AEOD/N202

REPORT ON THE

BUILDUP OF URANIUM - BEARING SLUDGE

IN WASTE RETENTION TANKS

by

Office for Analysis and Evaluation

of Operational Data

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NOTE: This report documents results of studies completed to date by the Office for Analysis and Evaluation of Operational Data with regard to a particular operating event. The findings and recommendations do not represent the position or requirements of the responsible program office of the Nuclear Regulatory Commission.

1.0 INTRODUCTION

Criticality safety at facilities processing enriched uranium is an important factor in the establishment of operating procedures and equipment design. Finding a slurry containing significant quantities of enriched uranium in a large vessel where such materials are unexpected may represent a significant compromise of criticality control.

In June 1979, Westinghouse Electric Company discovered a buildup of uranium sludge in the waste retention tanks at its fuel fabrication facility in Columbia, South Carolina. The sludge buildup was unanticipated by the licensee, and was discovered after an NRC inspector suggested that the tanks be inspected.

2.0 EVENT DESCRIPTION

At the Columbia facility, Westinghouse fabricates uranium dioxide fuel elements for light water reactors.* In 1979, the ammonium diuranate (ADU) process was used to convert uranium hexafluoride (UF_6) to uranium dioxide (UO_2). In the ADU process, gaseous UF_6 is hydroloyzed to uranium fluoride (UO_2F_2) and HF. The uranium is then precipitated as ammonium diuranate by the addition of ammonium hydroxide, and the ADU is removed by centrifuge. The liquid waste is pumped through a polishing filter and an inline monitor. If the uranium concentration is low enough, the waste is pumped to 30,000 gallon tanks in the waste treatment facility. These vessels, flat bottomed tanks with side discharges, had been in use for about three years prior to the sludge findings.

During an inspection in May 1979, the NRC inspector asked whether the retention tanks in the waste treatment area were inspected for sludge buildup. The licensee's position was that there would not be a buildup because the liquid was recirculated

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* These activities are authorized under NRC licensee SNM-1107 (Docket 70-1100).

within the tanks. The licensee, however, agreed to inspect the tanks within 30 days and to analyze any sludge found in the tanks.

During a subsequent inspection in June 1979, Westinghouse informed the NRC inspector that about 168 Kg* of uranium containing 2.8 w/o uranium-235 had been recovered from the bottom of the two 30,000 gallon waste retention tanks. The uranium was contained in one to two inches of slurry at the bottom of the tanks; an analysis of a sample showed a uranium-235 concentration of 4 g/1. The licensee stated that the slurry resembled ADU.

3.0 ACTIONS BY THE LICENSEE

The licensee's corrective actions were to (1) lower the side drain pipe from eight inches to four inches from the tank bottom (a safe slab thickness), (2) improve the recirculation system performance, and (3) perform quarterly inspections of the tanks for uranium buildup. In addition, Westinghouse specified that all vessels in the Advance Waste Treatment Process Building would have bottom drains to minimize the buildup of uranium.

4.0 AEOD FINDINGS

The buildup of uranium in the retention tanks in the waste treatment area was unanticipated by Westinghouse and might have continued without the intervention by the IE inspectors.

We have been informed by NMSS personnel that the inspector's actions were triggered by a similar problem at Babcock and Wilcox facility** earlier in the same year.

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* Source: E. Reitler, W

** See immediate action letter IAL-79-01, Docket 70-135, Jan. 24, 1979

No information circular or notice was sent out to licensees.

5.0 RECOMMENDATIONS

Since the same problem has occurred at two facilities operated by different licensees, it can be considered generic. Although the IE inspectors have been alerted to the problem, and have, in turn, alerted licensees, AEOD recommends that IE issue an information notice to applicable licensees, detailing this type of event. Publication of such a notice would provide formal, written feedback of information to licensees.