MAY 3 1985

Note to: [redacted]
Deputy General Counsel

From: Guy H. Cunningham, III
Executive Legal Director

Subject: UCS LETTER REGARDING STAFF TESTIMONY IN RESTART PROCEEDING

You have asked me to provide you with sufficient information to answer the questions posed by UCS in its April 12, 1985 letter to the Commission. In that letter, UCS alleged that testimony by the Staff in the TMI-1 restart proceeding has been contradicted by Staff statements in support of NRC's proposed research budget. Because of the time required for the Staff to prepare specific responses to the six questions in UCS' letter, and the desire to have a Staff response at this time, you agreed that it was sufficient for the Staff to address the apparent discrepancy noted by UCS and also provide an estimate on how long it would take to specifically answer all of UCS' questions. The attached Memorandum from R. Wayne Houston to Gus C. Lainas addresses the apparent discrepancy and indicates that it would take approximately 2-3 weeks of effort to provide specific responses to the UCS questions.

Guy H. Cunningham, III
Executive Legal Director

Attachment: As stated

cc w/ attachment: W. Dircks
H. Denton
R. Minogue

APR 30 1985

MEMORANDUM FOR: Gus C. Lainas, Assistant Director for Operating Reactors, DL

FROM: R. Wayne Houston, Assistant Director for Reactor Safety, DSI

SUBJECT: RESPONSE TO UCS LETTER OF APRIL 12, 1985

Reference: Memorandum, Lainas to Houston, "Response to UCS Letter" dated April 24, 1985

As requested in your reference letter, enclosed is a proposed response to the April 12, 1985 UCS letter. Please note that this response does not directly respond to the six specific questions UCS asked the Commission to answer, since a major portion of the requested information is already contained in the staff's testimony and the hearing record. Rather, it only addresses what we understand to be the original underlying concern of UCS; namely the discrepancy between the previous staff testimony on TMI-1 restart and the recent statement made by RES in response to Congressional inquiries. This response was discussed with Jack Goldberg, OELD, who obtained OGC (Malsch) concurrence on its scope. The Office of Nuclear Regulatory Research (L. Shotkin) has reviewed this response and their comments are incorporated.

We were also asked by Jack Goldberg to estimate the time it would take to answer all six UCS questions. We believe it would take approximately 2-3 weeks of effort to provide responses. Moreover, significant input from RES would be required as well.

R. Wayne Houston, Assistant Director
for Reactor Safety, DSI

Enclosure: As stated

cc: D. Eisenhut
R. Bernero
H. Thompson
D. Ross, RES
O. Bassett, RES
L. Shotkin, RES
J. Stolz
H. Silver
J. Goldberg, OELD
J. Cray, OELD

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In their letter of April 12, 1985, UCS identified an apparent discrepancy between testimony filed by the staff with the TMI-1 Appeal Board and a statement made in response to congressional inquiries concerning NRC's research budget. Specifically, the NRR staff, in 1983 testimony filed with the TMI-1 appeal board, stated that experimental testing was not needed to confirm the effectiveness of boiler condenser decay heat removal in the TMI-1 plant during small break loss of coolant accidents. More recently however, the Office of Nuclear Regulatory Research, in responding to congressional inquiries regarding the research budget, stated that testing to assess the effectiveness of the boiler-condenser process to remove heat from the reactor coolant and maintain natural circulation was research needed in response to TMI-1 restart concerns regarding adequate decay heat removal capability.

First, the staff reaffirms its position that experimental testing is not needed to confirm the effectiveness of boiler-condenser decay heat removal for TMI-1. Since we recognize that the statement provided to Congressman Udall implies a contradiction with this position, the following discussion is provided to clarify this issue and show that no discrepancy or contradiction actually exists.

The concern over the effectiveness of the boiler condenser mode of decay heat removal was that during certain small break LOCA's, steam formation at the top of the hot leg U-bends was predicted to interrupt natural circulation. In the absence of natural circulation, decay heat removal capability would be lost and the primary system would repressurize. This had a twofold effect as it

increased the coolant loss rate out of the break and reduced the flow of safety injection water into the primary system. If decay heat removal was not restored, the system would continue to lose more water than was being made up, and eventually core uncovery and core damage would occur. In order to recover the system, it was necessary to reestablish decay heat removal. This would lower the primary system pressure, reduced the break flow, and increase the safety injection flow sufficient to prevent core uncovery and refill the primary system.

