

October 22, 1990

NOTE FOR: Gary Burdick

FROM: Erasmia Lois *Elm*

SUBJECT: COMMENTS ON DRAFT NUREG/CR-5604, "ASSESSMENT OF ISLOCA RISKS -  
METHODOLOGY AND APPLICATION: DAVIS BESSE NUCLEAR STATION"

My comments are focusing mostly on the on the HRA part the report.

1. Overall impressions:

INEL should be praised for an excellent work; indeed INEL has contributed to the advancement of the state of the art

2. Some general comments:

2.a Since INEL developed new methodologies such as COMET and INTENT for HRA, also should:

- Say that these methodologies were developed for and because of this particular application;
- Instead of only referencing the methodologies should also provide an outline and explain the rational of and the scientific approach. For example, for the HRA trees (such as figure 16, pg. 46) should explain how the logic was developed (based on procedures?, expected task activities?, e.t.c.), and provide an example that relates its logic back to material or documents that show the expected operator actions. Also explain whether this tree represents the only path(s) that lead to this particular error, or, represent just one (or some) of the many ways by which this particular error could be committed; In the first case, the calculated HEP represents a probability for a particular error; in the second case, the calculated HEP could represent the probability of such error(s), i.e. an HEP for a class of errors (and not an HEP of a particular error).
- Were the HRA trees validated; namely, did INEL go back to the plants to verify that the paths represented are representative of actual operator or team behavior under the circumstances?

2.b There is no discussion on the limitations of HRA methodologies and in particular the newly developed. On page 58 it is stated "By visiting and analyzing additional NPP facilities, we hope to validate our preliminary ISLOCA methods, analyses, and findings. Since these methods, are preliminary and need validation, the report should up front say that: a) New methods were developed; b) They are preliminary and need validation; c) caveat the methodology by discussing the limitations of both methods and data.

2.c There is no mention of the peer-reviews of the report's previous version and how INEL incorporated the comments.

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- 2.d I think it is worthwhile to discuss the CDF dominant sequences. Although the particular design or human-related weaknesses are discussed, the individual sequences dominating the risk are not addressed in the main report, or in Appendix D.
- 2.e I did not see any documentation of the task analyses performed; (Is it difficult to document, and reference where necessary?) In general, the section "HEP estimation" on pages E-12 -E-14, need substantiation with documents of the related task analyses performed and plant specific data used. INTENT and COMET should be thoroughly discussed and substantiated; the discussion on these methods in the Appendix does not provide any additional information from the main chapter. The actual data collected and analyzed, (such as through the forms on page E-16 are not included in the report. I think, in order to make a convincing case, the raw information (based on which the data were derived) should be part of the report.
- 3. Some editorial comments:
  - 3.a The MU&P CDF sequence of Table 4 (3.07 E -7) seems not to be in agreement with the numbers of the corresponding event tree (Figure 5, seq. 20) showing at least 7.26 E -7.
  - 3.b The comment of page 71 "the information presented in this table shows the use of HEPs based on screening values , rather than HEPs developed through plant specific analysis, would produce significantly higher core melt frequencies and risk values" is an important insight which should be included in the executive summary;
  - 2.c In Section 4.2, "As in any HRA, these HEPs must be considered in light of hardware failure information ....." should be highlighted and probably explained up-front.
  - 3.d The names on page A-14, are not connected with any association (are they INEL people?)
  - 3.e Appendix D needs to be cross-referenced with Appendix E. For example, on page D-7 cross reference the statement "Failure probabilities were obtained from THERP and NUCLARR" with the corresponding data entry items in Appendix C)

During the November 5 meeting, I would appreciate if items of section 1 could be addressed to the extend possible.

cc. Tom Ryan  
Frank Coffman

00-25 10/10

BRAIDWOOD UNIT 1  
REACTOR COOLANT LEAK OUTSIDE CONTAINMENT (AIT)  
OCTOBER 4, 1990

Gary  
Per your request  
Sammy

PROBLEM

REACTOR COOLANT LEAK INTO AUX BUILDING CONTAMINATED THREE INDIVIDUALS.

CAUSE

PREMATURE OPENING OF 1RH8702B HOT LEG ISOLATION VALVE WITH THE VENT VALVE IN THE SAME LINE STILL OPEN.

