



Westinghouse
Electric Corporation

Water Reactor
Divisions

Box 355
Pittsburgh Pennsylvania 15230

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NS-NRC-85-3025

Mr. D. G. Eisenhut

Office of Nuclear Reactor Regulation
U.S. Nuclear Regulatory Commission
Phillips Building
7920 Norfolk Avenue
Bethesda, MD 20014

Subject: BART-WREFLOOD Input Revision

Dear Mr. Eisenhut:

The purpose of this letter is to inform you of an input methodology revision in the interface between two computer codes used in the Westinghouse Emergency Core Cooling System (ECCS) evaluation model which is used to demonstrate compliance with Appendix K to 10CFR50.46. Specifically, the input methodology revision applies the way input to the BART code is determined from the WREFLOOD code in the large break loss-of-coolant-accident (LOCA) analyses. The revision in the input methodology may result in an increase in calculated peak cladding temperature for analyses which have used the BART computer code. This problem has been discussed with Dr. Brian Sheron and Mr. Norman Lauben of your staff. Additional details regarding this problem may be found in the attachment.

Westinghouse has reviewed the LOCA analyses which have been performed with the Westinghouse ECCS evaluation model which incorporates the BART code and WREFLOOD code interface and determined that the effect of the input methodology revision would not result in any of the analyses exceeding the 2200°F regulatory limit on peak cladding temperature. Reanalyses of Turkey Point units 3 and 4 have been completed as reflected in the attachment and reanalyses of the other affected plants is in progress.

If you have any questions concerning these modifications, please contact Mr. Brian McIntyre of my staff at (412)374-5506.

Sincerely,
Westinghouse Electric Corporation

E. P. Rahe, Jr.
E. P. Rahe, Jr., Manager
Nuclear Safety Department

cc: B. Sheron
N. Lauben

~~8504030174~~

BART Vin ISSUE SUMMARY

BACKGROUND

In the course of performing work unrelated to the Florida Power and Light Company analyses for Turkey Point Units 3 and 4 it was determined that it was necessary to revise the approved procedure by which the flooding rate information generated by the WREFLOOD code was transferred to the BART code. The core inlet flooding rate (Vin) is transferred by hand from the WREFLOOD code output to the BART code input. Examination of a typical flooding rate curve shows that it is divided into two phases; an initial insurge which takes place in approximately the first seven seconds, reaching values on the order of 15 in/sec or more, and the remainder of the transient which is characterized by relatively slowly varying inlet velocities on the order of one inch per second. The transient response is dependent on the integrated value of the inlet velocity.

A limited number of instantaneous values of Vin are available to the analyst for replicating the Vin curve as a part of the BART input. Use of all available Vin values in the initial insurge portion of the transient does not necessarily produce good integrated agreement at the start of the second portion of the transient. Connecting the discrete input points can result in more water in the core than the WREFLOOD code calculates.

A representative example of WREFLOOD output and BART input is presented in figure 1. It can be seen that the area under the BART input Vin curve is greater than under the WREFLOOD output Vin curve. The BART points are the WREFLOOD values normally available to the analyst.

As a result the integrated value of water in the core may be higher in BART than in the WREFLOOD code. This higher water level provides an earlier onset of entrainment which results in an earlier initiation of steam cooling in the upper regions of the core. This earlier initiation of steam cooling gives a lower calculated PCT than would be calculated if the integrated value of the Vin curve from WREFLOOD had been matched exactly.

The WREFLOOD integrated Vin curve and the BART integrated Vin curve for a representative plant are presented in figure 2.

CORRECTIVE ACTION

A data transfer procedure, utilizing the available WREFLOOD Vin output, has been developed and implemented that results in good agreement between the WREFLOOD calculated value of the integrated flooding rate and the BART calculated value of the integrated flooding rate. This procedure also cautions the analysis reviewer to verify the similarity of the integrated Vin curves between the two codes and provides a standard method for comparing the two curves.

IMPACT ON TURKEY POINT UNITS 3 AND 4

A reanalysis of the Turkey Point Units 3 and 4 was performed using this new methodology. The results of this reanalysis indicated that the calculated PCT increased 79 F to 2051 F from the original analysis value of 1972 F.

The revised calculated peak cladding temperature is well below the 2200 F limit of 10CFR50.46.

