UNITED STATES
NUCLEAR REGULATORY COMMISSION
REGION II
SAM NUNN ATLANTA FEDERAL CENTER
61 FORSYTH STREET, SW, SUITE 23T85
ATLANTA, GEORGIA 30303-8931

December 29, 2005

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

SUBJECT: NRC INSPECTION REPORT NO. 70-7003/2005-002

Dear Mr. Sewell:

The U.S. Nuclear Regulatory Commission (NRC) conducted an announced inspection in the functional area of the USEC Inc. American Centrifuge Lead Cascade facility's heavy loads program implementation and seismic loading program. The inspection was conducted at your facility in Piketon, Ohio, from August 8 - 11, 2005 and November 28 - December 1, 2005. The purpose and scope of the inspection were to verify through the review of objective evidence whether activities supporting implementation of the heavy loads program and verification of the seismic mounting configuration were implemented in accordance with regulatory requirements. An interim exit meeting was held on August 11, 2005 and a final exit meeting was held on December 1, 2005, during which time observations from the inspections were discussed with you and 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. Based on the inspection, activities involving implementation of your heavy loads program implementation and seismic loading program were found to be in accordance with regulatory requirements and industry standards. No violations or deviations were identified.

In accordance with 10 CFR 2.390 of NRC's "Rules of Practice," this document may be accessed through the NRC's public electronic reading room, Agency-Wide Document Access and Management System (ADAMS) on the Internet at http://www.nrc.gov/reading:rm/adams.html.

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

cc w/encl:
Pete Miner, USEC INC., Director, Regulatory and Quality Assurance - Bethesda
Dan Rogers, USEC INC., Director, Lead Cascade Construction and Operations - Piketon
T. Sensue, Regulatory Affairs Manager - Piketon
K. Coriell, USEC INC., Regulatory Engineer - Piketon
Roy. Holiday, USEC INC., Regulatory Manager - Piketon
R. M. DeVault, Regulatory Oversight Manager, DOE
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U.S. NUCLEAR REGULATORY COMMISSION

REGION II

Docket No.:	70-7003
License No.:	SNM-7003
Report No.:	70-7003/2005-002
Licensee:	USEC Inc.
Location:	Piketon, Ohio
Inspection Dates:	August 8 - 11, 2005 and November 28 - December 1, 2005
Inspector:	Steven Vias, Senior Engineering Inspector, Division of Reactor Safety, Region II
Approved:	Jay Henson, Chief Fuel Facility Inspection Branch 2, Division of Fuel Facility Inspection, Region II

Enclosure

EXECUTIVE SUMMARY

American Centrifuge Lead Cascade
NRC Inspection Report 70-7003/2005-002

This inspection was an announced inspection of the American Centrifuge Lead Cascade facility on August 8 - 11, 2005 and November 28 - December 1, 2005. The NRC inspector reviewed objective evidence of activities associated with the implementation of the licensee's Heavy Loads Program and performed a review of the design and actual configuration in the field of the seismic mountings.

The inspection identified the following aspects of the licensee's programs as outlined below:

- The licensee implemented adequate inspection and maintenance programs and operation procedures and training to assure that any lifting and rigging of heavy loads at the Lead Cascade Facility was handled within the industry codes and licensee's commitments (Section 2).

- Also, that the seismic floor mountings were found to be as designed and described in the licensee application (Section 3).

Attachment
Persons Contacted
Inspection Procedures
Partial List of Documents Reviewed
Items Opened, Closed, and Discussed
Acronyms

REPORT DETAILS

1. Summary of Plant Status

Refurbishment and construction of the American Centrifuge Lead Cascade facility were ongoing throughout the inspection period.

2. Heavy Loads Program

a. Inspection Scope and Observations

The inspector reviewed the licensee's program in the area of heavy loads, hoisting and rigging programs. This inspection consisted of a review of the licensee's program for making heavy load lifts around the process building, the buffer storage area and the Centrifuge Test and Training Facility (CTTF.) To verify that the procedures and documents were clear and technically accurate, provided appropriate direction, and were used to support safe and reliable plant operations and maintenance, the inspector reviewed inspection and maintenance procedures, and records to assure that the lifting and rigging equipment was properly inspected and maintained per industry code requirements and licensee commitments. The review of the licensee's periodic crane inspections, load testing, and preventative maintenance program was performed and verified by a field walkdown and visual inspection of various cranes, lifting devices and rigging. Also, the inspector observed the actual lift of a Process Verification Machine (PVM) from the process building to the buffer storage area.

