ACCELERATED DISTRIBUTION DEMONSTRATION SYSTEM

REGULATORY INFORMATION DISTRIBUTION SYSTEM (RIDS)

ACCESSION NBR:9002120298 DOC.DATE: 90/01/29 NOTARIZED: NO DOCKET #
FACIL:50-269 Oconee Nuclear Station, Unit 1, Duke Power Co. 05000269
50-270 Oconee Nuclear Station, Unit 2, Duke Power Co. 05000270
50-287 Oconee Nuclear Station, Unit 3, Duke Power Co. 05000287
AUTH.NAME AUTHOR AFFILIATION
TUCKER,H.B. Duke Power Co.
RECIP.NAME RECIPIENT AFFILIATION
Document Control Branch (Document Control Desk)

SUBJECT: Advises of EPRI release of Mod 2 of VIPRE-01 computer code which util intends to use as described in topical repts.

DISTRIBUTION CODE: A001D COPIES RECEIVED:LTR 1 ENCL 1 SIZE: 9
TITLE: OR Submittal: General Distribution

NOTES:

	RECIPIENT ID CODE/NAME	COPIES LTTR	COPIES ENCL	RECIPIENT ID CODE/NAME	COPIES LTTR	COPIES ENCL
	PD2-3 LA	1	1	PD2-3 PD	1	1
	WIENS,L	5	5			
INTERNAL:	ACRS	6	6	NRR/DET/ECMB 9H	1	1
	NRR/DOEA/OTSB11	1	1	NRR/DST 8E2	1	1
	NRR/DST/SELB 8D	1	1	NRR/DST/SICB 7E	1	1
	NRR/DST/SRXB 8E	1	1	NUDOCS-ABSTRACT	1	1
	OC/LFMB	1	0	OGC/HDS2	1	0
	REG FILE 01	1	1	RES/DSIR/EIB	1	1
EXTERNAL:	LPDR	1	1	NRC PDR	1	1
	NSIC	1	1			

NOTE TO ALL "RIDS" RECIPIENTS:

PLEASE HELP US TO REDUCE WASTE! CONTACT THE DOCUMENT CONTROL DESK, ROOM P1-37 (EXT. 20079) TO ELIMINATE YOUR NAME FROM DISTRIBUTION LISTS FOR DOCUMENTS YOU DON'T NEED!

TOTAL NUMBER OF COPIES REQUIRED: LTTR 27 ENCL 25

RIDS/ADDS

RIDS/ADDS

RIDS/ADDS

A/14

Duke Power Company
P.O. Box 33198
Charlotte, N.C. 28242

HAL B. Tucker
Vice President
Nuclear Production
(704)373-4531

DUKE POWER

January 29, 1990

U. S. Nuclear Regulatory Commission
Washington, D.C. 20555

Attention: Document Control Desk

Subject: Oconee Nuclear Station
Docket Numbers 50-269, -270, and -289
McGuire Nuclear Station
Docket Numbers 50-369 and -370
Catawba Nuclear Station
Docket Numbers 50-413 and -414
Computer Code Revision for Use in
Duke Power Company Topical Reports

Duke Power Company has submitted several Topical Reports (See References 1-3, Attachment I) which use the VIPRE-01 computer code. The purpose of this letter is to inform you that the Electric Power Research Institute (EPRI) has released Mod 2 of the VIPRE-01, which Duke intends to use for applications described in the Topical Reports.

There are 77 changes incorporated into Mod 2 of VIPRE-01. Most of these changes originated from comments received from Code users. Each change was assigned a number, CH101 through CH177. Only 2 of the changes are considered significant. Change number CH172 updates the programming language to FORTRAN-77, and change number CH139 adds a Drift Flux Void Model (which Duke does not intend to use). The remaining changes are relatively minor, and are briefly described in Attachment II.

Duke will consider the change to VIPRE-01 Mod 2 acceptable to the staff unless advised to the contrary. If there are any questions, or you would like to discuss this further, please call Scott Gewehr at (704) 373-7581.

Very truly yours,

Hal B. Tucker

SAG205/lcs

A001
1/1

Summary of Changes to VIPRE-01, Mod2

(Errors that are not easily detected)

CH101
BAW#2 CHF correlation's nonuniform axial power correction not applied if quality is below -0.03. (Not consistent with standard usage.)

CH102
Pressure solution for water tube channel modeled using optional input in group BWRG is not correct; results in small error in water tube flow rate.

CH107
Dimension check needed for stacked case option in OPER. If too many stacked cases are specified, code fails.

CH110
The usineu axial power profile option does not work properly with a cold inlet length. Total power input will not be what the user thinks.

CH118
Arrays for the conduction solution need to be dimensioned by the number of nodes plus 1.

CH119
Error in Y' term in the Bowring WSC-2 CHF correlation results in small errors in MDNBR values.

CH125 and CH128
Errors in coefficients of zircaloy thermal conductivity equation cause small errors (on the order of 5%) in clad and fuel temperatures.

CH127
Energy error in boiling transients when the subcooled boiling models are used.

CH130
Heat transfer input flag 'THSP' gives Thom-plus-Dittus-Boelter for boiling heat transfer coefficient, not Thom plus user-specified single-phase heat transfer coefficient, as it is supposed to.

CH133
Error in dimension parameter for array CPFF; MN should be NM.

CH141
When Bowring CHF correlation is used to define the peak of the boiling curve for wall heat transfer, a cold inlet or exit will cause a divide-by-zero failure of the code.

CH158
The vapor density is evaluated at the film temperature, rather than at the superheated vapor temperature, in the application of the Groeneveld-Delorme film boiling heat transfer correlation.

