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December 5, 2008
GDP 08-1047

Director, Spent Fuel Project Office
Office of Nuclear Material Safety and Safeguards
ATTN: Document Control Desk
U.S. Nuclear Regulatory Commission
Washington, D C. 20555-0001

Paducah Gaseous Diffusion Plant (PGDP)
Docket No. 70-7001, Certificate No. GDP-1
10 CFR 71.95 - Type AF Transportation Package Report (USA/9196/AF-96)

Pursuant to 10 CFR 71.95(a)(1), the United States Enrichment Corporation (USEC) is filing the attached report to communicate information related to our discovery of an abnormal condition involving an NRC-approved Type AF package. Specifically, a Model UX-30 transportation package transported from the Russian Federation to PGDP. This package is identified by USEC as SP-UX-0402, transportation package identification number USA/9196/AF-96. During receipt inspection of this package at PGDP, one of the ten ball lock pins used to fasten the overpack lid to its base was found to have broken such that it was no longer engaged as designed. The package was inspected prior to departure from the Port of Baltimore for the shipment's return to Paducah from Russia and no abnormal conditions reported. Thus, USEC believes that the ball lock pin failed during transport from Baltimore, Maryland to Paducah, Kentucky. USEC's review of the available UX-30 overpack design documents and consultations with the UX-30 Certificate of Compliance holder did not result in a determination of the impact on the effectiveness of the packaging.

Any questions regarding this report should be directed to Vernon J. Shanks, Regulatory Affairs Manager at (270) 441-6039.

Sincerely,

Steven R. Penrod
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Enclosures: As Stated

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File: 08-890-079
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ABSTRACT

During an October 7, 2008, receipt inspection at the Paducah Gaseous Diffusion Plant (PGDP) of a shipment of UX-30 overpacks containing low enriched uranium of Russian origin, one overpack, a Model UX-30 package (USA/9196/AF-96), was found to be missing a portion of one of the ten ball lock pins that are used to fasten the overpack lid to its base. The package contained one type 30B cylinder of 4.95 wt. percent UF_6. The cylinder was not affected by this condition, and there was no release of radioactive material. Since USEC is the owner of the package in question (user but, not certificate holder) and USEC's review of the available UX-30 overpack design documents and consultations with the UX-30 Certificate of Compliance holder did not result in a determination of the impact on the effectiveness of the packaging, USEC has chosen to conservatively report this incident under 10CFR71.95 (a)(1).

USEC has reviewed its overpack receipt and shipping inspection procedures and determined that they are adequate. However, due to the marine environment that these packages are exposed to, USEC intends to replace any aluminum capped ball lock pins with all stainless steel ball lock pins in USEC owned UX-30 overpacks prior to their next shipment from PGDP.

DETAILS

On October 7, 2008, an ISO flatrack of four UX-30 overpack transportation packages, each with a 30B UF_6 cylinder containing fissile UF_6, arrived at PGDP. During receipt inspection, one of the ten ball lock pins that secure the overpack lid to its base was discovered to be broken. The ball lock pin's aluminum cap was separated from its shank. The cap was still secured to the package by the ball lock pin lanyard, but the pin's stainless steel shank was missing.

Overpack SP-UX-0402 departed the Paducah site on Nov. 13, 2007, bearing an empty 30B cylinder LU0157 to be delivered to the Ural Integrated Electrochemical Plant (UEIP) in Russia. The cylinder was filled with low enriched uranium (LEU) at 4.95 percent assay on July 4, 2008, placed back in SP-UX-0402 and shipped by rail from UEIP to the Saint Petersburg Federal State Unitary Enterprise IZOTOP facility in St. Petersburg, Russia. Following routine inspections, the flatrack was loaded onto a vessel in the Port of St. Petersburg on September 9, 2008. The flatrack entered the United States through the Port of Baltimore on October 2, 2008, where the flatrack was loaded onto a trailer for transport to PGDP. Upon receipt, the transportation agent responsible for the UF_6 shipments from Russia to USEC inspects each package for any damaged or failed components prior to shipping. No anomalies were reported with the ball lock pins prior to departure from Baltimore for the shipment's return to Paducah. It is suspected the pin failed during transport from Baltimore, Maryland to Paducah, Kentucky.

INVESTIGATION RESULTS

PGDP has investigated recent problems identified in its corrective action system associated with ball lock pins used on UX-30 overpacks. The conclusions of this investigation by USEC's PGDP site metallurgist, based on extensive lab evaluations and field inspections of overpacks at the Paducah site, are applicable to this instance where the ball lock pin shank was found missing. The cause of failure is the aluminum capped ball locking pins are corroding from galvanic coupling to the stainless steel shank. The corrosion ultimately cracks the aluminum cap and may also seize the stainless steel pin. The corrosion is accelerated due to chlorine and salt water exposure during overseas transport. The duration between initial salt water exposure and pin operational problems cannot be determined. Pins made entirely of stainless steel are impacted much less by the salt environment, and in most cases have lasted seven to twelve years without issue. Field inspections indicate some overpacks built in the late 1990's have the original all stainless steel pins and are still in good condition.

