referenced the GDP procedures for the monthly and annual inspections of the wet pipe sprinklers systems. The fire suppression system for Process Building X-3001 was an IROFS (ISA 7.3.2.1). However, ISA 7.3.2.1 requirements were not included in the GDP procedures to perform the required monthly and annual inspections of the system.

As a result of the inspectors* observations, the licensee revised the GDP fire services procedures to include ISA 7.3.2.1 requirements. The licensee also performed an extent-of-condition for other services contracted out and implemented by GDP procedures to ensure that license requirements were properly proceduralized. The licensee also ensured that commitment stamps were placed adjacent to those procedure steps that applied to the Lead Cascade to ensure that they were not inadvertently revised or deleted.

The inspectors noted some discrepancies between the license application and the licensee*s documentation related to the design basis for the sprinkler system. These discrepancies were as follows:

- Chapter 1, Section 1.4.5, stated that the process building met the criteria for Ordinary Hazard Group 2, and the sprinkler system exceeded the discharge density of 0.15 gallons per minute (gpm)/square foot (sq. ft.) for this type of occupancy.
- Chapter 7, Section 7.3.1, stated that the systems were hydraulically designed to exceed the NFPA recommended sprinkler density for Ordinary Hazard Group 1 of 0.12 gpm for 3,000 sq. ft.
- The building survey for Building X-3001 stated that the occupancy classification was Ordinary Hazard Group 1 with a discharge density of 0.15 gpm for 3,000 sq. ft.
- Hydraulics calculations performed by a contractor for the licensee classified Building X-3001 as Ordinary Hazard Group 2.
- NFPA 13 specified that, for a discharge density of 0.15 gpm/sq. ft., the coverage area was 1,500 sq ft and, for a discharge density of 0.12 gpm/sq ft., the coverage area was 3,000 sq ft.

In response to the discrepancies, the licensee performed an engineering evaluation to determine the correct occupancy hazard classification for the process building. The licensee performed hydraulics calculations to demonstrate that the fire suppression

system was able to meet the requirements of an Ordinary Hazard Group 1. The licensee also revised the license application based on the results of the evaluation. The inspectors reviewed the engineering evaluation and related documentation and had no further issues.

The inspectors reviewed the general combustible material control program which was covered in the conduct of operations procedure. The procedure provided general guidance regarding minimization of combustible material and notification of the fire department in the event of combustible material accumulation. No safety problems were identified.

The inspectors reviewed IROFS ISA 7.3.1.1, "Feed Cart Constructed of Predominantly Non-combustible Material," ISA 7.3.1.2, "Process Building Constructed of Non-combustible Materials," and ISA 7.3.1.3, "Centrifuge Casings and Service Modules Constructed of Non-combustible Materials." The inspectors verified that those components and structures were of predominantly steel construction with some minor combustibles.

The feed cart was posted with signs warning personnel not to store combustible or flammable materials on the feed cart as required by the ISA 7.3.3.1. In addition, ISA 7.3.3.1 also required a monthly surveillance to verify that combustible materials were not being stored on or around the feed cart. The inspector noted that the licensee had a procedure in place to implement the required surveillance.

The inspectors reviewed the procedure for transfer of diesel fuel from the delivery truck to the diesel generator fuel storage tank, which was a sole IROFS (ISA 7.3.3.5). The inspectors noted that the procedure provided proper direction to follow common safety precautions to prevent fire/explosion while filling the tank. The inspectors verified that concrete-filled steel bollards (ISA 7.3.5.2) were in place to protect the diesel fuel storage tank and to reduce the likelihood that a vehicle impacted the tank. No safety issues were noted.

The inspectors reviewed IROFS ISA 7.3.3.3, "Natural Ventilation in Battery Room," to ensure that proper ventilation was provided in the room to prevent the accumulation of hydrogen, which could have created an explosive atmosphere. The inspectors toured the battery room and observed the inflow and outlet vents. The inspectors reviewed calculation, "X-3001 UPS/Battery Room Calculations."

