UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D. C. 20555

JUL 17 1979

MEMORANDUM FOR: Roger J. Mattson, Director
TMI-2 Lessons Learned Task Force

FROM: Warren Minners

SUBJECT: TRIP REPORT - TMI SYSTEM THERMAL HYDRAULIC ANALYSIS MEETING
JULY 11 & 12, 1979, PALO ALTO, CA

The meeting by EPRI with the objectives of 1) gaining additional technical insights on the TMI-2 system thermal-hydraulic response, 2) to assess the capabilities of current computer programs and 3) to identify the improvements in the computer programs. The meeting was attended by representatives of all of the organizations(EPRI, GPU, ITI, INEL, LASL and NRC) analyzing the TMI accident data. An agenda listing of the participants is attached. Copies of the slides presented at the meeting are available in my file.

Two general approaches for evaluating the TMI-2 system response, data analysis and computer analysis, were presented.

Data Analysis

Both EPRI and GPU presented their analysis of the data. The majority of the discussion centered on the first 100 minutes of the accident, that is until shortly after the reactor coolant pumps were shut off.

EPRI concludes, based on an energy balance on the relief valve drain tank, that the relief valve failed in the full open position. However, the mass flow rate through the valve is sensitive to the steam quality and has not yet been determined. Based on their computer analysis, B&W calculates twice the mass flow rate estimated by EPRI. Both B&W and EPRI estimate the flow rate in the letdown line to be about 140 gpm based on a heat balance across the letdown line cooler. Therefore the letdown line flow is comparable to the flow from the relief valve.

However, B&W estimates that the net letdown/makeup flow averaged a positive 35 gpm which sets the makeup flow at 175 gpm. EPRI believes such a high makeup flow should be revealed by the response of system parameters which they do not see. EPRI estimates the makeup flow to have been 40 gpm, which result in a negative net letdown/makeup flow of 100 gpm. There is a consensus that the water level in the RCS after the RCP were turned off was not above the pressure vessel hot leg nozzles.

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EPRI speculates that since the system appears to have begun to repressurize before the relief valve block was first closed, hydrogen may have been generated soon after the RCP were stopped. EPRI also speculated that a rapid 140°F increase in the cold leg temperature and similar 300 psi increase in system pressure at 3 hours and 45 minutes may indicate the time when the core collapsed. However, these increases can be also explained by increases in HPI flow, outflow from the pressurizer and re-welting of the core. After generation of hydrogen little or not heat transfer through the steam generators occurred and cooling was due to flow of HPI injected water through the core. During the period between 11 and almost 16 hours there was no significant heat removal from the core.

Computer Analysis

Computer analysis of the accident are being made to 1) evaluate the capability of the codes, 2) fill in gaps in knowledge of the accident and 3) investigate the effect of possible alternatives. The NRC representatives urged that the primary emphasis be placed on the last purpose, that is answer some questions of "what if".

The codes being used are RETRAN (GPU, ITI and EPRI), RELAP (INEL), TRAC (LASL) and CRAFT (B&W). The RETRAN codes used a detailed system model (about 100 volume(including modeling much of the secondary system. The RELAP and TRAC models used half as many volumes (about 50) and much simpler secondary side models. Except for TRAC which had 3-D modeling of the vessel, the models were one dimensional.

The computer analyses generally predicted the trends of the parameters better than the quantitative valves. The codes that attempted to model the secondary system in the most detail (RETRAN) made poorer predictions, than codes that used secondary conditions as boundary conditions to a reactor coolant system (CRAFT).

The time span calculated to date is short as shown by the following table.

CODE	INVESTIGATOR	TIME SPAN
RETRAN	GPU	8 min.
RETRAN	ITI	3 min.
RETRAN	EPRI	1/2 min.
RELAP	INEL	100 min.
TRAC	LASL	100 min.
CRAFT	B&W	100 min.

The calculations show that the relief valve mass flow is sensitive to the steam quality. All analyses overpredict the initial decrease in pressurizer level. The RCS flow rate decay due to void formation is under-predicted by the two codes (RELAP and TRAC) for which the parameter was available.

In order to facilitate completion of the analyses and comparison of the results a "standard" set of initial and boundary conditions was developed based on the best information available to date.

Warren Minners

cc: LLTF Dist.
PDR
Z. Rosztoczy
D. Ross
W. Johnston
S. Fabic

ATTACHMENT 1

AGENDA

for

"TMI-2 SYSTEM THERMAL HYDRAULIC ANALYSIS MEETING"

LOCATION: Rm. 3-254, Bldg. 3, EPRI, Palo Alto, CA

July 11, 1979

8:30	Introduction	(T. Fernandez)
8:35-12:30	Plant Data Analyses	
8:35- 9:45	TMI-2 Plant Data Analyses-EPRI	(J. Kendall)
9:45-10:00	BREAK	
10:00-11:15	TMI-2 Plant Data Analyses-GPU	(G. Broughton)
11:15-11:40	Early Time Lumped Parameter Analysis- EPRI	(J. P. Sursock)
11:40-12:30	DISCUSSION	(All Participants)
12:30-1:30	LUNCH	
1:30-5:30	Computer Code Analyses	
1:30-2:30	RETRAN Analyses-GPU/EI	(N.Trikouros, J.Harrison)
2:30-3:30	RETRAN Analyses-ITI	(K.House,C.Slater,C.Miller)
3:30-3:45	BREAK	
3:45-4:30	RETRAN Analyses-EPRI	(J. Naser)
4:30-5:30	DISCUSSION	(All Participants)
7:00PM	DINNER	

July 12, 1979

8:30-12:30	Computer Code Analyses(cont.)	
8:30- 8:45	NRC TMI-2 Analysis Activities	(S. Fabic)
8:45- 9:45	RELAP 4 MOD 7 Analyses-INEL	(H.Sullivan, S. Behling)
9:45-10:00	BREAK	
10:00-11:00	TRAC Analyses-LASL	(J. Ireland)
11:00-12:00	CRAFT Analyses-B&W	(B.B. Davis)
12:00-12:30	Discussion	(All Participants)
12:30-1:30	LUNCH	
1:30-2:30	Discussion	(All Participants)
2:30-3:00	NRC Task Force Plans	(W.Johnston, W. Minners)
3:00-3:15	SUMMARY	(T. Fernandez)

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