CH159

Iteration to determine the critical boiling length for the EPRI-2 CPR correlation is not performed.

CH160

Code continues execution past a table lookup failure for fluid properties. (It should quit with an informative diagnostic.)

CH161

Code continues execution after a table lookup failure for material properties. (It should quit with an informative diagnostic.)

CH174

Levy subcooled boiling model uses the user-specified single-phase heat transfer correlation where it should always be using Dittus-Boelter.

CH176

For transients with a pressure boundary condition, the minimum number of iterations needs to be 3 rather than 2, or the code might think it is converged when it not.

Summary of Changes to VIPRE-01, Mod2

(errors discovered when using unusual input)

CH108
Code fails when a nuclear rod, wall, or tube is modeled with only one radial node. (Fix is to generate an input error message when this occurs.)

CH109
Specifying zero power factors for all rods causes a divide-by-zero.

CH112
Iteration on radial peaking factor to a specified MDNBR blows up if the initial value is below the specified limit. (Fix is to generate an informative diagnostic for the user and terminate the calculation.)

CH142
Groeneveld-Delorme film boiling heat transfer coefficient has a hard-wired reference to the property tables, so causes code failure if the EPRI water properties functions are being used directly.

CH143
If the bandwidth for a problem is larger than the number of channels, an array overwrite occurs in the energy solution. (Note: it requires a perverse disregard for the recommended efficient channel number convention to encounter this error.)

CH147
The user-specified gap conductance table is not interpreted correctly if the axial locations named in the input correspond exactly to the locations of the node boundaries.

CH149
The lower limit on the critical heat flux value for the peak of the boiling curve is too high for some low-flow, low-power problems, so the code will not correctly calculate the transition to film boiling for these conditions.

CH150
If local enthalpy exceeds the top of the superheated steam table, this can cause a divide-by-zero in the energy solution. (The fix for CH160 circumvents this problem with a general fix for exceeding the range of the properties tables.)

CH152
Incorrect user-specification of the uniform axial power profile option when the problem has a cold inlet length with a constant power profile can result in power input errors. (Fix is a check for cold inlet when the option is specified, and write an informative diagnostic.)

CH157
Conflict between flexibility of input order and input options; if OPER is read before RODS, option to specify power in kW/rod results in a divide-by-zero.

CH171
Material properties should be entered in order of increasing temperature, but the code does not check for this.

Summary of Changes to VIPRE-01, Mod2

(errors which had no significant effect on results)

CH103
Output of input data in group OPER is not correct when option ISP=1 is specified. (Actual flow boundary conditions are calculated correctly, however.)

CH105
Printout arrays not reset between stacked cases; may result in extraneous output.

CH106
Extraneous output line in results for MDNBR iteration on power.

CH113
The uniform CHF value printed for the EPRI-1 correlation when the nonuniform axial flux correction is the same as the nonuniform CHF value.

CH115
Output on tape81 for the RASP package is not in the proper format.

CH116
Coding error in the water tube channel model results in a small continuity error, which is on the order of machine round-off.

CH117
If the automatic time-step adjustor causes a time-step to be repeated, ASP will not be able to read the plot dump produced by that run.

CH131
Error in coefficient of the equation for liquid water temperature above the critical point; results in 0.0002% change in calculated temperature in that region.

CH132
Error in coefficient of equation for viscosity of water; results in no discernable difference in calculated viscosities.

CH140
Common blocks MAINS and FUELS are too long to permit additional continuation lines. If SPECSET inserts new lines on respecing, the common blocks will exceed the FORTRAN-77 limit of 19 continuation lines.

CH145
Recalculation of QPRIM array for output in RESULT neglects the heat generated in the coolant and uses the wrong heated perimeter for the inside surfaces of tubes and walls.

CH146
Variable for CPU time, TMAX, does not always default correctly in group CONT.

CH148
Heat transfer coefficient derivatives are not reset to zero between rods in the conduction solution. This can sometimes cause a spurious heat flux from a rod with an adiabatic boundary condition.

CH166
Error message for dimension check on JF in radial power forcing function input does not identify the parameter.

CH167
Error message for dimension check on JF in gap conductance forcing function input does not identify the parameter.

CH168
Error messages for dimension checks on MF do not identify the parameter.

CH169
Array DR is overwritten in subroutines NUCROD and GENROD, but it is not used anyway, so the error is harmless.

Summary of Cosmetic Changes in VIPRE-01, MOD-02

CH104
Changes to heading to identify code version and MOD.

CH126
Change contact telephone number on banner page output.

CH135
Additional information added to the output of results for the MDNBR iteration.

CH154
Expansion of various line printer output formats to avoid output conversion errors and loss of information in printed results.

CH170
CHF print interval is not selected correctly in transients unless all time steps are printed out.

CH177
Output file written to unit 12 for microfiche device does not include the iteration summary for the solution or the output from an MDNBR iteration.

Summary of Changes to VIPRE-01, Mod2
Documentation Errors (the code was correct)

CH114
There is an error in the description of the input variable NPROD in Vol. II, pg. 3-46. The documentation refers to CHF results instead of ROD results.

CH134
The leading coefficient on the A-term of the profile fit equation for the EPRI void model is documented in Vol. I, pg. 2-102 as 1.0 instead of 4.0.

Reported Errors That Are Not Actually Errors

CH124 and CH144

Errors in the ASP Postprocessor CALCOMP Plotting Program

CH111
CH120
CH121
CH122
CH123
CH129
CH136
CH137
CH138
CH151
CH153
CH155
CH156
CH162
CH163
CH164
CH165
CH173
CH175