Because of the primary system configuration at TMI-1 (and all other lowered loop B&W-designed reactors), it was shown that before the coolant level in the primary system could drop below the top of the core, a condensing surface would be exposed in the steam generators sufficient to remove decay heat and depressurize the primary system such that core uncovery was avoided. The efficacy of the thermal hydraulic and heat transfer processes involved were not deemed to require experimental data since (a) All B&W reactors modified their emergency procedures to instruct the operators to raise the secondary side water level to 95 percent of the operating range, thus ensuring an ample condensing surface in the steam generators at an elevation above the top of the core, (b) the heat transfer correlations associated with condensation heat transfer are well established, (c) systems calculations of this process had been performed by independently developed computer codes, including RELAP4, RELAP5, and CRAFT, and despite differences in the predicted detailed thermal hydraulic behavior associated with the boiler condenser mode of decay heat removal, all of the codes predicted the ultimate establishment of decay heat

removal and no core uncovery, (d) decay heat removal by condensation heat transfer had been experimentally confirmed in test facilities with inverted U-tube generators, which, while not exactly the same, exhibit many of the thermal hydraulic characteristics of the B&W OTSG design, and (e) sufficient margin existed such that uncertainties in the analytical results would not influence our conclusions. Based on the above considerations, the staff determined that experimental information demonstrating the efficacy of boiler-condenser decay heat removal was not needed to ensure safe operation of TMI-1.

No new information has been established in the intervening period since the staff made this determination to change its conclusions today.

Rather, data recently obtained from the GERDA and OTIS facilities (B&W raised loop simulations) and recent TRAC and REBL analyses on the MIST facility have served to confirm the staff determination.

As stated above, the staff fully recognized that uncertainties existed in the analysis methods available at the time of the appeal board hearing and actively supported the need for a thermal hydraulic experimental facility geometrically similar to the B&W NSSS design in order to study and quantify the uncertainties in the small break LOCA analyses for B&W designed NSSSs.

The need for this information was to provide confirmatory data for the purpose of (1) quantifying the ability of thermal hydraulic codes, such as RELAP5 and

TRAC, to calculate the best-estimate, or realistically expected thermal hydraulic response of a B&W NSSS to small LOCAs, (2) providing a data base from which code improvements, if needed, could be based and assessed, and (3) using these codes as an audit tool for confirming selected emergency operator guidelines for B&W NSSSs.

The need for and use of this data, and its relationship to the licensing process, is considered identical to the staff's need for and use of data from other thermal hydraulic facilities, notably LOFT and Semiscale for PWRs and TLTA and FIST for BWRs. Data from these facilities has been used primarily to confirm and quantify safety margins in licensing requirements, to provide a basis for reducing exc ssive margins, and to provide a data base against which best estimate codes can be assessed and improved.

Therefore, the staff's response to Congressman's Udall's staff does not mean that experimental data is needed to conclude that TMI-1 meets the Commission's regulation's and can safely remove decay heat and prevent unacceptable core uncovery during small break LOCAs. Rather, it is intended to mean that additional experimental data is desired by the Regulatory staff for the purposes of quantifying thermal hydraulic performance uncertainties in codes used for evaluating small break LOCAs in B&W-designed NSSSs.

With respect to the use of these codes to confirm emergency operating procedures, we note that UCS points out statements made in a 1981 NRR Research User Need Letter that implies incorrect operator actions could result as a consequence of unpredicted phenomena producing false symptoms of other events.

Since the User Need Letter was written in 1981, the staff has completed an indepth review of the B&W Abnormal Transient Operator Guidelines (ATOGs), from which the TMI-1 plant emergency procedures were developed. The ATOG guidelines are designed to treat symptoms of accident conditions such as steam generator heat transfer and core cooling and are not dependent on operator event diagnosis for safe shutdown. The staff approved these guidelines and concluded that since any operator error of significance will manifest itself as an abnormal symptom or plant response and would be treated accordingly, operator error is adequately covered.