The following cranes were identified for use in the operation of the Lead Cascade Facility:

- Buffer Storage Area Building (X-7725), Overhead Crane Nos. V1226 and V1218.
- Centrifuge Test and Training Facility (X-7226), Overhead Crane Nos. V2025, V2001, V2026, and V2027, and Floor-mounted Jib Crane V-2084.
- Process Building (X-3001) Rigid Mast Crane Trains 3/6 (V-0002D)

For the above equipment located in the various buildings the inspector reviewed the following documentation:

Process Building, Building X-3001

- GCEP Turnover Report #74, 6/15/1983, for Rigid Mast Crane (RMC), Trains 3 and 6, Crane No.: V-0002D. As of the end of the inspection period this crane was limited to 80% of its rated capacity until the documentation for the 125% load test was located/verified or a 125% load test performed.
- Overhead Bridge Crane Inspection Report, 6/3/05, WO#0505548-03
- Gantry Cranes, were assembled, but were not tested and accepted by the American Centrifuge Project (ACP).

The preeminent standard that was used in the procurement of the RMC was the ANSI / ASME B30.2. The B30.2 was referenced in the RMC design criteria, in procurement

documents and in the installation and testing requirements.

The following documents were reviewed by the inspector to determine the adequacy of the cranes and verification by use of industry codes.

- Technical specifications ES-KCA-978000-1 Rigid Mast Crane, Rev. 1
- Procurement documents for PO 82A-155514V
- Vendor Surveillance documents, MVD #136, dated 2/28/83, for Lake Shore Industries
- Construction specification, DE-FB05-82-OR20532, Installation of the Rigid Mast Cranes in the X-3001
- EE-2101-0008, Pedigree of the Lead Cascade Rigid Mast Crane, The Rigid Mast Crane (RMC)

Buffer Storage Area Building X-7725

- Certificate of Weight Load Test for Overhead Electric Cranes, 2/10/84, Crane No. V1226, Manufacturer: Westmont Industries, Certificate No: 8783-1226, Complied with load suspension of 125% of rated crane hoist capacity (Trolley/ cab, works with V1218)
- Certificate of Weight Load Test for Overhead Electric Cranes, 8/26/83, Crane No. V1218, Manufacturer: Westmont Industries, Certificate No: 8783-1218, Complied with load suspension of 125% of rated crane hoist capacity. (Bridge works with V1226)
- Overhead Bridge Crane Inspection Report, 10/7/05

CTTF Building X-7226

- Certificate of Weight Load Test for Overhead Electric Cranes, 5/12/83, Crane No. V2025, Manufacturer: Westmont Industries, Certificate No: 8783-2025, Complied with load suspension of 125% of rated crane hoist capacity.
- Overhead Bridge Crane Inspection Report, 8/8/05
- Certificate of Weight Load Test for Overhead Electric Cranes, 5/12/83, Crane No. V2001, Manufacturer: Westmont Industries, Certificate No: 8783-2001, Complied with load suspension of 125% of rated crane hoist capacity.
- Overhead Bridge Crane Inspection Report, 8/8/05
- Certificate of Weight Load Test for Overhead Electric Cranes, 5/13/83, Crane No. V2026, Manufacturer: Westmont Industries, Certificate No: 8783-2026, Complied with load suspension of 125% of rated crane hoist capacity
- Overhead Bridge Crane Inspection Report, 8/11/05
- Certificate of Weight Load Test for Overhead Electric Cranes, 5/13/83, Crane No. V2027, Manufacturer: Westmont Industries, Certificate No: 8783-2027, Complied with load suspension of 125% of rated crane hoist capacity.
- Floor mounted Jib Crane, No. V-2084, the 125% load test paperwork was obtained but was not reviewed and accepted by ACP.
- Overhead Bridge Crane Inspection Report, 8/11/05
- Jib/Monorail Hoist Inspection Report, 8/8/05
- Work Instructions – Troubleshoot and Repair V-2027, 10/31/05

- WO#R0500135-01, X-7226 CTTF South High Bay Bridge Crane (V-2027)

The inspector reviewed the following evaluations concerning the Dropped Load and Load Path Analysis:

- Engineering Evaluation, EE-2204-0003, Load Path Analysis – Gantry Crane – Lead Cascade.

