TENNESSEE VALLEY AUTHORITY
CHATTANOOGA, TENNESSEE
37401

TVA
40TH
ANNIVERSARY
OF PEOPLE IN
PARTNERSHIP

December 14, 1973

Mr. F. E. Kruesi, Director
Directorate of Regulatory Operations
U.S. Atomic Energy Commission
Washington, DC 20545

Dear Mr. Kruesi:

TVA made initial report to AEC-DRO Region II on November 10, 1973, of a possible design deficiency in the control logic of HPCI and RCIC systems of our Browns Ferry Nuclear Plant. An interim report on this deficiency was submitted to you on December 10, 1973. Enclosed is a second interim report on the safety implications associated with this problem. We will submit a final report by January 10, 1974, on design changes being made.

Very truly yours,

J. E. Gilleland

J. E. Gilleland
Assistant to the Manager of Power

Enclosure
CC (Enclosure):
Mr. Norman C. Moseley, Director
Directorate of Regulatory Operations
U.S. Atomic Energy Commission
Region II - Suite 818
230 Peachtree Street, NW.
Atlanta, Georgia 30303

ENCLOSURE

BROWNS FERRY NUCLEAR PLANT UNITS 2 AND 3
HPCI AND RCIC CONTROL LOGIC PROBLEM
INTERIM REPORT

References: (1) Letter from E. F. Thomas to John F. O'Leary, AEC, Director, the Directorate of Licensing, Office of Regulation, "Tennessee Valley Authority - Browns Ferry Nuclear Plant Unit 1 - Docket No. 50-259 - Facility Operating License DPR-33 - Abnormal Occurrence Report BFAO - 7334W," with enclosure, dated November 19, 1973.

(2) Letter from R. B. Beers to H. M. Bankus, General Electric Company Internal Letter No. 4668, "Pipe Break Outside Containment: Main Steam Line Break, No RCIC, No HPCI, No Loss of Offsite Power," with attachment, dated June 1, 1973. Copy is attached.

The initial report of the HPCI (High Pressure Coolant Injection) and RCIC (Reactor Core Isolation Cooling) control logic problem of units 2 and 3 at the Browns Ferry Nuclear Plant was made on November 10, 1973, to the AEC Directorate of Regulatory Operations Region II Office in compliance with paragraph 50.55(e) of 10CFR50.

Under the operating situation described in reference 1 for the unit 1 reactor, the momentary loss of offsite power would trip the Feedwater Control System (FCS) as well as the HPCI and RCIC systems. The operator would have been unable to start the RCIC and HPCI systems until the standby diesel generators energized the shutdown auxiliary boards and the tripping logic to the RCIC and HPCI systems was manually reset. Since units 2 and 3 of the plant are designed similarly to unit 1, we assume that similar occurrences can later take place when units 2 and 3 are operated unless appropriate changes are made.

The safety implications associated with this problem would be no worse than those produced during the situation described in reference 2 (copy attached) even if the plant had been at full power and had contained an equilibrium inventory of fission products. The situation in reference 2 assumed a main

steam line break with no RCIC, no HPCI, and no loss of offsite power. A main steam line break causes closure of the main steam line isolation valves; a loss of offsite power causes isolation of the steam lines by either rapid closure of the steam turbine control valves or by closure of the turbine stop valves. There would be no steam dump with no offsite power. Thus, either situation isolates the steam lines and requires steam relief to the torus. The curves in reference 2 show that the reactor is safe for 10 minutes with no steam flow except through the relief valves and no RCIC or HPCI. The presence or lack of offsite power during this time interval would not affect the results. Note in reference 2 that after 10 minutes the Automatic Depressurization system (ADS) was actuated by operator action. It could also be assumed that, had it been necessary during the present problem, the ADS could have been manually actuated after 10 minutes. Also note in the curves in reference 2 that the vessel pressure did not exceed 1080 psia, the peak clad temperature did not exceed 1200°F, and an adequate vessel water level was maintained.

GENERAL ELECTRIC

ATOMIC POWER EQUIPMENT DEPARTMENT
San Jose, California

Internal Letter No. 4658

June 1, 1973

cc: RR Barris
JE Stice
BN Rogers

H. M. Bankus
Knoxville Office

Subject: PIPE BREAK OUTSIDE CONTAINMENT: MAIN STEAMLINE BREAK, NO RCIC, NO HPCI, NO LOSS OF OFFSITE POWER

Recently TVA (Jerry Chapman) has postulated a steamline break in the steam tunnel which disables the RCIC. They also assumed a single failure of the HPCI with offsite power available and drywell coolers operating.

Design Engineering has reviewed the case of a steamline break outside the containment with no RCIC, no HPCI, no loss of offsite power and drywell coolers operating for a 251-764 '67 product line plant. They have concluded that the peak clad temperature is well below the perforation threshold and no fuel rod failures will occur. Adequate water level is maintained and 10 minutes following the accident the operator is assumed to take action by manually activating the ADS system.

Please informally advise TVA (Jerry Chapman) of this fact.

R. B. Beers
Acting Manager
Browns Ferry Project

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1100 MWC

FIGURE 2

SUSQUEHANNA NUCLEAR POWER STATION 2SA

STEAM LINE BRK. OUTSIDE THE PRIMARY CONTAINMENT

FAILURE OF HPCI

NO POWER AVAILABLE

NO SCRAM

RDS ACTUATED BY OPERATOR ACTION

VESSEL PRESSURE

WATER LEVEL INSIDE SHROUD

WATER LEVEL OUTSIDE SHROUD

TAF Top of active fuel

BAF

PEAK CLAD TEMPERATURE

1200
1000
800
600
400
200
0

60
50
40
30
20
10
0

WATER LEVEL FT

2000
1000
0

0 10 20 100 200 300 400 500 600 700 800 900 1000

SCALE CHANGES

TIME AFTER ACCIDENT ~ SEC

FMP 12-16-71

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TVA 40TH ANNIVERSARY OF PEOPLE IN PARTNERSHIP

December 10, 1973

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Mr. F. E. Kruesi, Director
Directorate of Regulatory Operations
U.S. Atomic Energy Commission
Washington, DC 20545

Dear Mr. Kruesi:

In conformance with paragraph 50.55(e) of 10 CFR 50, this is submitted as an interim report on a design deficiency in the control logic of HPCI and RCIC systems of our Browns Ferry Nuclear Plant units 2 and 3. Initial report of this deficiency was made to AEC-DRO Region II on November 19, 1973. Had this deficiency not been discovered, a complete loss of plant electrical power would have caused the HPCI and RCIC to be inoperable until manually reset. We are continuing to analyze the safety implications associated with this problem and we are making design changes to these control systems. We will supply a final report on this problem to you by January 10, 1974.

Very truly yours,

J E Gilleland

J. E. Gilleland
Assistant to the Manager of Power

CC: Mr. Norman C. Moseley, Director
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