UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D.C. 20555-0001

October 30, 1996

MEMORANDUM TO: Chairman Jackson
Commissioner Rogers
Commissioner Dicus
Commissioner Diaz
Commissioner McGaffigan

FROM: James M. Taylor
Executive Director for Operations

SUBJECT: MEDIA ARTICLE ON PROJECT SAPPHIRE DISCREPANCIES

The purpose of this memorandum is to provide clarification to the Commission regarding recent media articles concerning an apparent nuclear material discrepancy at the Babcock and Wilcox (B&W) plant in Lynchburg, Virginia. B&W is in the process of purifying and downblending approximately 580 kilograms of high enriched uranium (HEU) removed from Kazakstan under a U.S./Kazakstan cooperative effort referred to as "Project Sapphire."

In view of the Administration's concern that the HEU could not be adequately protected in Kazakstan, DOE staff went to Kazakstan to package the material for shipment to the U.S. Material types included uranium metal, homogeneous uranium oxides, uranium/beryllium rods, heterogeneous uranium/beryllium scrap and mixed low level residues in graphite crucibles and laboratory salvage. Measurements were performed on a best effort basis, and the containers tampersealed. The heterogeneous uranium/beryllium scrap, which could not be representatively sampled and is the source of the apparent referenced bias, was measured by nondestructive assay (NDA). (The bias is the difference between the DOE declared amount and the B&W measured amount.) Based on informal input from DOE, the measurement uncertainty on the NDA measurements was large, on the order of plus or minus 100 percent.

Upon arrival in the U.S. the Project Sapphire material was placed in storage by DOE at Y-12 in Oak Ridge, Tennessee where it remained for approximately a year while final contract arrangements were completed by DOE for processing and recovery of the HEU at B&W. No receipt measurements were performed by DOE on the material at that time. Also during this period, discussions took place between the U.S. and the International Atomic Energy Agency on when the material would be subject to IAEA safeguards as had been agreed with the Kazakstan Government. Due to IAEA resource constraints and the difficulties that would be encountered in applying safeguards at Y-12, it was decided to defer IAEA safeguards until the material was received by B&W.

In August 1995, shipments of the material by DOE were initiated. NRC involvement was initiated prior to the receipt of material at B&W to ensure adequate accountability and facilitate the application of IAEA safeguards. B&W receipt activities included tampersafe seal verification, item identification and weight verification on an item basis prior to placing the material in the vault. After processing parameters were established and agreement was reached with the IAEA on where in the process international safeguards would be initiated, B&W commenced sampling of the homogeneous uranium metal and oxides. NRC was present for the sampling and procured a split sample from that taken for the IAEA for independent verification. Analyses on samples randomly selected from this population by NRC's contractor laboratory were in excellent agreement with B&W's measurements. Recovery results provided further confirmation of the validity of the as-received measurements. NRC also procured samples of the recovery product for independent confirmation and is awaiting results. No samples were taken of the heterogeneous uranium/beryllium scrap due to the aforementioned difficulty in representatively sampling such material. It was agreed that accountability values for shipper/receiver purposes would be based on samples taken after dissolution which is a routine practice in the industry.

B&W initiated dissolution of the uranium/beryllium scrap in July 1996. To-date approximately 24 percent of the 232 kilograms of as-received total uranium/beryllium material, estimated by DOE using NDA, has been processed in a number of batches. There has been a consistent negative bias relative to what was declared on the as-received material. The current estimate of the magnitude of the bias is on the order of 27 percent. Due to a safety concern, not related to the measurement bias, that subsequently developed in processing this particular scrap material, further processing has been delayed.

With regard to implications for IAEA safeguards, the apparent bias will have no impact since the decision was to apply safeguards to the downblending only which is not impacted by shipper-receiver differences. This decision was based on IAEA's position that no statements could be made by the Agency regarding the origin of the material.

Headquarters and Region II staff have reviewed the results of safeguards inspections performed at B&W since the initiation of Project Sapphire material processing and conclude that during April through June of 1996, the uranium/beryllium scrap material was removed from the sealed containers, tested for dissolution rate, processed through a calciner to increase surface area and dissolution rate, and subsequently returned to containers which were protected with tamper indicating seals. During the same period, a physical security vulnerability existed relative to searches of personnel exiting the processing area under emergency conditions. Through a review of the licensee's records of alarms on emergency exits and discussions with security personnel, the staff concluded that there were no emergency exits from the processing area that could have exploited this vulnerability to commit a theft or diversion.

Considering the measurement uncertainty associated with the original measurements by DOE of this uranium/beryllium scrap material, it can be expected to have this type of measurement discrepancy. However, staff will continue to monitor the processing of this uranium/beryllium scrap material, including the taking of split samples for independent verification.

cc: SECY
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