The inspectors questioned the conservatism of some of the assumptions regarding temperature differentials used to determine the flow induced by the "chimney effect." The inspectors noted that the licensee had not performed any validation of the calculations to ensure that adequate flow existed under the worst case weather conditions and when the battery was being given an equalizing charge (maximum hydrogen generation). As a result of the inspectors' questions, the licensee performed tests to validate the calculations, and the results showed that the sole IROFS was unable to perform its intended safety function.

As a corrective action, the licensee replaced the sole IROFS with forced ventilation and hydrogen monitoring systems. The inspector verified that the licensee had functionally tested the new IROFS and that the new IROFS were included in the preventive maintenance program to ensure that periodic testing was performed. The inspectors also reviewed the boundary assumptions and design calculations for the new IROFS and the revised operating procedures. The inspector did not identify any safety issues.

The inspectors reviewed the pre-fire plans and the building surveys for Buildings X-3001, X-3012, X-7725, and X-7726. The inspectors determined that the pre-fire plans contained sufficient information to support the response of the facility's fire department. The inspectors noted that the information contained in the building surveys was sufficient to support the facility's integrated safety analysis.

During further review of the fire suppression system licensing basis, the licensee identified that the cylinder feed cart required additional fire suppression coverage. Installation of the fire suppression system for the feed cart is an IFI (IFI 70-7003/2006-001).

(2) Conclusions

Discrepancies with the license application and other documentation related to the design basis for the sprinkler system, as well as the inability of the sole IROFS for the battery room ventilation to perform its intended function, were identified. The licensee took appropriate action to address those issues. One IFI remained open regarding the installation of a fire suppression system for the cylinder feed cart.

3. Radiological Controls

a. Radiation Protection

(1) Scope and Observations (IP 83822)

The inspectors conducted interviews and reviewed licensee documentation to determine the status of the operational readiness review for the radiation protection program. The inspectors reviewed documentation related to the implementation of the IROFS (ISAs 7.3.4.7 and 7.3.4.8) for requirements for personal protective equipment (PPE) when opening equipment exposed to UF₆ and determined that inadequate procedural guidance was provided. In response, the licensee revised applicable procedures to include specific PPE requirements.

The inspectors had discussions with Lead Cascade representatives and reviewed radiation protection procedures for the use of thermo-luminescent detectors and the bioassay (uranalysis) program. The inspectors also reviewed the frequencies for both programs to determine if they were in compliance with the regulations, and that controls were in place to maintain occupational doses As Low As Reasonably Achievable (ALARA). Based on interviews and procedural reviews, the inspectors determined that the Lead Cascade's monitoring program for internal and external exposure was in place to be consistent with the requirements in the regulations.

The inspectors reviewed procedures for the respiratory protection program to verify that the training was adequate and to assure that respiratory equipment would be obtained by certified users only. Through discussions with the licensee's representatives and review of the respiratory protection program procedure for the Lead Cascade, the inspectors determined that the procedure was adequate for respiratory equipment training and its use and that the program was in place for implementation.

The licensee was not in possession of special nuclear material for the Lead Cascade at the time of the inspection. Postings required by 10 CFR 20.1902 and the set up of the entry and exit boundaries from controlled areas had not been established by the licensee. However, the licensee did have postings, as required by 10 CFR 19.11, in sufficient places to permit individuals engaged in licensed activities to observe them.

The licensee's ALARA program and procedure were reviewed to determine if the program and ALARA goals were developed for implementation in accordance with license requirements. Managers of the Lead Cascade were interviewed to determine if they had an adequate understanding of the ALARA concepts. The inspectors reviewed the licensee's first ALARA committee report dated March 3, 2006. The report included detailed ALARA goals and exposure summaries to identify undesirable trends. The annual threshold dose limit for 2006 was set at less than 100 mrem for TEDE, less than 1 milligram per week for intakes of soluble uranium, and less than 1 mrem for offsite releases. Based on a record review and interviews, the inspectors concluded that the licensee's ALARA program was properly implemented.