  The load path analysis evaluated the potential for load drop and outlined the measures that were implemented to assure safe cylinder lifting. These types of accident sequences were addressed in the Integrated Safety Analysis (ISA, CP3-2).

  The inspector reviewed the measures that were implemented to assure safe control of the lifted product. The crane was designed and tested in accordance with ANSI/ASME B30.16. Lifting fixtures were designed and will be tested in accordance to ANSI/ASME B30.20. The gantry cranes and lift fixtures were scheduled to be inspected annually by a qualified inspector in accordance to ANSI/ASME B30 guidelines.

  The inspector verified that the crane operations were performed in accordance to written procedures and operators were trained in accordance to the written procedures. The inspector also verified that appropriate measures were implemented to assure safe cylinder lifting for the Lead Cascade.

- Engineering Evaluation, EE-2101-0005, Load Path Analysis – RMC – Lead Cascade.

  The load path analysis evaluated the potential for dropping a centrifuge machine which could affect other operating machines in the cascade and cause unwanted release. These types of accident sequences were addressed in the ISA (CP3-4 & CP3-5).

  The inspector reviewed the measures that were implemented to assure safe control of the lifted machine adjacent to operating machines. The crane was designed and tested in accordance with ANSI/ASME B30.2. The RMCs were inspected annually by a qualified inspector in accordance to OSHA 29 CFR 1910.179 and ANSI/ASME B30 guidelines.

  The inspector verified that the crane operations were performed in accordance to written procedures and operators were trained in accordance to the written procedures. The inspector also verified that appropriate measures were implemented to assure that there would not be a release of radioactive material that exceeded the 10 CFR 70.61 performance requirements for the Lead Cascade.

- Engineering Evaluation, EE-2303-0002, Load Path Analysis – X7226 Assembly Area & X-7225 Buffer Storage – Lead Cascade.

The load path analysis evaluated the lifting equipment used in the X-7226, assembly and X-7725 buffer storage areas to assure safe centrifuge operation.

The inspector reviewed the measures that were implemented to assure safe lifting associated with the assembly of the centrifuge machines. The cranes, jib cranes, and monorails were designed and tested in accordance with ANSI/ASME B30.2. All lift fixtures were designed and tested in accordance to the ANSI/ASME B30 series standards. The cranes, jib cranes, and monorails were inspected annually by a qualified inspector in accordance to OSHA 29 CFR 1910.179 and ANSI/ASME B30 guidelines.

The inspector verified that the cranes, jib cranes and monorails operations were performed in accordance to written procedures and operators were trained in accordance to the written procedures. The inspector also verified that appropriate measures were implemented to assure that safe lifting of the components, assemblies and machines can be performed in a safe manner for the Lead Cascade.

The following programmatic areas were reviewed by the inspector to verify their capability to perform their intended functions:

- Hoisting and Rigging Program for Cranes (CP3-2 & CP6-13)

  The hoisting and rigging program as it applied to lifting cylinders by crane was an administrative control that functioned as a preventative feature. As a preventative feature, the hoisting and rigging programs reduced the likelihood that a cylinder will be damaged or the valve sheared while being lifted, thereby reducing the likelihood of a release of uranium hexafluoride (UF_6).

  The inspector verified that this program provided controls for hoisting and rigging UF_6 cylinders transferred within the facility. Procedures directed the appropriate selection and use of rigging equipment for lifting cylinders and proper use of the equipment. The inspection and maintenance procedures assured that the rigging equipment was properly inspected and maintained to reduce the probability that equipment failure will result in dropping a cylinder containing UF_6. The period for such maintenance was specified by the site hoisting and rigging program which incorporates industry standards.

