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Writer's Direct Dial Number

December 7, 1981
LIL 342

Office of Nuclear Reactor Regulations
Attn: John F. Stolz, Chief
Operating Reactors Branch No. 4
U. S. Nuclear Regulatory Commission
Washington, D.C. 20555



Dear Sir:

Three Mile Island Nuclear Station, Unit 1 (TMI-1)
Operating License No. DPR-50
Docket No. 50-289
Natural Circulation Cooldown
(Response to Generic Letter 81-21)

Generic Letter 81-21 requested an evaluation of our procedures and training for accomplishing plant cooldown under natural circulation conditions. Enclosed are specific responses to the items identified in the subject letter. The enclosed information is true and correct to the best of my knowledge and belief.

Sincerely,

H. D. McKill
H. D. McKill
Director, TMI-1

HDH:CWS:vjf

Sworn and subscribed to before me this 7th day of December, 1981.

Pamela Joy Lubrecht
Notary Public
PAMELA JOY LUBRECHT, Notary Public
Middletown, Dauphin County, Pa.
My Commission Expires August 29, 1983

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1. A demonstration (e.g. analysis and/or test) that controlled natural circulation cooldown from operating conditions to cold shutdown conditions, conducted in accordance with your procedure, should not result in reactor vessel voiding.

Response:

Due to the design of the reactor vessel (RV) head area very little circulation occurs in the area under natural circulation conditions. Under rapid cooldown with reduced pressure this stagnant hot area may flash and create a void until losses to ambient etc. result in cooling of the head region. The void will remain unless the depressurization rate is slowed and cooling of the head catches up or the system is repressurized. The size of the void is limited to the stagnant area of the RV head. Due to the complexity of the RV head area, it is not possible, with current computer codes, to predict the occurrence or behavior of the head void. In addition, tests would provide little additional information since they could cover only a limited set of conditions. On this basis, TMI-1 in conjunction with other B&W owners is developing a cooldown procedure to permit a controlled natural circulation cooldown with a RV head void present. In addition to this procedure, TMI-1 is considering, as a long term modification, installing RV head thermocouples so that the operator can anticipate void formation and respond accordingly. Until the above actions have been completed, the procedural guidance described in response to item 3 below will remain in effect.

2. Verification that supplies of condensate-grade auxiliary feedwater are sufficient to support your cooldown method

Response:

TMI-1 has two condensate storage tanks (CST) which normally contain 250,000 gallons of condensate each with a Technical Specification minimum (3.4.3) of 150,000 gallon per CST. 150,000 gallons is sufficient to cool the plant down to Decay Heat Removal (DHR) System conditions with Reactor Coolant Pumps (RCP) running while steaming to atmosphere. (With the RCP off for natural circulation (NC), the heat to be removed is reduced but the time to cooldown is extended, therefore, depending on the rate of cooldown, 150,000 gallons may not be enough to reach DHR system conditions.) In addition, TMI-1 has two other potential sources: a one million gallon capacity demineralized water storage tank, and about 24000 gallons deliverable to EFW system from the condenser hotwell to back up the CST's. As a last resort an unlimited supply of cooling water can be provided from the discharge of the Reactor Building Emergency Cooling Water Systems. These supplies are judged as adequate to respond to unusual events requiring NC cooldown using condensate grade water as well as to extreme NC cooldown events using available river water sources.

3. A description of your training program and the provisions of your procedures (e.g. limited cooldown rate, response to rapid change in pressurizer level) that deal with prevention or mitigation of reactor vessel voiding.

Response:

The TMI-1 operators have been made aware of the St. Lucie event as part of our training program in mitigating core damage. Reference material in the program consisted of IMPO #2/NSAC #16 report dated October 1980. Training on more recent events such as described in IE Circular 81-10 has been scheduled as part of the simulator requalification training in January and February of 1982. The operators have been trained on the use of the natural circulation cooldown procedure (1102-16). In addition, as a result of IE Circular 80-15, cautions were added to the Plant Cooldown (1102-11) and the RCS Natural Circulation Cooling (1102-16) Operating Procedures to caution the operator about the possibility of voids occurring in the RV head during cooldown as evidenced by large, rapid increases in pressurizer level. Should this condition occur, RCS pressure should be increased to collapse the void and return pressure control to the pressurizer.