B 03/30/78

REGULATORY INFORMATION DISTRIBUTION SYSTEM (RIDS)
DISTRIBUTION FOR INCOMING MATERIAL 50-305

REC: CASE E G
NRC

ORG: JAMES E W
WI PUB SVC

DOCDATE: 03/21/78
DATE RCVD: 03/29/78

DOCTYPE: LETTER NOTARIZED: NO
SUBJECT:

COPIES RECEIVED
LTR 1 ENCL 1

RESPONSE TO NRC LTR DTD 12/16/77...FURNISHING DESCRIPTION OF THE UPPER PLENUM INJECTION EFFECTS - ECCS MODEL DEVELOPMENT PROGRAM...W/ENCL.

PLANT NAME: KEWAUNEE

REVIEWER INITIAL: XJM
DISTRIBUTOR INITIAL: mc

********** DISTRIBUTION OF THIS MATERIAL IS AS FOLLOWS **********

NOTES:
1. SEND 4 COPIES OF ALL MATERIAL TO I&E
2. LAWRENCE(OELD) - 1 COPY ALL MATERIAL

GENERAL DISTRIBUTION FOR AFTER ISSUANCE OF OPERATING LICENSE.
(DISTRIBUTION CODE A001)

FOR ACTION: BR CHIEF SCHWENCER**W/7 ENCL

INTERNAL:
REG FILE**W/ENCL
I & E**W/2 ENCL
HANAUER**W/ENCL
EISENHUT**W/ENCL
BAER**W/ENCL
GRIMES**W/ENCL
J. MCGOUGH**W/ENCL
NRC PDR**W/ENCL
OELD**LTR ONLY
CHECK**W/ENCL
SHAO**W/ENCL
BUTLER**W/ENCL
J COLLINS**W/ENCL

EXTERNAL:
LPDR'S
KEWAUNEE, WI**W/ENCL
TIC**W/ENCL
NSIC**W/ENCL
ACRS CAT B**W/16 ENCL

DISTRIBUTION: LTR 40 ENCL 39
SIZE: 1P+3P

CONTROL NBR: 780890007

ECCS 1
GD

********** THE END **********

WISCONSIN PUBLIC SERVICE CORPORATION

P.O. Box 1200, Green Bay, Wisconsin 54305

March 21, 1978

Office of Nuclear Reactor Regulation
U. S. Nuclear Regulatory Commission
Washington, D. C. 20555

Attention Mr. Edson Case, Acting Director

Gentlemen:

Docket 50-305
Operating License DPR-43
Upper Plenum Injection
Letter from Mr. Edson Case to Wisconsin
Public Service dated December 16, 1977

The referenced letter requested that we identify a permanent resolution to the Upper Plenum Injection modeling concerns of the NRC staff and a schedule for that resolution.

Please find attached a description of the Upper Plenum Injection Effects Model Development Program which has been discussed with members of your staff and is being submitted as documented description of our resolution program.

Very truly yours,

E. W. James
Senior Vice President
Power Supply & Engineering

sna

Attach.

780890007

A001
S
1/1

UPPER PLENUM INJECTION EFFECTS-ECCS
MODEL DEVELOPMENT PROGRAM DESCRIPTION

A new ECCS evaluation model is to be developed in an effort to address the Safety Evaluation Report [1] (SER) issued by the NRC, December 1977. This SER requested explicit accounting of upper plenum injected (UPI) water to be simulated during a loss-of-coolant accident. The previous ECCS analyses had assumed that the UPI water adds directly to the bottom reflooding with no account of steam-water interaction. It has been our position that such a model is indeed conservative since no credit was taken for steam condensation and fuel rod cooling as the UPI water penetrates the core. However, in an effort to be responsive to the SER, we are embarking on a work scope which will include steam-water interaction due to upper plenum injection during the reflood portion of the accident. The work is segregated into three phases: development of model, generic sensitivity study and individual plant analysis.

The development of the new model will assume as a starting point the W evaluation codes WREFLOOD [2] and LOCTA [3]. Added to these appropriate codes will be an average model approach for simulating the UPI water and its interaction with the system. The approach for handling the UPI water interaction is similar to the approach used by the NRC in its SER. The simulation of the UPI water will be accounted for during the reflood portion of the transient and no blowdown effect will be considered.

The basis for eliminating modelling of the UPI water during the blowdown portion of the transient is based upon two generic 2-loop sensitivity studies [4,5]. These studies showed that for all postulated breaks from 3 ft^2 split break to the full double ended cold leg guillotine (DECLG) (C_D = 1.0, .8, .6, .4) safety injection does not occur during blowdown.

Therefore, requiring no modification to the SATAN-VI code during the blowdown portion. The DECLG breaks have been shown to be the most limiting breaks. For small breaks, the results show that for breaks less than 8" the core pressure is above the shutoff head of the low head safety injection pumps (UPI). Therefore, no UPI will occur and need not be modelled. For breaks between 8" and 3 ft^2 splits, UPI will occur during the blowdown portion of the transient. However, for such breaks the core recovers very quickly ($>$ 1 ft/sec) due to accumulator injection. Assuming the steam-water interaction model yields about the same flooding rate decrease as for the large breaks ($\pm$ 0.2 in/sec), the relative effect is much smaller for these breaks than the limiting breaks. As indicated in our January submittal, there is little effect in peak clad temperatures on the limiting breaks. Therefore, the small breaks have 500-700^{o}F margin to the limiting breaks; no modification will be made to either WFLASH or SATAN-VI to run break sizes between 8" and 3 ft^2 breaks.

In the new models the following effects will be considered: metal heat in the upper plenum, top quench frame propagation, vaporization of UPI water, horizontal and vertical entrainment, decay heat in the fuel and the integration with the existing WREFLOOD code to get the overall system and feedback effects. Upon completion of the development phase, generic sensitivity studies will be performed including large break spectrum for double-ended cold leg guillotines (C_D = 1.0, .8, .6, .4). Single failure criteria will be examined assuming loss of offsite power and no pumped SI during blowdown.

Upon completion of the sensitivity studies, a one worst break individual plant analysis will be performed for the limiting conditions determined by the generic sensitivity study.

For the work scope described above the following delineation of estimated calendar time is:

Development	5-6 months
Sensitivity	2 months
Plant Analysis	1 month
Report	1 month
	9-10 months

The above schedule is an estimate of the time required to accomplish the basic scope of work and does not include any allowance for NRC staff review or time required to respond to requests for additional information.

References:

1. Case, E. G. letter, dated December 16, 1977, "Safety Evaluation Report on ECCS Evaluation Model for Westinghouse Two-Loop Plants".

2. Collier, G., etal., "Calculational Model for Core Reflooding After Loss of Coolant Accident (WREFLOOD Code)".

3. Bondeler, etal., "LOCTA-IV Program: Loss of Coolant Transient Analysis", WCAP-8301-June 1974.

4. Delsignore, etal., "Westinghouse ECCS Two-Loop Plant Sensitivity Studies (14 x 14)", WCAP-8854-A, May 1977.

5. "Westinghouse Emergency Core Cooling System-Plant Sensitivity Studies", WCAP-8340, July 1974.