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ComEd

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August 2, 2000

U. S. Nuclear Regulatory Commission
ATTN: Document Control Desk
Washington, DC 20555-0001

Dresden Nuclear Power Station, Units 2 and 3
Facility Operating License Nos. DPR-19 and DPR-25
NRC Docket Nos. 50-237 and 50-249

LaSalle County Station, Units 1 and 2
Facility Operating License Nos. NPF-11 and NPF-18
NRC Docket Nos. 50-373 and 50-374

Quad Cities Nuclear Power Station, Units 1 and 2
Facility Operating License Nos. DPR-29 and DPR-30
NRC Docket Nos. 50-254 and 50-265

Subject: Use of the General Electric GEXL Correlation in Siemens Power Corporation MICROBURN 3-D Simulator Code

References:

1) Letter from C. P. Patel (U.S. NRC) to ComEd, "Commonwealth Edison Company Topical Report NFSR-0091, Benchmark of CASMO/MICROBURN BWR Nuclear Design Methods," dated March 22, 1993.

2) Letter from P. L. Piet (ComEd) to U.S. NRC, "Topical Report for Neutronics Methods for BWR Reload Design Using CASMO/MICROBURN," dated December 31, 1991

3) Letter from P. L. Piet (ComEd) to U.S. NRC, "Topical Report for Neutronics Methods for BWR Reload Design Using CASMO/MICROBURN," Supplement 1, dated March 24, 1992

4) Letter from P. L. Piet (ComEd) to U.S. NRC, "Topical Report for Neutronics Methods for BWR Reload Design Using CASMO/MICROBURN," Supplement 2, dated May 22, 1992

5) Letter from R. A. Copeland (Advanced Nuclear Fuels Corporation) to U.S. NRC, "Transmittal of XN-NF-80-19 (A) Volume 1 Supplement 3,

A001

XN-NF-80-19 (A) Volume 1 Supplement 3 Appendix F, and XN-NF-80-19 (A) Supplement 4", dated November 30, 1990

In Reference 1, the NRC approved our use of the Siemens Power Corporation (SPC) CASMO/MICROBURN BWR core physics steady state methods, as described in references 2 through 5, for BWR core design and neutronic licensing analyses. The approval excluded use of these methods for certain analyses for General Electric (GE) supplied Commonwealth Edison (ComEd) Company Boiling Water Reactor (BWR) reloads. The purpose of this letter is to request NRC concurrence to perform the steady state neutronic licensing analyses for GE-supplied reloads using the GEXL critical power correlation and the CASMO/MICROBURN steady-state neutronic methods consistent with the application process described in Reference 3, excluding fuel assembly misorientation analyses. The need for this concurrence was discussed at a May 31, 2000, meeting between ComEd and the NRC regarding ComEd's proposed transition from SPC fuel to GE fuel.

At the time of our referenced submittals, the MICROBURN 3-D simulator code package only included the SPC ANFB critical power correlation. Without the inclusion of the General Electric (GE) GEXL critical power correlation in the computer code package, our submittals indicated that the MICROBURN methodology would not be used to perform steady state neutronic licensing analyses for the determination of the change in the critical power ratio (CPR) associated with certain events for GE-supplied ComEd BWR reloads. These were the rod withdrawal error, loss of feedwater heating, fuel assembly mislocation, and fuel assembly misorientation events. As such, NRC approval excluded the use of MICROBURN methods for performing these steady state neutronic licensing analyses for GE-supplied ComEd BWR reloads.

Since that time, the MICROBURN 3-D simulator code has been updated to include the GE GEXL critical power correlation. It is our intent to use the GEXL correlation in the MICROBURN 3-D simulator code to perform neutronic licensing calculations for GE-supplied ComEd BWR reloads consistent with the methodology described in Reference 3. We intend to perform the analyses for the rod withdrawal error, loss of feedwater heating, and fuel assembly mislocation events for our GE-supplied reloads. In order to use the GEXL correlation in the MICROBURN 3-D simulator code for the determination of CPR, we intend to use the appropriate bundle R-factors as calculated by GE. Due to the complexity of obtaining R-factors for misoriented assemblies, we do not intend to evaluate the fuel assembly misorientation event for GE-supplied reloads. We will continue to rely on GE to perform the calculations for this event.