(2) Conclusions

The inspectors concluded that the licensee was implementing its radiation protection program in accordance with the license and regulatory requirements. The licensee took appropriate action to address a lack of procedural guidance regarding the implementation of the IROFS for PPE requirements when opening equipment exposed to UF₆.

b. Transportation

(1) Scope and Observations (IP 86740)

The inspectors reviewed implementation of the licensee's program for routine radioactive material shipments to assess compliance with applicable regulatory requirements. Also, the inspectors reviewed Procedure AC2-RG-071 "NMC&A for the Lead Cascade," for the transfer and shipment of nuclear material. No issues were identified.

(2) Conclusions

The licensee was implementing a program for the transportation of radioactive material in accordance with regulatory requirements.

c. Environmental Protection and Waste Management

(1) Scope and Observations (IP 88045 and 88035)

The inspectors reviewed procedures, conducted interviews with environmental personnel, and performed walk downs of selected environmental equipment to determine if the personnel were familiar with sampling procedures, that installed equipment was operational, and a program to monitor and control the impact of potential releases was in place for the Lead Cascade facility. The inspectors reviewed the task order and statement of work agreement between the Lead Cascade and the Portsmouth Gaseous Diffusion Plant to verify that specific environmental services, as required to comply with Section 9 of the Lead Cascade license application, were in place.

The environmental procedures included criteria for sample collection, data recording and storage, sample release limits for reporting criteria, and the frequency for collecting the various types of environmental media. The release limits in the license application and procedures were consistent with federal guidance.

The inspectors reviewed both the procedures and equipment for monitoring and controlling gaseous and liquid effluent releases. The inspectors noted during the procedure review and walk-down of the primary vent sampling system for measuring gaseous releases that the as-installed equipment was slightly different from the schematic shown in the sampling procedure. In response, the licensee took prompt action to revise the schematic to reflect the as-installed equipment for the Lead Cascade.

The inspector reviewed training documentation and interviewed personnel with responsibility for performing the periodic vent sampling to verify training and familiarity with equipment operability. The interviewee demonstrated knowledge and familiarity with both the equipment operability as well as the sample collection and analysis procedure.

Regarding the monitoring of liquid effluents, the inspector reviewed the procedures governing the collection of environmental water samples in addition to verifying the location and installation for effluent collection tanks and composite water sampling equipment. Composite water sampling equipment was inspected at two discharge/holding pond locations and verified as operational and within calibration. The program for monitoring, collection, and reporting of liquid effluents appeared to be adequate.

The inspectors discussed with the site contact if any audits were conducted to verify the analytical results provided by the Portsmouth environmental laboratory. In response, the inspectors were provided the quality assurance plan, dated April 25, 2006, which detailed the practices and actions to ensure the reliability of analytical equipment and data provided by the Portsmouth laboratory.

(2) Conclusions

Based on procedures, interviews, equipment walk-downs, and an established environmental network at Portsmouth, the inspectors determined that environmental protection and waste management programs were in accordance with license and regulatory requirements.

4. **Facility Support**a. Maintenance and Surveillance Testing(1) Scope and Observations (IP 88025)

The inspectors reviewed procedures used to implement the program requirements described in Section 11.2 of the license application, including a work control process for performing corrective and preventive maintenance. The inspectors verified that the work control process established the necessary reviews for maintaining the configuration control of the Lead Cascade.

The inspectors also reviewed IROFS surveillance evaluation forms that provided preventive maintenance requirements and implementing procedures for ensuring that the following IROFS were available and reliable to perform their intended function:

- ISA 7.3.3.2: automatic feed cylinder high temperature shutoff calibration
- ISA 7.3.4.3: procedures requiring periodic preventive maintenance and inspection of cylinders and valves
- ISA 7.3.4.6: machine isolation valve switch calibration
- ISA 7.3.5.5: periodic crane inspection, load testing, and preventive maintenance

No issues were identified regarding those activities. However, the inspectors noted that the licensee had not implemented a procedure that established compensatory measures prior to removing IROFS from service for maintenance as required by Section 11.2 of the license application. Licensee implementation of the compensatory measure procedure is an IFI (IFI 70-7003/2006-002).