- Periodic Crane Inspection, Load Testing, and Preventative Maintenance (CP3-2 & CP6-13)

  The inspection, testing, and maintenance programs as it applied to cranes used to lift UF_6 cylinders was an administrative control that functions as a preventative feature. As a preventative feature, the inspection, testing, and maintenance program for cranes reduced the likelihood that a cylinder will be damaged or the valve sheared while being lifted, thereby reducing the likelihood of a release of UF_6.

The inspector verified that this program provided inspection, testing and maintenance for cranes used to lift UF_6 cylinders within the facility. The inspection procedures assured that the crane equipment was properly inspected for signs of damaged or worn cables, hooks, or other hardware. Maintenance procedures directed preventative maintenance on the cranes as well as the process for repairing or replacing equipment not suitable for continued service. Load testing with test weights assured that the crane was serviceable for handling cylinders containing UF_6.

- Handling Procedures for Loading and Unloading Feed Cylinders from Truck (CP3-2)

  Procedures for loading and unloading UF_6 cylinders from trucks constitute an administrative control that functioned as a preventative feature. As a preventative feature, the handling procedures for unloading feed cylinders from trucks reduced the likelihood that a cylinder will be damaged or the valve sheared while being unloaded for use in the Lead Cascade, thereby reducing the likelihood of a release of UF_6.

  The inspector verified that this procedure directed the use of appropriate equipment for loading and unloading from trucks. The procedures assured that the appropriate equipment and techniques were used when loading and unloading cylinders, thereby reducing the probability of dropping a cylinder containing UF_6.

The following documents were also reviewed during the inspector verification of the heavy loads program:

- Lifting Fixtures A-6931, Casing Lift Bail Lifting Fixture
  - This fixture was used on the monorail crane V-2001 in the Buffer Storage area (X-7225) on a crane that was shared with the CTTF
  - NDE records:
    - Hook to Steel Bail, PT Examination-ASME Section V
    - Post Weld Heat Treatment (PWHT)
- RMC 3/6 Equipment Specification (Union Carbide, 4/7/78)
  - Provides 125% Load Test and that the cranes shall be tested and inspected in accordance with ANSI B30.2. by the vendor at the vendor site.
  - Training
    - Table-Top Job Analysis for Lead Cascade Centrifuge Standard Assembly (Job) – Overhead Pendant Crane Operations (Duty Area)
    - Table-Top Job Analysis for Lead Cascade Centrifuge Standard Transportation and Installation (Job) – Rigid Mast Crane Normal Operation (Duty Area)
    - Table-Top Job Analysis for Lead Cascade Centrifuge Standard Transportation and Installation (Job) – RMC Routine Checks (Duty Area)

- Task-To-Train-To-Procedure Matrix- Operations Technician
- Preparation and Assembly
- Transport and Installation
- Auxiliary Operator / Area Control Room Operator
- Training Bulletin ACP05-02, 11/11/05, Safety Concerns / Precautions Regarding Lifting and Rigging Safety Precautions.
- Training Module Approval Sheets
  - RMC Routine Checks
  - RMC Normal Operations
  - Operation of the Overhead Pendant Crane
  - Transport and Installation Technician
  - Preparation and Assembly Technician
- Training records for the movement of the PVM from X-3001 to X-7225
  - RMC Normal Operations
  - RMC Routine Checks
  - Operation of the Overhead Pendant Crane

b. Conclusions

The heavy load, rigging and lifting programs were designed, fabricated, tested and implemented in accordance to the ANSI/ASME B30.2 standards and licensee commitments and procedures.

3. Seismic Loading Program

a. Inspection Scope and Observations

The inspector reviewed the licensee's program in the area of seismic loading with respect to the physical condition and configuration of the centrifuge mountings. The machine mount system was the primary structural interface between the soil subgrade of the process building (PB1) floor and the centrifuge machines. The mount system was designed so that each machine responds to its operating environment independently of all other machines. During this inspection, the inspector reviewed the Design Analysis and Calculation (DAC) 2101-0028 R/0 (QL-2), "Comparison of Machine Mount Loadings to Design Capacity," and held discussions with your staff to better understand the operation and boundaries/limitations of the centrifuge mounting system. The scope of this analysis and calculation compared the design loads for the new USEC machine to the capacity of the existing centrifuge mounting system. The inspection consisted of a field walkdown of the physical floor mountings and discussions with your staff about the design configuration of the system. A discussion was held with your staff about the recovery of the mountings that were filled with concrete and the results of the two tests that were performed by outside vendors.

b. Conclusions

The physical condition of the existing floor mountings along with the analysis, showed that there was an adequate margin in the mount components and were suitable for use with the new machines.