The application processes described in Reference 3 for these analyses are independent of both the core physics steady state methods being applied and the fuel supplier, as long as the proper critical power correlation is being applied to the fuel being evaluated. Incorporation of the GEXL critical power correlation into the MICROBURN 3-D simulator code package allows the proper critical power correlation to be applied for our neutronic licensing analyses of GE-supplied reloads.

All of the conclusions supporting the original approval of our use of the MICROBURN 3-D simulator code remain valid as documented in Reference 1. The attachment to this letter is provided to demonstrate that the GEXL correlation has been properly implemented into the MICROBURN 3-D simulator code. Based on this successful demonstration, we request NRC concurrence to perform the steady state neutronic licensing analyses for GE-supplied reloads using the GEXL critical power correlation and the CASMO/MICROBURN steady-state neutronic methods consistent with the application process described in Reference 3, excluding fuel assembly misorientation analyses. To support core reloads for the Fall 2001, outages, we request concurrence by January, 2001.

Should you have any questions concerning this submittal, please contact Mr. J. V. Sipek at (630) 663-3741.

Respectfully,

R. M. Krich
Vice President - Regulatory Services

Attachment: Demonstration of Implementation of the GEXL Critical Power Correlation into the MICROBURN Simulator 3-D Code

cc: Regional Administrator - NRC Region III
NRC Senior Resident Inspector - Dresden Nuclear Power Station
NRC Senior Resident Inspector - LaSalle County Station
NRC Senior Resident Inspector - Quad Cities Nuclear Power Station

Attachment

Letter from R.M. Krich, "Use of the General Electric GEXL Correlation in Siemens Power Corporation CASMO/MICROBURN 3-D Simulator Code," dated August 2, 2000

Demonstration of Implementation of the GEXL Critical Power Correlation into the MICROBURN 3-D Simulator Code

Demonstration of Implementation of the GEXL Critical Power Correlation into the MICROBURN 3-D Simulator Code

Introduction

This document presents the results of a demonstration of the proper implementation of the General Electric (GE) GEXL Critical Power Correlation into the Siemens Power Corporation (SPC) MICROBURN 3-D simulator code. The GEXL correlation and the MICROBURN 3-D simulator code package are approved methodologies for Boiling Water Reactor (BWR) core design and neutronic licensing analyses. This document is intended to show that the GEXL correlation has been properly implemented into the MICROBURN 3-D simulator code.

Discussion

Table 1 presents two quarter-core 2-D maps of bundle critical power. The Critical Power Ratios (CPRs) determined with the GE GEXL correlation in the NRC-approved GE PANACEA 3-D simulator code are presented in the upper portion of the table (Result 1). The CPRs determined with the GE GEXL correlation as implemented in the MICROBURN 3-D simulator code are presented in the lower portion of the table (Result 2). The bundle R-factors used were obtained from GE, and were identical for the two methods of calculation. A uniform power shape was used for all assemblies to ensure identical core power distributions for the comparisons between Results 1 and 2. This explains why the peripheral fuel assemblies show lower CPRs than the interior assemblies.

Due to differences in the hydraulic models between the PANACEA and MICROBURN 3-D simulator codes, there were slight differences in the 2-D assembly flows between the PANACEA and MICROBURN calculations. These slight flow differences, which were larger for the peripheral fuel assemblies than the interior fuel assemblies, could not be eliminated in these comparisons.

Conclusion

In spite of the slight flow differences, Table 1 shows that Results 1 and 2 are virtually identical, which confirms the proper implementation of the GEXL critical power correlation into the MICROBURN 3-D simulator code.