The inspectors also reviewed vendor information for the MIV solenoids valves and noted that it recommended monthly cycling of the valves. During followup, the inspectors noted the licensee was not implementing the recommendation and did not have a documented justification for not doing so as required by the licensee's quality assurance program.

To address this concern, the licensee initiated CN No. 389 and performed an engineering evaluation that determined an annual cycling of the solenoid valves was sufficient based on instrument air quality and controlled building environmental conditions. The inspectors reviewed the engineering evaluation and had no further issues.

The inspectors also noted that there was no periodic calibration activity being performed on the sodium iodide detector used to monitor the buildup of uranium on the primary filter to the continuous vent sampler. The referenced detector provided a direct readout and/or alarm at the vent sampler to indicate if the filter became saturated and required change-out before the regularly scheduled weekly change-out. In response, the licensee issued CN 464 and established an annual calibration frequency on the detector based on the recommendation from the vendor.

(2) Conclusions

The licensee was implementing a maintenance program that was in accordance with license requirements. Issues regarding testing for MIVs and the vent sampler detector were appropriately addressed. One IFI remained open regarding licensee implementation of a procedure that established compensatory measures prior to removing IROFS from service for maintenance.

b. Emergency Preparedness

(1) Inspection Scope and Observations (IP 88050)

The existing Portsmouth Emergency Plan (EP), emergency plan implementing procedures (EPIPs), the emergency organization, emergency response training, emergency equipment, emergency facilities, and the interface with offsite support organizations were reviewed to determine if the appropriate program changes were made to reflect responding to emergencies involving the Lead Cascade facility.

The description in the EP of site activities and the site maps were updated to reflect the Lead Cascade process building location. The description in the Plan of the emergency organization was also revised to reflect the addition of a representative from the Lead Cascade when responding to events. The inspectors conducted interviews and reviewed the Emergency Operations Center (EOC) activation procedures and determined that the Lead Cascade position was activated for all events involving the gaseous diffusion plant and the Lead Cascade facility.

The inspectors reviewed the adequacy of EPIPs governing emergency classification, activation of the emergency organization, protective action recommendations, notification to offsite agencies, and procedures for activation of the offsite joint information center. The Lead Cascade license application stated that the postulated accidents for the Portsmouth EP bounded any postulated accident at the Lead Cascade.

The inspectors verified via review of selected emergency action levels that the emergency classifications in the EPIPs were consistent with the EP classification scheme. The inspectors randomly selected Emergency Action Plans (EAPs) within the Lead Cascade facility to verify that details in the EAPs were consistent with the Portsmouth emergency procedures. No problems were noted. The EPIPs for notification, activation, and protective actions were adequate for providing a timely response to an emergency involving hazardous materials.

The adequacy of emergency organization staffing and training was reviewed. The EOC staffing roster was reviewed and interviews were conducted with a Local Emergency Director for the Lead Cascade and an individual assigned to the EOC as the Lead Cascade Construction and Operations Advisor. Both interviewees were familiar with their roles and responsibilities during an emergency.

The inspectors randomly selected names from the March 6, 2006, EOC staffing roster and noted that some training for a member of the technical support staff had expired. The expired training modules were for criticality and radiation emergencies and re-entry and recovery. In response, the licensee initiated a complete audit of the emergency response organization training and found two other examples where training had expired. Prompt actions were taken to remove affected personnel from the EOC call list until the required training was completed.

The inspectors requested for review documentation to show that a drill involving the Lead Cascade had been performed. In response, the inspectors was informed that a drill involving severe weather was conducted on March 23, 2006. The inspectors reviewed the drill documentation and determined that the scenario did not involve a source term from the Lead Cascade facility and, therefore, key elements of the program were not fully challenged. In response, the licensee discussed plans to conduct a drill during the fourth quarter of 2006 using a source term involving the Lead Cascade facility.

