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Dalwyn R. Davidson
VICE PRESIDENT
SYSTEM ENGINEERING AND CONSTRUCTION

March 25, 1982

Mr. A. Schwencer
Chief, Licensing Branch No. 2
Division of Licensing
U. S. Nuclear Regulatory Commission
Washington, D. C. 20555

Perry Nuclear Power Plant
Docket Nos. 50-440; 50-441
Response to Draft SER
Core Performance Branch

Dear Mr. Schwencer:

This letter and its attachment is submitted to provide draft responses to the concerns identified in the Draft SER for Core Performance.

It is our intention to incorporate these responses in a subsequent amendment to our Final Safety Analysis Report.

Very Truly Yours,

Dalwyn R. Davidson

Dalwyn R. Davidson
Vice President
System Engineering and Construction

DRD: mlb

cc: Jay Silberg
John Stefano
Max Gildner

B001
S.1

CPB-1

492.11
(4.4.4.5)

You have not cited the name, version, or reference of the computer program used in this sub-section.

Letter from N. W. Curtis (Pennsylvania Power and Light Company) to B. J. Youngblood (NRC), "Response to NRC question on Susquehanna FSAR," dated March 25, 1982, states that name of the computer program is "ISCØR" and reference is "General Electric Document NEDO-20953, May 1976, Chapter 4."

Please confirm ISCØR has been used for Perry.

What version number of ISCØR is the latest version? Has this version been applied to Perry? If the reference of this version is different from GE Document NEDO-20953, provide the document or the reference. Also describe any significant changes of this version of ISCØR code over the previous version of ISCØR.

Response

The computer program cited in Section 4.4.4.5 is named ISCØR. The ISCØR computer program and another GE program PANACEA (3 demensional BWR core simulator) use the same steady state thermal hydraulic mathematical module described in NEDO-20953-A dated January 1977. The program ISCØR and the calculations used for Perry are consistent with the technical content of NEDO-20953-A, dated January 1977.

Perry FSAR Sub-section 4.4.4.5 description also corresponds to ISCØR Version No. 5 which was used for Perry.

The details of ISCØR and its associated proprietary documentation are available for review at GE in San Jose.

CPB-2
(492.16)

You have not cited the name, version, and reference of the core wide transient analysis code (i.e., ODYN or REDY) and for the GETAB-MCPR evaluation of the transients. Please provide name, version, and reference of these two codes used for Perry.

Response

The REDY code, as documented in NEDO-10802, "Analytical Methods of Plant Transient Evaluations for the General Electric Boiling Water Reactor," was used for the core wide transient analysis as shown in Chapter 15. Limiting pressurization events evaluated with the ODYN code will be provided in the near future. All the GETAB-MCPR evaluation of the transients was performed with SCAT code as documented in NEDO-20566, "General Electric Company Analytical Model for Loss-of-Coolant Analysis in accordance with 10CFR50, Appendix K." However, in order to make SCAT more compatible to ODYN output, a modified version of SCAT has been prepared in conjuction with ODYN. The NRC was notified of this modified version of SCAT in a letter from GE's K.W. Cook to F. Schloeder and D. Eisenhut (MFN - 171 - 79) dated July 20, 1979.

The Cook to Eisenhut letter indicates that the SCAT code, when driven by ODYN, can exhibit numberical in-stabilities which, unless accommodated by the user, may result in highly conservative Δ CPR calculations. This is because of the explicit nature of the SCAT numerical scheme.(Discontinuities in pressure rate causing oscillations in void fraction solution and Δ CPR calculations). Since then, an implicit solution method has been applied to the vapor continuity equation. This stabilizes the void fraction solution and removes the non-physical Δ CPR conservatism.

The ODYN/SCAT results without user adjustments are compared with the results from the ODYN/modified SCAT in attached Table 2* which is taken from the aforementioned letter. The modified SCAT was also verified by the comparisons shown in Table 1, which is also taken from the aforementioned letter. In this case, both SCAT and the modified SCAT are stable with respect to REDY, which is used in most of the FSAR Chapter 15 transient analyses. As can be seen from Table 1, the Δ CPR comparisons from SCAT and modified SCAT are almost identical.

The above explanation was given in the Cook to Eisenhut letter and is repeated here for convenience purpose only.

* The numberical instabilities under the SCAT results column are clearly indicated here to show the unreasonableness if user accomodations are <u>not</u> considered.

TABLE 1

Δ CPR COMPARISIONS
(REDY INPUT)

PLANT	EVENT	SOURCE OF INPUT	Δ CPR SCAT RESULTS	Δ CPR REVISED VERSION RESULTS
BWR 3	TTNBT	REDY	0.2912	0.2964
	FWCF	REDY	0.3284	0.3250
BWR4/218/560 PLANT A	LRNBT	REDY	0.2795	0.2787
	FWCF	REDY	0.2399	0.2393
BWR4/218/560 PLANT B	LRNBT/RPT	REDY	0.0996	0.1064
BWR4/251/764 PLANT C	TTNBT	REDY	0.2337	0.2356
	FWCF	REDY	0.0737	0.0720
BWR4/218/560 PLANT D	TTNBT	REDY	0.1780	0.1881

TABLE 2

Δ CPR COMPARISONS
(ODYN INPUT)

PLANT	EVENT	SOURCE OF INPUT	Δ CPR SCAT RESULTS*	Δ CPR REVISED VERSION RESULTS
BWR4/218/560 PLANT 1	LRNBT	ODYN	0.271	0.226
	TTNBT/RPT	ODYN	0.1765	0.1243
	LRNBT/MST	ODYN	0.221	0.185
BWR4/183/368	TTNBT	ODYN	0.2522	0.2266
BWR4/218/560 PLANT 2	LRNBT	ODYN	0.2798	0.2461
	FWCF	ODYN	0.2487	0.2189

LRNBT - Load rejection without bypass transient
TTNBT - Turbine trip without bypass transient
RPT - Recirculation pump trip
MST - Measure scram time of insertion
FWCF - Feedwater Controller Failure
PLANT - Plant type/vessel size/No. fuel bundles

*Results are based on raw input data without user adjustments

KWC:vm/1244
7/19/79

CPB-3 Provide by separate amendment, the operating limit MCPR as calculated by including the ODYN methods.

Response

The operating limit minimum critical power ratio (MCPR) will be provided by separate amendment with the results of the ODYN analysis for Perry, scheduled for submittal in April 1982.

DSER Item CPB-4

Single loop operation is not permitted unless supporting analyses are provided and approved.

Response

Operation with one recirculation loop out of service shall be limited. A reasonable time will be allowed for restarting that loop or for an orderly reactor shutdown. This will be identified in the technical specifications.

DSER Item CPB-5

Operation in a natural circulation mode is not permitted while we continue our generic evaluation of thermal hydraulic stability for BWRs.

Response

The technical specifications shall preclude reactor operation in the natural recirculation mode except to allow completion of the natural circulation testing (test mode 4) that is required by the NRC.

DSER Item CPB-6

The core flow should be checked at least once every 24 hours to account for possible effects of crud deposition.

Response

The technical specifications will address checking core flow every 24 hours to account for possible effects of crud deposition.