Table 1

Representative GEXL 2-D Core Critical Power Ratios (CPRs)

Result 1 - GEXL CPRs Determined with GE PANACEA 3-D Simulator Code

								1.703	1.702	1.702	1.702	1.703	1.701	1.704
							1.7	2.116	2.116	2.13	2.116	2.128	2.141	2.141
					1.703	1.701	2.11	2.116	2.131	2.131	2.119	2.13	2.131	2.119
					1.702	2.141	2.141	2.131	2.159	2.119	2.131	2.159	2.159	2.115
				1.697	2.12	2.117	2.12	2.137	2.159	2.138	2.159	2.114	2.159	2.127
		1.703	1.702	2.119	2.1	2.13	2.159	2.138	2.111	2.138	2.13	2.138	2.142	2.138
		1.701	2.141	2.117	2.13	2.13	2.119	2.142	2.159	2.131	2.11	2.141	2.159	2.111
	1.7	2.11	2.141	2.12	2.159	2.118	2.12	2.138	2.131	2.113	2.112	2.138	2.13	2.117
1.703	2.115	2.117	2.131	2.137	2.138	2.142	2.138	2.138	2.159	2.142	2.159	2.116	2.159	2.129
1.702	2.116	2.131	2.159	2.159	2.111	2.159	2.131	2.159	2.12	2.138	2.142	2.138	2.142	2.138
1.702	2.13	2.131	2.119	2.138	2.138	2.131	2.113	2.142	2.138	2.111	2.112	2.127	2.159	2.112
1.702	2.115	2.119	2.132	2.159	2.13	2.11	2.112	2.159	2.142	2.112	2.114	2.138	2.126	2.119
1.703	2.128	2.13	2.159	2.114	2.138	2.141	2.138	2.116	2.138	2.127	2.138	2.131	2.159	2.14
1.701	2.141	2.131	2.159	2.159	2.142	2.159	2.13	2.159	2.142	2.159	2.126.	2.159	2.111	2.138
1.703	2.141	2.119	2.115	2.127	2.138	2.111	2.117	2.129	2.138	2.112	2.119	2.14	2.138	2.114

Result 2 - GEXL CPRs Determined with GEXL Incorporated into the MICROBURN 3-D Simulator Code

								1.724	1.725	1.724	1.723	1.725	1.723	1.725
							1.722	2.115	2.116	2.13	2.115	2.126	2.14	2.14
					1.724	1.721	2.109	2.117	2.13	2.13	2.12	2.128	2.13	2.119
					1.723	2.14	2.139	2.13	2.161	2.12	2.13	2.161	2.161	2.115
				1.718	2.121	2.117	2.12	2.135	2.161	2.139	2.161	2.113	2.161	2.126
		1.724	1.723	2.119	2.1	2.128	2.161	2.139	2.111	2.139	2.129	2.139	2.14	2.139
		1.722	2.14	2.117	2.128	2.129	2.119	2.14	2.161	2.13	2.11	2.139	2.151	2.111
	1.722	2.109	2.139	2.12	2.161	2.118	2.121	2.139	2.13	2.114	2.112	2.139	2.129	2.118
1.724	2.115	2.117	2.13	2.135	2.139	2.14	2.139	2.139	2.161	2.141	2.161	2.116	2.161	2.127
1.724	2.116	2.13	2.161	2.161	2.111	2.161	2.13	2.161	2.121	2.139	2.14	2.139	2.141	2.139
1.725	2.13	2.13	2.12	2.139	2.139	2.13	2.114	2.141	2.139	2.111	2.113	2.124	2.161	2.112
1.724	2.115	2.12	2.13	2.161	2.129	2.11	2.112	2.161	2.14	2.113	2.114	2.139	2.124	2.119
1.725	2.126	2.128	2.161	2.113	2.139	2.139	2.139	2.116	2.139	2.124	2.139	2.129	2.161	2.138
1.723	2.14	2.13	2.161	2.161	2.14	2.161	2.129	2.161	2.141	2.161	2.124	2.161	2.111	2.139
1.725	2.14	2.119	2.115	2.126	2.139	2.111	2.117	2.127	2.139	2.112	2.119	2.138	2.139	2.114