During tours of the facility, the inspectors interviewed workers regarding what to do and where to go in the event of a "take cover" alarm. All interviewees were familiar with the appropriate actions to take and where to go. Areas were identified during the tours where the Lead Cascade facility lacked postings to adequately communicate the directions to the nearest evacuation route and/or "take cover" location. Prompt actions were taken to resolve this matter by installing additional signs and postings leading to evacuation routes and "take cover" locations.

Offsite support activities involving training and agreements were reviewed to verify that the offsite authorities were contacted regarding the Lead Cascade activities and any changes to the site's source term. Documentation was provided to show that emergency management personnel had met with offsite authorities, in addition to providing copies of the commercial plan for the Lead Cascade facility. No problems were noted. Agreements were current and up to date.

Regarding emergency equipment, facilities, and supplies, the inspectors verified that adequate communications equipment, survey instruments, personal protective equipment, and plant drawings associated with the Lead Cascade were properly maintained. Portable survey instruments and other sampling equipment were verified to be operational and calibrated.

(2) Conclusions

The Portsmouth emergency management program provided the Lead Cascade with adequate emergency facilities, equipment, staffing, emergency planning, and procedures to protect workers, the public, and the environment. Issues related to expired training and inadequate signage were appropriately addressed by the licensee.

c. Operator Training(1) Scope and Observations (IP 88010)

The inspectors reviewed training requirements and qualification cards for operators, technicians, operations analysis and system engineers, maintenance personnel, and supervisors to verify that safety requirements and IROFS were covered. The inspectors noted that the licensee provided specific training for IROFS and management measures for each of the affected groups.

The inspectors reviewed qualification status and noted that the licensee had four shifts of operations personnel fully qualified. In addition, the inspectors reviewed selected training records for the personnel mentioned above including completed qualifications cards, lessons plans, and examinations. The written examinations reviewed adequately tested the operators* knowledge of the subject matter. No safety problems were identified.

The inspectors interviewed operators and supervisors to verify that they understood facility operations and were aware of the safety controls for their respective systems. The inspectors noted that supervisors and operators interviewed had an adequate knowledge of safety controls and recognition of response to anomalous conditions associated with the equipment.

The inspectors observed an on-the-job training (OJT) session related to the operation of the feed cart. During the OJT session, walk downs of the procedure and IROFS were performed. The operator-in-training demonstrated adequate knowledge of the equipment and the ability to operate the system safely.

(2) Conclusions

The inspectors determined that the licensee adequately implemented the training program to ensure that the facility would be operated safely using qualified personnel.

d. Management Organization And Controls(1) Scope and Observations

The inspectors verified that the licensee had established a management structure that provided for safe operations of the Lead Cascade as described in Section 2.1 of the license application. However, the inspectors noted that some key staff members and designated alternates did not possess the formal educational requirements or did not have the equivalent technical experience specified in Section 2.1.

Section 2.1 also stated that, for those individuals that did not meet those requirements, other factors that clearly demonstrated proficiency in the technical area for which the position would be responsible were evaluated on a case-by-case basis, documented, and approved by the Director, Lead Cascade Construction and Operations. The inspectors noted that those factors had not been documented and approved for the affected individuals. In response, the licensee initiated CN No. 394 and documented and approved the factors as required. The inspectors reviewed the documentation and had no further issues.

During a review of the licensee's procedure process, the inspectors noted that it was inconsistent with Section 11.4.4 of the license application. The inspectors noted that the licensee was performing verification and validation of draft procedures prior to being distributed for technical review, while Section 11.4.4.6 of the license application stated that the purpose of the procedure validation was to ensure that no technical errors or human factor issues were inadvertently introduced during the procedure review process. In response, the licensee initiated CN No. 391 and revised the license application to be consistent with actual practice.

The inspectors verified that the licensee was implementing procedures for license programs and other requirements including the Facility Safety Review Committee, Audits and Assessments, and Corrective Action Program. The inspectors noted that in response to a Quality Assurance audit of the effectiveness of the Corrective Action Program, the licensee implemented several enhancements including making the computerized system more user friendly and establishing a committee to ensure that issues were consistently screened for adverse trending and characterized for significance.