SAFETY SIGNIFICANCE

- o HAZARD TO PERSONNEL FROM BURNS AND CONTAMINATION.
- o POTENTIAL FOR AN INTERSYSTEM LOSS OF COOLANT.

DISCUSSION

- o PLANT IN MAINTENANCE OUTAGE SINCE 09/29/90 TO INVESTIGATE SPURIOUS SAFETY INJECTION SIGNALS.
- o REQUIRED SURVEILLANCES BEING PERFORMED ON THE RHR SUCTION ISOLATION VALVES.
  - INDIVIDUAL VALVE LEAK TESTING.
  - STROKE TIME TESTING.
- o REACTOR SYSTEM AT 360 PSIG AND 180 F.
- o THE REDUNDANT RHR TRAINS HAVE INDEPENDENT SUCTION LINES FROM THE HOT LEGS.
- o ON THE B-RHR TRAIN WITH SUCTION VALVE 1RH8702A OPEN, LEAKAGE THROUGH CLOSED 1RH8702B BEING COLLECTED AND MEASURED THROUGH VENT VALVE 1RH028B.
- o LEAKAGE TEST REPORTED TO BE COMPLETED.
- o VENT VALVE 1RH028B REQUESTED TO BE CLOSED.
- o ISOLATION VALVE 1RH8702B OPENED FROM THE CONTROL ROOM FOR STROKE TIME TESTING.
- o VENT VALVE 1RH028B NOT YET CLOSED.

CONTACT: W. SHAFER/W. JENSEN

AIT: YES  
SIGEVENT: YES

REFERENCES: 10 CFR 50.72 #19523 AND MORNING REPORT 10/04/90

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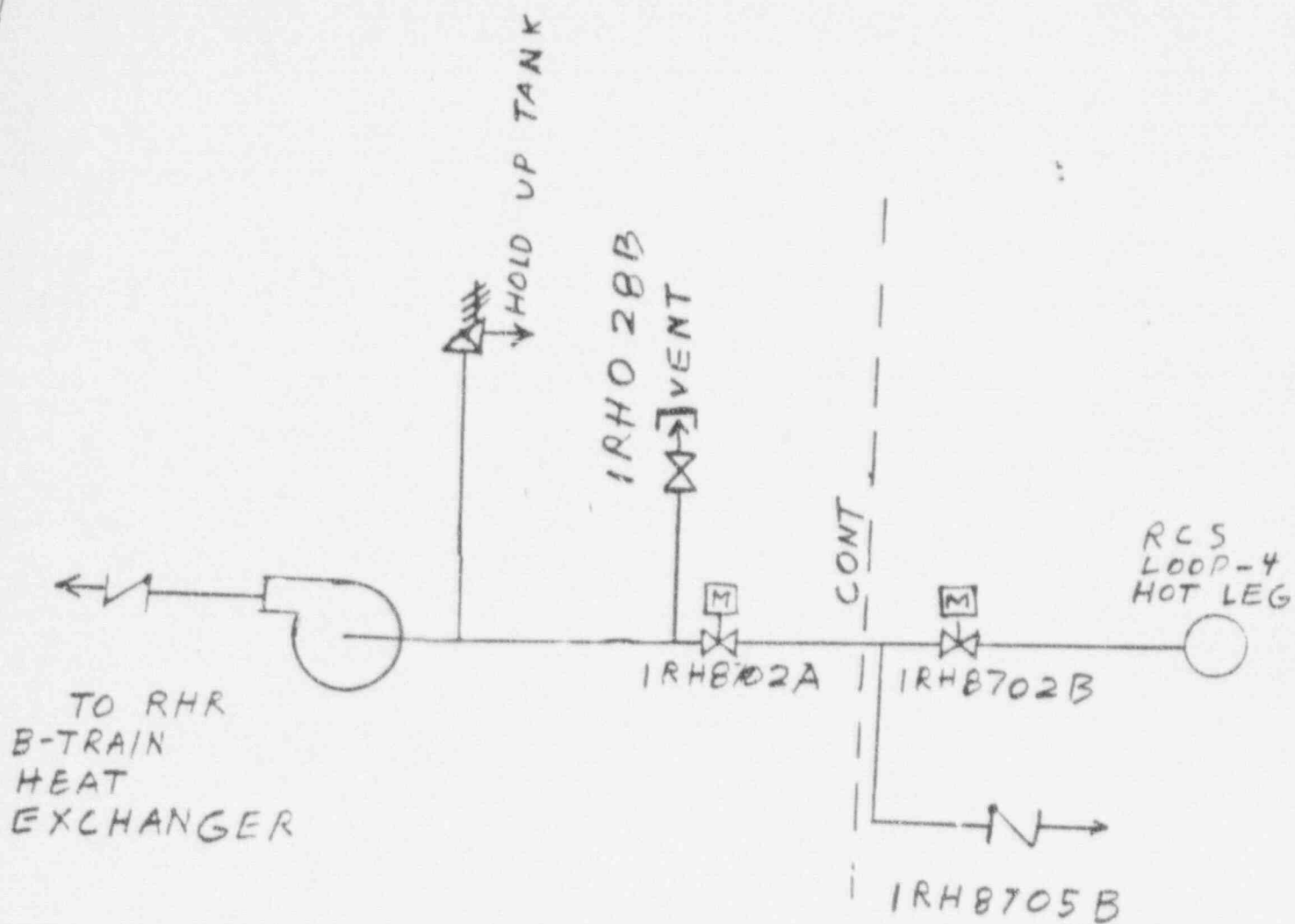
- o TYGON MEASURING TUBE BROKE LOOSE.
- o TWO TEST ENGINEERS SPRAYED WITH COOLANT, ONE EQUIPMENT ATTENDANT WAS BURNED.
- o 620 GALLONS OF COOLANT LEAKED INTO AUX BUILDING.
- o 5% LOSS IN PZR LEVEL.

