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50-313

February 1, 1983

MEMORANDUM FOR: Commissioner Ahearne
FROM: William J. Dircks
Executive Director for Operations
SUBJECT: AEOD REPORT ON ARKANSAS UNIT 1 OVERFILL EVENT

Your memorandum of December 2, 1982, requested NRR's comments on two concerns identified in the AEOD report on the April 8, 1981 steam generator overfill transient at Arkansas Nuclear One, Unit 1 (ANO-1). The attachment includes our interpretation of the ANO-1 conformance to GDC-13, -54, and -57 along with the present schedule for resolving USI A-47, subtask 1, "Steam Generator and Reactor Vessel Overfill Transients." You should note that pending final resolution of A-47, we are treating operating B&W reactors somewhat differently than new OLs for B&W reactors insofar as steam generator overfill is concerned. We believe that the safety problem is adequately addressed in the interim by proposed voluntary actions by the licensees with B&W plants, as described in the attachment.

The new treatment of the steam generator overfill event in new B&W OLs, if applied to all operating B&W reactors, would constitute a backfit. Such a change in requirements for ORs is required by NRC procedures to be evaluated regarding costs and benefits before implementation. The staff is following this approach for additional steam generator overfill protection by incorporating the issue into Unresolved Safety Issue A-47 (Safety Implications of Control Systems). This program will provide the technical and the cost/benefit information needed for deciding whether to backfit the requirement now being applied to new OLs of B&W design.

(Signed) William J. Dircks

William J. Dircks
Executive Director for Operations

Enclosure:
As stated

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Commissioner Gilinsky
Commissioner Roberts
Commissioner Asselstine
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ENCLOSURE

Response to Memorandum from Commissioner Ahearne to W. J. Dircks dated December 2, 1982.

Response to Question #1

Your followup Question #1 asks if ANO-1 conforms to GDC-13, -54, and -57. We understand the genesis of your question is based on the statement made on page 11 of the AEOD report which states:

"... the ANO-1 design does not appear to conform to several General Design Criteria (GDC) as set forth in 10 CFR, Part 50 (Ref. 8). For example, GDC-13 controls have not been provided to maintain OTSG level as required to assure adequate safety (i.e., maintain the plant within its design envelope); GDC-54 and GDC-57 containment isolation provisions (secondary side pressure boundary and MSIVs) are not designed as required to assure performance of their isolation function during a severe OTSG overfill event which results in subcooled water entering the steam line."

To begin with, it is NRR's view that GDC-13 applies to steam generator level control for all PWRs but in the case of B&W plants, credit should not continue to be given for operator action. It is our view that GDC-54 and -57 do not apply to the steam generator overfill event for any PWRs. Our reasoning is elaborated below.

GDC-54 and -57 address containment isolation provisions. GDC-54 states, in part, "Piping systems penetrating primary reactor containment shall be provided with leak detection, isolation and containment capabilities having ... performance capabilities which reflect the importance to safety of

isolating these piping systems." GDC-57, in essence, requires "... at least one containment isolation valve which shall be either automatic, or locked closed, or capable of remote manual operation." The purpose of the two GDC is to provide assurance that the containment barrier to fission product release following an accident is not violated by an open pipe penetrating containment. In LWRs, each main steam line exiting containment is provided with a safety grade main steam isolation valve capable of remote manual operation, as well as automatic operation. This satisfies GDC-54 and -57. The question raised on ANO-1 and that could apply to PWRs is whether the valves that are supplied pursuant to GDC-54 and -57 can be assured to perform their function for a steam generator overfill event. We cannot supply that assurance because steam generator overfill is not a design basis event, and the isolation valves need only be qualified for design basis events. It may be that the isolation valves at ANO-1 and in other plants have the functional capability to isolate when the steam line is full or partially full of water. We do not know. We would agree that if steam generator overfill events were included in the plant design bases, then GDC-54 and -57 would apply insofar as the containment isolation provisions for water-filled main steam piping would have to be met.

