SIEMENS

October 10, 1996
LJM:96:078

U.S. Nuclear Regulatory Commission
Document Control Desk
Washington, DC 20555

Dear Gentlemen:

Subject: Follow-up to Bulletin 91-01 Report No. 30998 UO_2 Powder Spill from a 45-Gallon Drum in the UO_2 Lube Blend Room

On September 12, 1996, Siemens Power Corporation (SPC) reported an incident which met the 24-hour reporting criteria of NRC Bulletin 91-01. The event had occurred at 2:20 a.m. PDT that day and involved a spill of 16.5 kgs of uranium dioxide (UO_2) powder at 3.91 wt.% ^{235}U outside the confines of a hood in the Lube Blend room. SPC internal procedures require a 30-day follow-up report to all Bulletin 91-01 reportable conditions or events. This letter meets this requirement.

Background

The Lube Blend room has hoods used to contain 45-gallon UO_2 powder storage drums, which are equipped with neutron absorbing inserts, for the addition of lubricants and pore formers. After the addition of the lubricant and pore former, a lid is placed on the drum and a retaining ring is clamped in place to ensure that the lid stays on the drum. The drum is then removed from the hood and transferred to the Turbula blender that tumbles the drum. For radiological control purposes, before the retaining ring is attached to the drum, tape is applied around the rim of the drum to provide a better seal against trace amounts of powder being released during tumbling.

Criticality requirements specify that the drum lid must be secured in place whenever the drum is external to a hood. As such, the taping of the drum must be performed in the hood before the drum is removed.

Incident Description and Immediate Corrective Actions

During the graveyard shift on September 12, 1996, an operator was performing the task of preparing a powder storage drum for tumbling. Because of difficulties in getting the tape around the drum while the drum is in the hood, the operator moved the drum onto the transfer cart to do the taping. The operator failed to immediately lower the restraining bar on the cart as required. The operator then loosened the ring clamp, slid the ring down the drum, and proceeded with the task of taping the drum.

The operator then closed the door to the hood to reduce possible airborne contamination. In order to close the door to the hood, the operator backed up the cart. The operator

turned the cart to the left which rolled the drum to the right. Because the restraining bar was not in place, the drum rolled from the cart, spilling 16.5 kgs of 3.91 wt.% enriched UO_2 powder.

The operator then called for everyone to leave the room because of the possibility of high airborne. He immediately contacted his lead tech, who contacted the Chemical Area Shift Supervisor, who contacted the Criticality Safety Specialist. Following notification, cleanup of the spilled powder was initiated under the direction of a Criticality Safety Specialist. The drum was set upright and the spilled powder collected and weighed within forty-five minutes of the spill.

A telephone report to the NRC Operations Center was made later that day in accordance with NRC Bulletin 91-01. Criticality Safety Analysis U360 identifies an accident condition that could lead to a criticality accident as one in which a drum falls from a cart, spills, and is optimally moderated. Barrier 1 against this occurrence is comprised of two controls. The first is that the drum must have the lid clamped in place when the drum is outside a hood. The second is that the restraining bar must be down when the drum is on the cart. The report was made because both controls comprising Barrier 1 had been lost.

Due to the second barrier, moderation control in the room, a criticality accident was not possible. The amount of powder spilled, 16.5 kgs of UO_2 at 3.91 wt.% ^{235}U, was 29.7% of the minimum critical mass of 55.56 kgs at that enrichment. The spill did not result in any injuries, major equipment damage, or off-site release of radioactive materials, nor did any personnel contamination occur.

Incident Causes

The incident was investigated by an SPC Incident Investigation Board (IIB) with representation from Operations, Plant Engineering, and Safety, Security and Licensing. The team performed a TapRoot® root cause analysis as a mechanism to investigate the incident and evaluate it with respect to cause. The IIB identified the following causal factors:

1. The operator removed the drum from the hood for the express purpose of performing the taping outside the hood. This was done because of the difficulty of performing this task within the hood.

2. The fact that the restraining bar was left in the up position was human error; the operator forgot to perform the task. But the fact that the cart could be moved with the bar in the up position contributed to the spill.

Follow-up Corrective Actions

The following actions are being taken to resolve the problems revealed by this event. The actions stem from recommendations of the IIB and in some cases from assessments unrelated to this event.

- The key to resolving the first causal factor is to be able to easily perform the taping of the drums while ensuring that the drums cannot tip. Plant Engineering has been assigned the task of developing a solution. The solution may entail expanding the hood to allow better access by the operator or providing another location for the taping to be performed. Plant Engineering will plan a solution by 10-15-96. The solution will be prioritized and tracked to completion per standard SPC practices.

- The carts will be modified such that the motor will not engage unless both restraining arms are in the down position. This will ensure that the initiating event for this powder spill does not recur. These modifications will be complete by no later than 11-15-96.

- Plant personnel have been reminded of SPC's policy against short-cuts and work-arounds and the necessity of contacting supervision when tasks cannot be performed exactly as required.

If you have questions regarding this incident or SPC's responses to it, please contact me on (509) 375-8537.

Very truly yours,

L. J. Maas, Manager
Regulatory Compliance

LJM/pg

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