UNITED STATES
NUCLEAR REGULATORY COMMISSION
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61 FORSYTH STREET SW SUITE 23T85
ATLANTA, GEORGIA 30303-8931

June 1,2004

EA-04-096
NMED No. 040169

Westinghouse Electric Company
ATTN: Mr. M. Fecteau, Manager
Columbia Plant
Commercial Nuclear Fuel Division
Drawer R
Columbia, SC ***29250***

SUBJECT: NRC INSPECTION REPORT NO. 70-1151/2004-001

Bear Mr. Fecteau:

This refers to NRC Inspection Report No. 70-1151/2004-001 which was dated May 13, 2004. After we forwarded that report to you, we discovered that an NRC staff member's revision to page eighteen of the Report Details was not included in the copy that you received. A corrected copy of page eighteen, which includes the revisions made to the second full paragraph on that page, is enclosed. Please replace page eighteen of the report you previously received with this corrected copy.

In accordance with 10 CFR 2.390 of NRC's "Rules of Practice," a copy of this letter and its enclosures will be available electronically for public inspection in NRC's Public Document Room or from the Publicly Available Records (PARS) component of NRCs document system (ADAMS). ADAMS is accessible from the NRC web site at http://www.nrc.gov/reading-rm/adams.html (the Public Electronic Reading Room).

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. 70-1151
License No. SNM-1107

Enclosure: Corrected page

cc: w/encl: (see page **2)**

cc w/encl:
Sam McDonald, Manager
Environment, Health and Safety
Commercial Nuclear Fuel Division
Westinghouse Electric Corporation
P. O. Box R
Columbia, SC 29250

Henry J. Porter, Assistant Director
Div. of Radioactive Waste Mgmt.
Dept. of Health and Environmental
Control
Electronic Mail Distribution

R. Mike Gandy
Division of Radioactive Waste Mgmt.
S. C. Department of Health and
Environmental Control
Electronic Mail Distribution

Distribution w/encl:
J. Henson, RII
D. Seymour, RII
J. Lubinski, NMSS
J. Olivier, NMSS
P. Silva, NMSS
D. Stout, NMSS
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the off-gas system from fire. The inspectors concluded that the failure of the dump valve was a credible scenario leading to moderator intrusion into the incinerator.

Double Contingency Analysis

The detailed argument for the non-credibility of criticality outside of the lower combustion chamber is found in Section 5.3.5.9. of the ISA in the **CSE** for the ash handling system and is based on the accumuiation of sufficient mass. Licensee NCS engineers determined that it was unlikely for significant mass to pass the upper combustion chamber and that the average uranium concentration in the ash was not known to exceed 0.10 to 0.15 gm-U/gm. Based on this conclusion, **NCS** engineers performed infinite media calculations to show that k-infinity for ash, equals 1.0 for saturated uranium dioxide (UO_2) powder at a concentration of 21.8 wt% uranium. This corresponds to 21.6 wt% uranium for k-infinity equal to 0.98, therefore, 21.6% became a bounding assumption for the system. Based on acceptance of this assumption, the licensee eliminated the need to further investigate or review estimated deposition in the upper combustion chamber or availability of moderator during operation or shutdown periods. License sampling data from 1996 (shown in Figure #2) demonstrated that the bounding assumption regarding concentration was not correct.

The inspectors analyzed the upper combustion chamber using material descriptions from the previous licensee analysis consisting of a UO_2 and water mixture to bound wet fly-ash at a concentration of 30 wt% uranium and one inch of water to bound the refractory material. The calculation shows that the upper combustion chamber reaches k_{eff} of 0.98 near 558 kgs of material. Based on the clear increasing trend of concentration and mass values shown by licensee data and the availability of water at sufficient pressure in the quench system, the inspectors concluded that criticality was credible in the incinerator upper combustion chamber. Because the actual mass accumulation in *the* upper chamber was 271 kilograms and no other upset had occurred, the inspectors concluded that the as-found condition was subcritical.

Section 6.1.1 of the License Application states, in part, that the double contingency principle will be the basis for design and operation of processes using special nuclear material. Double contingency protection means that all process designs will incorporate sufficient margins of safety to require at least two unlikely, independent and concurrent changes in process conditions before a criticality accident is possible. The failure to incorporate sufficient margins of safety to require at least two unlikely, independent and concurrent changes in process conditions in the incinerator system before a criticality accident was possible is **Apparent Violation 70-1151-2004-001-03.**

Licensee analysis concluded that concentration in the incinerator would be limited by controls on mass in the lower combustion chamber. Lack of controls on concentration in the off-gas system resulted in concentration exceeding the established subcritical limit. Section **6.1.**3.e.1 states, in part, that limiting concentration may be used for nuclear criticality safety control of systems within the facility, and when utilized, that controls will be established to ensure that the concentration level is maintained within the analyzed system defined limits. CSE for the incinerator contained in ISA Section 5.3.4.9 states, in