With regards to adverse trending, the inspectors noted during the course of the operational readiness review an apparent adverse trend with procedure adherence. In response, the licensee initiated CN No. 475 and performed an investigation that confirmed that an adverse trend existed. The licensee determined that the root cause was an immature nuclear safety culture and lack of attention to detail when performing work governed by "information use" procedures. As corrective action, licensee management intended to provide nuclear safety culture training to plant personnel and continue to emphasize adherence to procedures during routine interactions.

Licensee management performed an internal readiness review of each safety program prior to NRC's operational readiness review. The inspectors noted that licensee's initial reviews emphasized compliance-based techniques and were therefore ineffective in identifying issues subsequently raised by the inspectors (e.g., inadequate battery room ventilation). The licensee responded by performing more effective reviews during the latter part of the inspection as evidenced by the fewer and less significant issues identified by the inspectors.

(2) Conclusions

The licensee was implementing management measures and other controls in accordance with license requirements. Issues related to management qualifications, procedure review process, an adverse trend regarding adherence to procedures, and the rigor of the internal readiness review were appropriately addressed by the licensee.

5. **Exit Meeting**

The inspection scope and results were summarized on July 13, 2006, with the licensee. The inspectors described the areas inspected and discussed in detail the inspection results. Although proprietary documents and processes were reviewed during this inspection, the proprietary nature of these documents or processes are not included in this report. No dissenting comments were received from the licensee.

ATTACHMENT

1. LIST OF PERSONS CONTACTED

Licensee

P. Miner, Director, Regulatory and Quality Assurance
D. Rogers, Director, Construction and Operations
T. Coulter, Operations and Maintenance Manager
D. Couser, Regulatory Manager
S. Fout, Engineering Manager
R. Kroll, Training and Procedures Manager
J. Oppy, Manager, Lead Cascade Demonstration
G. Smith, Quality Assurance Manager
B. Zeik, Project Support Manager

Other licensee employees contacted included engineers, technicians, production staff, and office personnel.

2. INSPECTION PROCEDURES USED

IP 83822	Radiological Protection
IP 86740	Transportation
IP 88005	Management Organization and Control
IP 88010	Operator Training
IP 88020	Regional NCS Inspection Program
IP 88025	Maintenance and Surveillance Testing
IP 88035	Radioactive Waste Management
IP 88045	Environmental Protection
IP 88050	Emergency Preparedness
IP 88055	Fire Protection
IPs 88056-88066	Chemical Safety
TI 2600/003	Operational Safety Review

3. LIST OF ITEMS OPENED

IFI 70-7003/2006-001	Installation of the fire suppression system for the feed cart (Section 2.d).
IFI 70-7003/2006-002	Licensee implementation of a procedure that established compensatory measures prior to removing IROFS from service for maintenance (Section 4.a).

4. **LIST OF ACRONYMS USED**

ADAMS	Agency-wide Document Access and Management System
ALARA	As Low As Reasonably Achievable
CFR	Code of Federal Regulations
CN	Condition Notification
DC	Direct Current
DFFI	Division of Fuel Facility Inspection
EAP	Emergency Action Plan
EOC	Emergency Operations Center
EP	Emergency Plan
EPIP	Emergency Plan Implementing Procedure
GDP	Gaseous Diffusion Plant
gpm	gallons per minute
IFI	Inspector Followup Item
IP	Inspection Procedure
IROFS	Items Relied on for Safety
ISA	Integrated Safety Analysis
MSDS	Material Safety and Data Sheets
MIV	Machine Isolation Valve
NCS	Nuclear Criticality Safety
NCSA	Nuclear Criticality Safety Approval
NMSS	Nuclear Material Safety and Safeguards
NRC	U.S. Nuclear Regulatory Commission
OJT	On-the-Job Training
PPE	Personal Protective Equipment
sq. ft.	square foot
TI	Temporary Instruction
U-235	Uranium-235
UF ₆	Uranium Hexafluoride
USEC	United States Enrichment Corporation