If there is a suggestion in the question that the main steam line isolation valves, either manual or automatic, are appropriate for mitigating the overfill event, it is probably not correct. This is because closure of the MSIVs on SG overfill would not necessarily avoid flooding and subsequent structural failure of the steam lines. Long lengths of steam line piping inside containment would be subject to flooding and possible failure regardless of whether the MSIVs were closed or remained open. Thus, to summarize the MSIVs should be relied upon for containment isolation for design basis events; the overfill event should be prevented by other means. The latter is where GDC-13 comes into the picture.

GDC-13 states, in part, that ". . . Appropriate controls shall be provided to maintain these variables (such as steam generator level) and systems (such as the secondary coolant system) within prescribed operating ranges."

GDC-13 has been cited as an acceptance criterion in Section 7.7 of the Standard Review Plan since 1975. However, at the time of licensing of ANO-1 and other B&W plants, the present awareness of the sensitivity of the B&W design to steam generator level transients did not exist, and steam generator overfill was not considered a significant concern. Therefore, at least implicitly, the staff found designs which relied on operator action to control steam generator level to be in conformance with GDC-13.

More recently, we have come to realize that the sensitivity of the B&W design makes it more difficult to rely on operator actions to mitigate certain events that are easier to handle in reactors designed by Westinghouse and Combustion Engineering. For Westinghouse and Combustion Engineering designs, the staff concludes they are in conformance with GDC-13, since these designs have control grade high steam generator level trips which either trip or runback main feedwater to a small percentage of the full power flow. The significant reduction in feedwater flow greatly extends the time available for operator action and is considered sufficient to preclude overfill of the steam generators. The need to study ways to reduce the sensitivity of B&W designs was incorporated into NUREG-0660, the TMI Action Plan, under item II.E.5.1.

Item II.E.5.1 has led to design changes. The applicants for the Midland plant proposed several modifications to reduce the sensitivity of the design to upset conditions. These modifications include safety grade main feedwater isolation

on high steam generator level plus a safety grade emergency feedwater level control system. Following the Midland example, other licensees with B&W reactors have proposed steam generator overfill protection modifications. In order to prevent steam generator overfill, the ANO-1 licensee has proposed to install both a safety grade main feedwater isolation signal on high steam generator level and a safety grade emergency feedwater level control system. These modifications are currently being reviewed by the staff. The licensee plans to make these and other TMI-related emergency feedwater modifications during the next refueling outage which is currently scheduled for mid-1984. We believe that this proposal, when implemented, will provide ANO-1 with higher assurance of preventing steam generator overfill than does the current reliance on operator action. Other owners of B&W plants are proposing somewhat different systems, but they all are going to address the need to reduce the likelihood of steam generator overfill events. (See attached Table)

There have been other cases where new safety perceptions have led licensees, applicants, or the staff to more extensive applications of the GDC, so this application of GDC-13 to overfill events is not a unique situation. New or more extensive interpretations of what is required for particular designs to meet the regulations, when applied to operating reactors, constitute a backfit, and are required by the NRC procedures to be evaluated regarding cost and benefits before implementation.

The staff is following this approach with respect to the need to provide additional protection relative to steam generator overfill, particularly

for B&W plants. This concern has been incorporated into USI A-47, "Safety Implication of Control Systems." This USI will determine whether or not the steam generator overfill event should become a design basis event. We also intend to rely on this program to provide a basis upon which a backfit decision can be made. Therefore, reduced to its essence, the staff position is that pending the resolution of the overfill issue as described above, ANO-1 and all other PWRs are in conformance with GDC-13.

See our answer to your Question #2 below.

Response to Question #2

Your memorandum of December 2, 1982, requested a response to a follow-up question regarding the schedule for resolution of the steam generator and reactor vessel overfill transients task.

The approved Task Action Plan (TAP) for resolution of USI A-47 (issued September 27, 1982), identified a proposed schedule for completing and issuing the contractor draft reports of the four NSS designs for Subtask 1, "Steam Generator and Reactor Vessel Overfill Transients," by July 1983. It is anticipated that, at that time, a staff review of the reports and of the conclusions reached will be made. Based on that review, a decision will be made whether to issue the staff's findings and recommendations regarding the overfill transients prior to completing the resolution of the overall task.

