SIEMENS

April 6, 1994

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

Gentlemen:

Subject: Follow-up to Bulletin 91-01 Report No. 26896 - Invalid Criticality Safety Analysis (CSA) Assumption Regarding Uranium Density

On March 7, 1994, Siemens Power Corporation (SPC) reported a condition that met the reporting criteria of NRC Bulletin 91-01. 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

As part of an ongoing SPC CSA update program, the CSA for the Line 1 process offgas (POG) system was being reanalyzed. An underlying limiting assumption in the CSA was that 0.85 gU/cc was a conservative maximum U density in ammonium diuranate (ADU). This assumption was based on work performed both in-house and by an outside research laboratory in the early 1970s and 1980s. As part of the reanalysis effort, initial and confirmatory samples of U-bearing material from the Line 1 and Line 2 POG systems and ADU dryers were collected to confirm the validity of the assumed maximum U density.

Description of Reportable Condition

Results of the laboratory analyses as received on March 7, 1994 revealed ADU U densities ranging from 0.672-1.278 gU/cc. These lab tests indicated that once the ADU has been dried and lightly compacted in a graduated cylinder, the U density increases above 0.85 gU/cc. Based on this evidence that a limiting assumption in a CSA appeared to be invalid, SPC reported the condition to the NRC Operations Center on March 7, 1994 at 1700 hours, PST.

Line 1 Conversion (including the Line 1 dryer and POG system) was not operating when this discovery was made due to scheduled down time and Line 2 Conversion (including the Line 2 dryer and POG system) was shut down at 1800 hours on March 7, 1994, after the lab results were confirmed. The affected equipment remained shut down pending investigation and the revised criticality safety bases.

There were no injuries resulting from this condition, nor were there any radiological safety implications.

Siemens Power Corporation
Nuclear Division - Engineering and Manufacturing Facility
2101 Horn Rapids Road, PO Box 130 Richland, WA 99352-0130 Tel: (509) 375-8100 Fax: (509) 375-8402

IE12
1/0

110055

April 6, 1994

Cause and Immediate Corrective Action

The original studies concluded that ADU centrifuged at a higher g-force than normally used in the process would create a limiting condition for densifying ADU and that primarily ADU would be picked up in the POG duct system. The original studies did not take into account the density increase which occurs when ADU is dried and then compacted. Also, during normal processing, U material other than ADU can get into the POG ducts.

A generic implications review was conducted to determine which systems/safety analyses were adversely impacted by the invalid limiting assumption. There were twenty-five CSAs which referenced or claimed a maximum ADU density of 0.85 g U/cc. Criticality Safety and Plant Engineering reviewed each of these areas. This review indicated potentially non-conservative impacts in the following areas:

- Line 1 and Line 2 ADU Dryers
- Line 1 and Lines 2 Conversion Process Offgas (POG) Systems
- Line 1 and Line 2 precipitation and recycle tanks

Line 1 Conversion was currently not operating and Line 2 Conversion was immediately shut down. Both Conversion area POG ducts were cleaned out. Prior to this the POG systems were being routinely cleaned out on a quarterly schedule; the last clean-out had occurred on both lines on February 15, 1994.

Follow-up Corrective Actions

- A new ADU dryer CSA has been written that is based on theoretical ADU density (6.27 g/cc) at optimum moderation and full water reflection rather than relying on a predicted limiting ADU U density. This CSA has been performed in compliance with license conditions and has been afforded full second party review. No physical changes were required for the Line 1 ADU dryer as it was determined to be geometrically safe under the new assumption. The lid on the Line 2 ADU dryer, however, required modification to limit its height. This modification was performed via an Engineering Change Notice (ECN).

- The POG system implications were addressed by an addendum to the applicable CSA and preparing a new Criticality Safety Specification (CSS). The immediate compensatory changes include increased frequency of ducting inspection and cleanout for the POG systems. As a longer term solution, the POG duct size will be reduced to a geometrically safe diameter where possible and disentrainers will be installed to reduce the buildup of U material in the ducts.

- The Line 2 precipitation and recycle tanks were of large enough diameter to be of potential concern relative to ADU crystal buildup. Calculations were performed to evaluate this condition. These tanks were found to have an acceptable diameter. Therefore, no physical modifications to the tanks were required. An addendum to the appropriate tank CSA was prepared to document the evaluation of this concern.

April 6, 1994

- A Startup Council, headed by the Manager, Manufacturing Engineering, was convened to evaluate the startup readiness of Line 1 and 2 following completion of the revised CSAs and the modification to the Line 2 Dryer. The Startup Council confirmed that all pertinent safety-related items were adequately addressed. Approval by the Startup Council and Plant Manager was given on March 11, 1994 for system startup.

If you have questions regarding SPC's actions in response to this condition, please contact me on 509-375-8537.

Very truly yours,

L. J. Maas, Manager
Regulatory Compliance

LJM:pm

cc: L. J. Callan, NRC Region IV
F. A. Wenslawski, NRC Region IV