A review of USEC purchases of overpacks indicate the manufacturer began to install aluminum capped pins on new overpacks starting in 2003 and USEC received 145 new overpacks with aluminum capped pins installed. Of the 13 overpacks from these orders that were inspected for operational problems during this investigation, approximately 20 percent of the aluminum ball lock pins have already been replaced with stainless steel style pins. Of the remaining 80 percent, most of the aluminum ball lock pins for these overpacks have evidence of cracking.

Ball lock pin problems would be discovered during inspections of shipping packages prior to shipment, or during receipt inspections.

BALL LOCK PIN DESIGN INFORMATION

The UX-30 overpack is designed with ten, 2-inch grip, 7/16-inch diameter single acting ball lock pins to hold the top and bottom half together during transport. UX-30 overpacks are currently manufactured by Columbiana Hi Tech (CHT). CHT Drawing X-20-238E, "Fabrication and Assembly UX-30 Overpacks," states the ball lock pins are Avibank 7M2.00, Carr Lane, or approved equal. The aluminum capped pins in service at PGDP are labeled 800670, C7B209 and are manufactured by Jergens, and were judged by the manufacturer to be an approved equal.

PGDP currently stocks all stainless steel replacement pins which are Avibank Part Number BLC7BC20SL6C7 that complies with part numbers 16 and 17 from CHT drawing X-20-238E.

ASSESSMENT OF SAFETY CONSEQUENCES

A review of the UX-30 Safety Analysis Report (SAR) and discussions with Energy Solutions (current UX-30 certificate holder) indicate the package was accepted on performance based testing conducted by Vectra (original equipment designer/manufacturer). No evaluations were performed in the SAR with less than the full complement of pins with full insertion. The package is placed on transport saddles that have metal straps, which are clamped over the

package. These devices provide a secondary clamping mechanism to hold the overpack halves together, but these devices are not credited in the SAR. Based on this review, USEC is unable to quantify whether a single missing ball lock pin is a significant reduction in the effectiveness of the package. However, the user inspection conducted prior to any shipment provides reasonable assurance that the packages will be shipped in a safe condition.

CORRECTIVE ACTIONS

USEC inspects each UX-30 package prior to shipment according to Chapter 7 of the UX-30 SAR. If an inspection indicates that a ball lock pin is not functional, then the ball lock pin is replaced. There has been no wholesale effort to replace the aluminum capped pins. The pins are acceptable for use if the pins pass the UX-30 required inspections and are functional. Based on the failure modes of the aluminum capped pins and the questionable life expectancy in a salt water environment for UX-30 overpacks owned by USEC, the two-inch aluminum capped ball lock pins are being replaced with all stainless steel pins when the packages are returned to PGDP, and prior to their subsequent shipment. USEC has reviewed its overpack receipt and shipping inspection procedures and determined no further enhancements are necessary. These replacements for the USEC fleet should be completed no later than December 31, 2010.

SIMILAR EVENTS

In April 2008, USEC was notified by a domestic fabricator that a shipment was received with two ball lock pins hanging loosely by the lanyard (not properly engaged). The cylinder did not contain fissile material and thus, reporting was not required. The corrective action from this event was increased attention and procedure enhancements for insertion of ball lock pins. These actions were implemented only to address pin engagement problems.

Energy Solutions provided USEC a letter dated September 3, 1998, of a 10CFR71.95 report involving UX-30 packages. In this case, a domestic shipper noted several locking pins were not engaged. The pins were reinserted by the transportation company and the shipment continued. Corrective actions taken were inspection and replacement of pins as necessary and a new inspection and replacement program was implemented according to Energy Solutions. This incident did not involve PGDP.

A review of the PGDP corrective action system historical records from January 1, 2006, to present found instances where ball lock pins were not properly engaged. These were noted during pre-shipping and receipt inspections and were corrected. Broken pins such as the one discussed in this report are rare.

These packages are subjected to re-certification inspections every five years and any anomalies discovered are documented and resolved prior to re-certification.

LIST OF COMMITMENTS

USEC will replace any two-inch aluminum capped ball lock pins with all stainless steel ball lock pins in USEC owned UX-30 overpacks prior to their next shipment from PGDP. These replacements for the USEC fleet should be completed no later than December 31, 2010.