4. Exit Meeting

The inspection scope and results were summarized on December 1, 2005, with the licensee. The inspector 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 were not included in this report. No dissenting comments were received from the licensee.

ATTACHMENT

1. **LIST OF PERSONS CONTACTED**

Licensee

T. Coulter, Manager of Lead Cascade Operations
D. Couser, Regulatory Manager
R. Kroll, Training and Procedures
J. Oppy, Lead Cascade Demonstration Manager
D. Rogers, Manager, Construction and Operations
T. Sensue, Regulatory Engineer
G. Smith, QA Manager
A. Takacs, DOE Regulatory Oversight
D. Weber, Manager, Mechanical and Civil Engineering

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

2. **INSPECTION PROCEDURE (IP) USED**

IP 88025 Maintenance and Surveillance Testing

3. **PARTIAL LIST OF DOCUMENTS REVIEWED**

- Procedures:
  - AC2-RG-059, Owner and User Equipment Inspection, Rev. 1
  - AC3-OP-022, Operating A Pendent Crane, Rev. 1
  - AC2-RG-004, Corrective Action Process, Rev. 2
  - AC2-RG-055, Accident Prevention/Equipment Control Tags, Rev. 0
  - AC4-PM-001, Overhead and Jib Crane Preventative Maintenance, Rev. 0
  - AC4-OP-019, Operation of Rigid Mast Crane, Rev. 0
  - AC3-OP-018, RMC Routine Checks, Rev. 0
  - AC2-FO-001, Conduct of Operations, Rev.0
  - AC4-PM-002, Rigid Mast Crane Preventative Maintenance, Rev. 0
  - AC4-OP-023, Machine Transport and Installation, Rev. 0
  - XP4-QA-QI6903, Code Inspection of Overhead and Gantry Cranes, Rev. 3
  - XP4-QA-QI6920, Inspection and Testing of Slings and Lifting Fixtures, Rev. 7
- Response from USEC to DOE, 4/25/2005, RE: Centrifuge Hoisting and Rigging Activities
- Response from USEC to DOE, 8/12/2005, RE: Corporate Review Requested in Centrifuge Hoisting and Rigging Activities
- SOW-562235, "Rigid Mast Crane Site Acceptance Test Plan" for Bldg X-3001 for crane 3/6, Rev. 1, 4/22/04

- Test Plan X-7225, ESO#2301-0001, Buffer Storage Bridge Crane Functional Test Plan, TP-2301-0001, Rev. 0 (this was a test plan to verify only the change out of the PLC control drives)
- DAC-MC-2002-0277, Rev. 0, Lift Fixture for 12" Cylinders
- ESO E569R101, Lift Fixture, for Loading 1`2" Cylinders in A/C Sump Stand, Rev. 0

4. LIST OF ITEMS OPENED, CLOSED, AND DISCUSSED

None

5. LIST OF ACRONYMS USED

ACP	American Centrifuge Project
ADAMS	Agency-Wide Document Access and Management System
ANSI/ASME	American National Standard Institute/American Society of Mechanical Engineers
CFR	Code of Federal Regulations
CTTF	Centrifugr Test and Training Facility
DAC	Design Analysis and Calculation
DOE	Department of Energy
ESDS	Engineering Standard Data Sheets
IP	Inspection Procedure
IROFS	Items Relied on for Safety
ISA	Integrated Safety Analysis
NRC	U.S. Nuclear Regulatory Commission
OSHA	Occupational Safety and Health Administration
PVM	Process Verification Machine
PWHT	Post Weld Heat Treatment
QL	Quality Assurance Level
RMC	Rigid Mast Crane
UF_6	Uranium Hexafluoride