#### SIMILAR EVENTS (BRAIDWOOD UNIT 1)

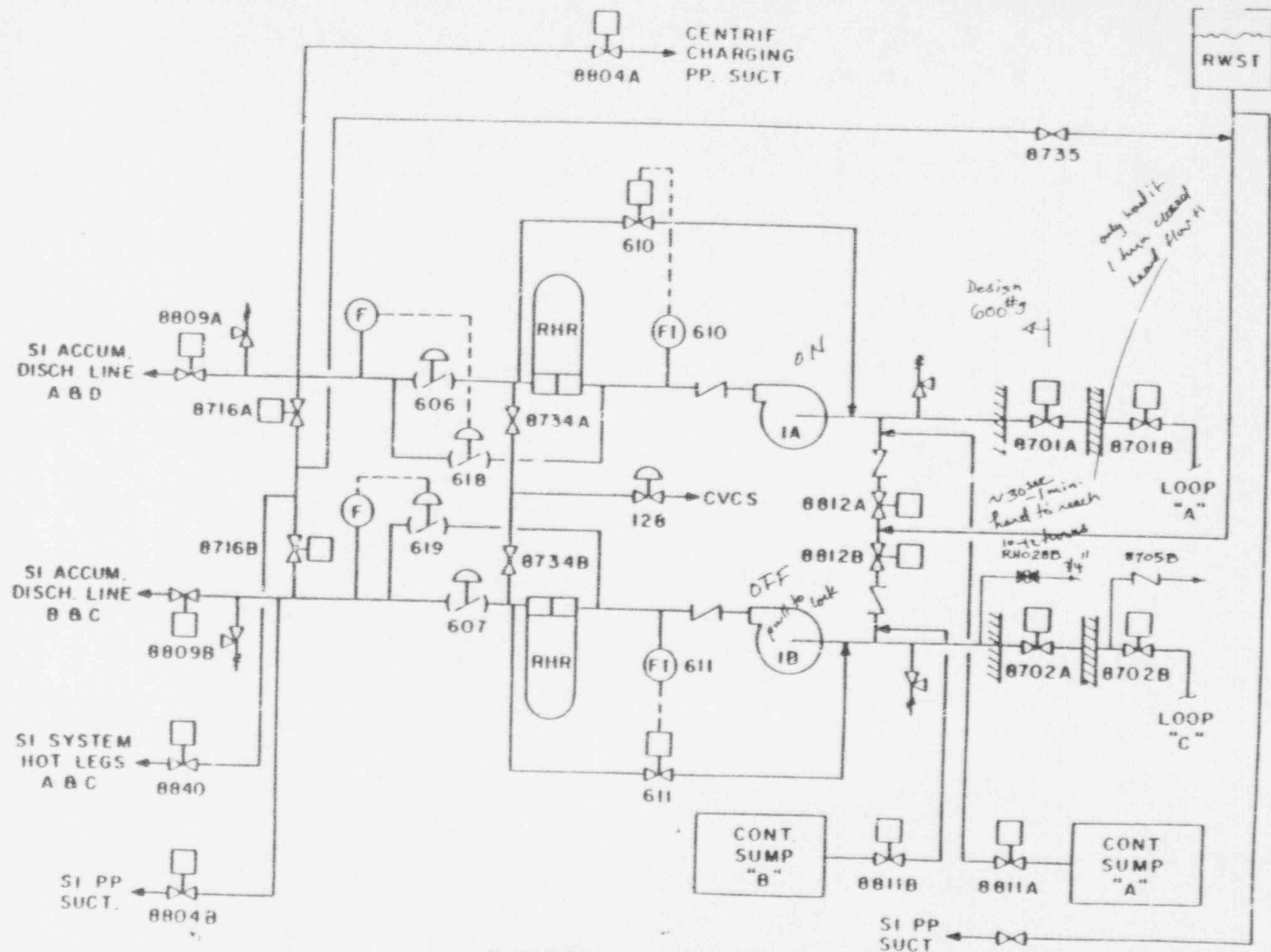
- o ON 12/01/89 60,000 GALLONS OF COOLANT LEAKED THROUGH B-TRAIN RHR SUCTION RELIEF VALVE AT BRAIDWOOD UNIT 1.
- o ON 3/18/90 INADVERTENT OPENING OF AN RHR SUCTION VALVE ON UNIT 2 CAUSED COOLANT LOSS TO THE RWST AND LOSS OF PZR LEVEL INDICATION.

