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Docket No. 50-461

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Nuclear Regulatory Commission
Washington, D.C. 20555

Subject: Operation Above the Licensed
 Maximum Thermal Power Level

Dear Sir:

The enclosed report discusses a violation of Section 2.C.(1) of the Clinton Power Station Operating License, "Maximum Power Level." This report is submitted in accordance with Section 2.G of the License.

Sincerely yours,

Wilfred Connell
Vice President

RSF/csm

Attachment

cc: NRC Clinton Licensing Project Manager
 NRC Resident Office, V-690
 Regional Administrator, Region III, USNRC
 Illinois Department of Nuclear Safety
 INPO Records Center

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ABSTRACT

On December 6, 1995, an investigation initiated due to reports by other nuclear utilities identified that Clinton Power Station (CPS) may have been operated above the licensed maximum power level by as much as 1.5 megawatts thermal (MWt). The investigation determined that a portion of Control Rod Drive (CRD) system flow is diverted prior to reaching flow measurement instrumentation that provides CRD system flow data to the process computer. Thus, the computer used a lower than actual CRD flow value in the calorimetric calculation for reactor heat balance and under-calculated reactor thermal power by as much as 1.5 MWt. Operators were directed to limit reactor thermal power to 2 MWt under the licensed maximum until the issue is resolved. The cause of this condition is attributed to the failure of General Electric (GE) to account for the diverted CRD system flow in the reactor heat balance. GE developed the software program used to perform the calorimetric calculation and established the constants used in the heat balance. Corrective action for this condition includes biasing the CRD system flow process computer point to account for the diverted CRD system flow.

DESCRIPTION OF EVENT

On December 6, 1995, the plant was in Mode 1 (POWER OPERATION) at about 100 percent reactor [RCT] power. Operations personnel determined that Clinton Power Station may have been operated above the maximum power level authorized in the CPS Operating License due to a potential error in the reactor heat balance. This condition was identified during an investigation initiated after several boiling water reactor (BWR) utilities were reportedly limiting reactor thermal power based on a potential error in considering Control Rod Drive system [AA] flow in their calorimetric calculations.

At about 1430 hours, Operations personnel identified that CRD system flow may not be correctly included in the plant heat balance calorimetric calculation. Specifically, a portion of CRD system flow at CPS is diverted from the system to provide a source of water for purging seals in the Reactor Recirculation (RR) [AD] system pumps [P]. The diversion occurs prior to reaching the flow measurement instrumentation that provides the plant process computer [CPU] [IO] with the CRD system flow data. This condition results in a lower than actual CRD system flow value being used in the plant process computer calorimetric calculation for reactor heat balance. In response to this finding, at about 1445 hours, the Director-Plant Operations directed the Operations shift supervisor (SS) to limit reactor thermal power to 2893 MWt.

At about 1555 hours, station nuclear engineers notified the SS that the diverted CRD flow may affect calculated reactor thermal power by as much as 1.5 MWt; the SS directed operators to limit reactor thermal power to 2892 MWt until the issue is resolved.

CPS Operating License, Section 2.C.(1) authorizes Illinois Power (IP) to operate CPS at reactor power levels not in excess of 2894 MWt. However, based on the error in the calorimetric calculation, IP has concluded that CPS has probably operated at power levels greater than the licensed thermal power limit by as much as 1.5 MWt during past operation.

Condition report (CR) 1-95-12-015 was initiated to track a root cause analysis and corrective action determination for this issue.

No automatic or manually initiated safety system responses were necessary to place the plant in a safe and stable condition. No equipment or components were inoperable at the start of this event to the extent that their inoperable condition contributed to this event.

CAUSE OF EVENT

The cause of this condition is attributed to the failure of GE to account for diverted CRD system flow in the CPS reactor heat balance. GE developed the software program used to perform the calorimetric calculation and established the constants used in the heat balance. GE has been unable to locate any documentation which would indicate that the diverted CRD system flow was ever evaluated.

CORRECTIVE ACTION

CPS will bias the CRD system flow process computer point, C11NA001, to account for the CRD system flow diverted to purge RR pump seals. Following completion of this action, CPS will remove the administrative control restricting the maximum power level.

ANALYSIS OF EVENT

This condition is reportable as a violation of Section 2.C.(1) of the CPS Operating License which prohibits plant operation at reactor core power levels greater than 2894 megawatts thermal (100 percent of rated thermal power).

Assessment of the safety consequences and implications of this condition indicates that this condition was not nuclear safety significant. Although the licensed reactor thermal power limit may have been exceeded for extended periods, the net effect on the reactor power calculation due to the unmonitored CRD flow is small, approximately 0.05 percent. CPS has been adequately protected against the consequences of operational occurrences and accidents by the conservatisms inherent in the corresponding design basis safety analyses which are documented in the CPS Updated Safety Analysis Report (USAR) and referenced Supplemental Reload Licensing Reports.

The loss-of-coolant accident has been analyzed assuming an initial core thermal power of 104% of rated. The MSIV closure (flux scram), loss-of-feedwater-heating, and HPCS initiation events have been analyzed at 102% of rated. The radiological consequences of the USAR Chapter 15 accidents which involve fuel failure are based on fission product inventories calculated for operation at 102% to 105% of rated power. For operational occurrences which are analyzed at rated power, the analyses (e.g., fuel cladding integrity Safety Limit MCPR bounding statistical analysis) include allowances substantially larger than 0.05% for reactor power uncertainty. Finally, during its entire operating history, CPS has not experienced any operational occurrences or accidents which have approached design limits.

ADDITIONAL INFORMATION

No equipment or components failed as a result of this condition.

A review of previous similar events identified two occurrences of operation in excess of 2894 MWt. On April 15, 1994, the plant operated at reactor power levels between 107.5 and 108 percent of rated for 43 seconds and reached a peak of 109.76 percent. This event was reported in Licensee Event Report Number 94-003 dated May 13, 1994.

On November 3, 1995, during the period of 0000 to 0655 hours, the plant was operated above the maximum authorized power level. The maximum average overpower was calculated to be about 0.9 MWt based on a time weighted 8-hour period. This occurrence was reported in IP letter U-602527 dated December 5, 1995.

The causes of the two previous occurrences were not similar to the cause of the condition occurring on December 6, 1995, discussed in this report.

For further information regarding this condition, contact T. A. Byam or S. L. Rowe, nuclear engineers, at (217) 935-8881, extensions 3415 and 3021, respectively.