OTHER AFFECTED PLANTS

ZION 1&2
DC COOK 1
MCGUIRE 1&2

An evaluation of the BART results for these plants indicates that in no case will the 2200 F limit of 10CFR50.46 be exceeded. More detailed analyses will be performed for these plants in the next two weeks.

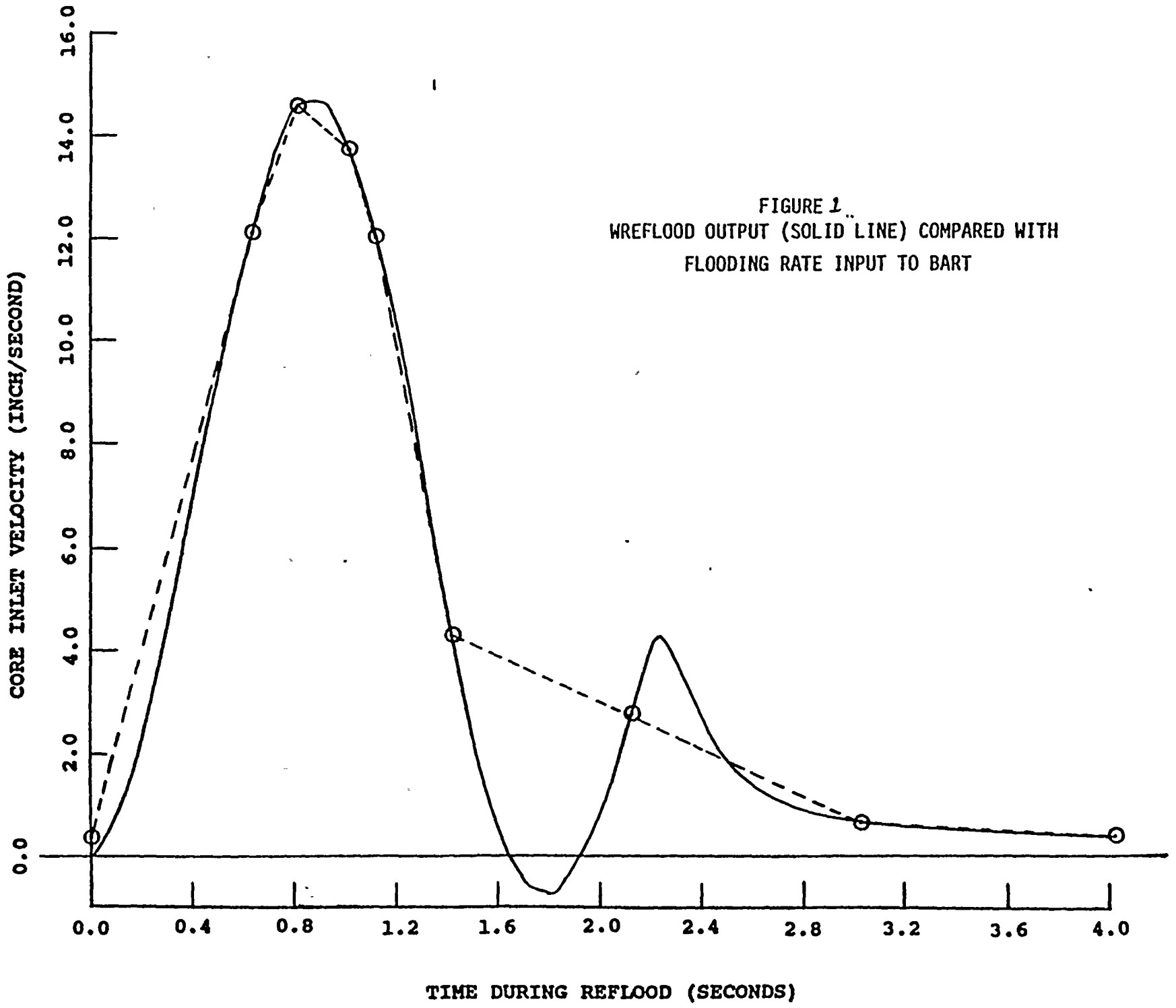


FIGURE 1
 WREFLOOD OUTPUT (SOLID LINE) COMPARED WITH
 FLOODING RATE INPUT TO BART

TIME DURING REFLOOD (SECONDS)

COMPARISON OF INTEGRATED CORE INLET FLOW
FIGURE 2