#### FOLLOWUP

- o AIT SENT TO THE SITE TO INVESTIGATE EVENT INCLUDING ROOT CAUSE, ADEQUACY OF OPERATOR PERFORMANCE, PROCEDURES AND ADMINISTRATIVE CONTROLS.
- o CONFIRMATORY ACTION LETTER ISSUED TO LICENSEE BY REGION III.



BRAIDWOOD UNIT 1  
RHR B-TRAIN



Brookwood - 10/4/90 event (1:21 AM)

- After leak during 8701A/B the valves were returned to the as-found conditions
  - ⓐ the next-to-last step is: close manual valve 28B
  - ⓑ the last step is: open 8702B
- Stroke testing of the same valves was also being continued (it is convenient). The engineer in charge of stroke testing gave an order for step ⓑ above before ⓐ was confirmed.
- The <sup>180°F</sup> 360#g water blew the plastic tube (connected to valve 28B for leakage collection) burned and carbonized individuals in the vicinity.
- A radio message came to the Control Room that a leak spray is taking place - A Ch operator closed 8702B. Event took about 5 min, RHR level dropped ~5%, spillage ~ 600 gal/hr.

Is this an ISLOCA of concern? No. Why?

- The unit has been in mode 5 for  $\geq 72$  hr at 180°F, 360#g. This is a pre-requisite for the 8701/2 tests. One RHR train was in operation while the other is undergoing leak and stroke testing.
- RHR system is designed for 600#g, RHR suction relief valves are set at 450#g to relieve any overpressurization. The RHR has not been subjected to overpressurization. Only valve misalignment at relatively low pressures.
- Small size leak (28B is 3/4" valve) provides long time for recovery.

## Root Cause

- Opening a valve before another valve is completely closed  
(especially significant if valve closing is done manually)
- Conducting more than one test procedure concurrently without appropriate precautions (8702 A/B leak testing > 8702 A/B stroke testing) - two people conducting the two procedures.
- Operations staff not aware that two tests are being conducted  
(knew of only one test - leak testing). The stroke testing was being done by Tech. staff.
- Failure of communications - didn't receive a confirmation of manual valve position
- Over work of staff (several members worked from 17 to 21 hours before incident). May have been anxious to finish test (didn't wait for confirmation of manual valve position/closed, or assumed that the other person received the confirmation.  
[Similar tests were done <sup>successfully</sup> for train A a few hours earlier]