

March 14, 2002

The Honorable Richard A. Meserve
Chairman
U.S. Nuclear Regulatory Commission
Washington, DC 20555-0001

SUBJECT: CORE POWER UPRATE FOR CLINTON POWER STATION, UNIT 1

Dear Chairman Meserve:

During the 490th meeting of the Advisory Committee on Reactor Safeguards, March 7-9, 2002, we completed our review of the AmerGen Energy Company (AmerGen) license amendment request for an increase in core thermal power for the Clinton Power Station, Unit 1. Our subcommittee on Thermal-Hydraulic Phenomena reviewed this matter during a meeting held on February 13-14, 2002. During our review, we had discussions with representatives of the applicant and the NRC staff. We also had the benefit of the documents referenced.

Conclusions and Recommendations

1. The proposed constant-pressure power uprate of 20% for the Clinton Power Station, Unit 1, should be approved.
2. The staff has been conducting extensive reviews of codes, inputs, and methods for analysis of design-basis accidents at the uprated plant. These reviews make acceptable the exceptions taken by the licensee to the approved power uprate methodologies for such analyses.
3. The AmerGen program to monitor piping expected to suffer from significant flow-assisted corrosion at the uprated flow conditions should be rigorously conducted. The importance of this program should be communicated to NRC staff inspecting the uprated Clinton Power Station.

Discussion

AmerGen, the licensee for the Clinton Power Station, Unit 1, has applied for a 20% power uprate that will take this boiling-water reactor (BWR/6) in a Mark III containment from a licensed power of 2894 MWt to 3473 MWt. The power uprate is to be done in steps of 7 and 13%. Although the power uprate is substantial, the unit will still be operating within the power range of other BWR/6 nuclear steam supply systems. As part of the power uprate, the licensee will incorporate fuel assemblies of a new design into the core.

To a significant extent, the licensee has followed the methodologies defined in the Extended Power Uprate Licensing Topical Reports (ELTR 1 and ELTR 2). These methodologies have been approved by the staff and have been used for the power uprates at the Duane Arnold, Quad Cities, and Dresden plants. This power uprate is, however, a constant-pressure power uprate, and the staff is in the process of reviewing the generic methodology for such an uprate. Consequently, the licensee has taken exceptions to the ELTR1 and ELTR2 methodologies for their specific situations.

The licensee proposes to provide a summary report on design-basis accident analyses as part of its core reload submission, rather than as part of the power uprate application. The staff has not been reviewing reload analyses routinely. For the power uprate at Clinton, the staff is conducting extensive reviews and audits of codes, inputs, and methods used for the accident analysis. These reviews include onsite audits and interviews with analysts. Based on these reviews, the staff has accepted the licensee's proposed deviations from the approved methodologies. We have been quite impressed by the reviews being done by the staff and agree that the exceptions taken by the licensee to the ELTR1 and ELTR2 methodologies are acceptable.

The constant-pressure power uprate produces higher steam and feedwater flows in the plant. The higher flows in the steamlines carrying scavenging steam to the high-pressure feedwater heaters are predicted to increase the flow-assisted corrosion in these lines to as much as 0.070 inches per year. The licensee is persuaded that the predictions of the flow-assisted corrosion rates in these lines with 0.500-inch thick walls are conservative, but acknowledges that the corrosion in these lines will be accelerated by the power uprate.

There has been an unfortunate history within the U.S. nuclear industry of pipe ruptures in nonsafety systems because of flow-assisted corrosion. These ruptures have had safety consequences even when they have occurred in lines that are usually found not to have great risk significance. It is important, then, that the licensee's program for monitoring flow-assisted corrosion in steam and feedwater lines be rigorously conducted. It is also important that the staff reviewing the power uprate application have a good process that communicates the importance of the monitoring program to the staff who inspect the uprated plant.

The licensee proposes not to conduct the large transient tests called for in the current version of the General Electric extended power uprate methodology. The staff has accepted this proposal and feels confident that analysis methods are adequate to predict plant performance. We have not found a value for these tests that are commensurate with costs and risks and, therefore, support the position not to conduct the large-transient tests. The modifications to the plant proposed by the licensee do not involve changes to the "recirculation runback system."

Dr. F. Peter Ford did not participate in the Committee's deliberations regarding this matter.

Sincerely,

/RA/

George E. Apostolakis
Chairman

References:

1. Memorandum dated January 29, 2002, from John A. Zwolinski, Office of Nuclear Reactor Regulation, NRC, Subject: Draft Safety Evaluation for Clinton Power Station Extended Power Uprate.
2. AmerGen Memorandums dated, June 18, November 30, November 29, December 5, November 21, October 17, September 7, September 28, October 31, December 6, October 23, November 8, October 26, November 20, 2001, January 16, 2002, Response to Requests for Additional Information Supporting License Amendment Requests to Permit Upgraded Power Operation, Dresden Nuclear Power Station and Quad Cities Nuclear Power Station.
3. U. S. Nuclear Regulatory Commission Generic Letter 89-08 dated May 2, 1989, "Erosion Corrosion Induced Pipe Wall Thinning."
4. U. S. Nuclear Regulatory Commission Bulletin 87-01, dated July 9, 1987, "Thinning of Pipe Walls in Nuclear Power Plants."
5. U. S. Nuclear Regulatory Commission Augmented Inspection Reports 50-280/86-42 and 50-281/86-42, dated February 10, 1987.
6. GE Nuclear Energy, Topical Report, NEDC-32424P-A, "Generic Guidelines for General Electric Boiling Water Reactor Extended Power Uprate" (ELTR-1), February 1999 (Proprietary).
7. GE Nuclear Energy, Topical Report, NEDC-32523P-A, "Generic Evaluations of General Electric Boiling Water Reactor Extended Power Uprate" (ELTR-2), February 2000 (Proprietary).
8. GE Nuclear Energy, Topical Report, NEDC-32523P-A, Supp 1, Volume 1, "Generic Evaluations of General Electric Boiling Water Reactor Extended Power Uprate - Supplement 1, Volume I," February 1999, and Volume II, April 1999 (ELTR-2) (Proprietary).
9. GE Nuclear Energy Topical Report, NEDC-33004P, Revision 1, "Constant Pressure Power Uprate," July 26, 2001 (Proprietary)