(Draft report currently anticipated to be prepared by March 1984.) A deciding factor for issuing the overfill subtask results on an earlier schedule will depend on the need to conduct additional studies of the transients on a plant simulator currently being developed to model plant response. At this time, the model development and verification testing of the plant simulator is the critical pacing task. The task manager of USI A-47 is currently working with the contractors to establish an updated schedule for each of the tasks identified in TAP A-47.

STATUS OF B&W OTSG OVERFILL PROTECTION

Plant

ANO-1	The licensee has proposed main feedwater isolation on high level plus a safety grade emergency feedwater level control system.
Crystal River 3	The licensee has proposed main feedwater isolation on high level plus a safety grade emergency feedwater level control system.
Rancho Seco	The licensee has proposed main feedwater isolation on high level plus a safety grade emergency feedwater level control system.
Midland	The licensee has proposed main feedwater isolation on high level plus a safety grade emergency feedwater level control system.
TMI-1	The licensee has committed, at the restart hearings, to provide overfill protection.
Davis-Besse	The licensee has informally indicated that a system like the ANO-1 overfill protection system is being considered.
Oconee 1/2/3	These units have control grade high level protection for tripping the main feedwater pumps (no overfill protection is included for the emergency feedwater system).

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MEMORANDUM FOR: Commissioner Ahearne
 FROM: William J. Dircks
 Executive Director for Operations
 SUBJECT: AEOD REPORT ON ARKANSAS UNIT 1 OVERFILL EVENT

Your memorandum of December 2, 1982, requested NRR's comments on two concerns identified in the AEOD report on the April 8, 1981 steam generator overfill transient at Arkansas Nuclear One, Unit 1 (ANO-1). The attachment includes our interpretation of the ANO-1 conformance to GDC 13, 54, and 57 along with the present schedule for resolving USI A-47, subtask 1, "Steam Generator and Reactor Vessel Overfill Transients."

William J. Dircks
 Executive Director for Operations

Enclosure:
 As stated

cc w/enclosure:
 Chairman Palladino
 Commissioner Gilinsky
 Commissioner Roberts
 Commissioner Asselstine
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MEMORANDUM FOR: Commissioner Ahearne

FROM: William J. Dircks
Executive Director for Operations

SUBJECT: AEOD Report on Arkansas Unit 1 Overfill Event

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Your memorandum of December 2, 1982, requested NRR's comments on two concerns identified in the AEOD report on the April 9, 1981 steam generator overfill transient at Arkansas Nuclear One, Unit 1 (ANO-1). The attachment includes our interpretation of the ANO-1 conformance to GDC 13, 54 and 57 along with the present schedule for resolving USI A-47 subtask 1, "Steam Generator and Reactor Vessel Overfill Transients."

William J. Dircks
Executive Director for Operations

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MEMORANDUM FOR: William J. Dircks
Executive Director for Operations

FROM: Harold R. Denton, Director
Office of Nuclear Reactor Regulation

SUBJECT: AEOD REPORT ON ARKANSAS UNIT 1 OVERFILL EVENT

Attached is the response to Commissioner Ahearne's memorandum of December 2, 1982, requesting NRR's comments on the AEOD report of April 8, 1981 steam generator overfill transient at Arkansas Nuclear One, Unit 1 (ANO-1).

You should note that pending final resolution of A-47, we are treating operating B&W reactors somewhat differently than new OLs for B&W reactors insofar as steam generator overfill is concerned. We believe that the safety problem is adequately addressed in the interim by proposed voluntary actions by the licensees with B&W plants, as described in the attachment.

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Original Signed by
H. R. Denton

Harold R. Denton, Director
Office of Nuclear Reactor Regulations

Enclosure:
As stated

** see concurrence on memo to Comm Ahearne*

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