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NUCLEAR REGULATORY COMMISSION
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May 28, 1980

Docket Nos. 50-295
and 50-304

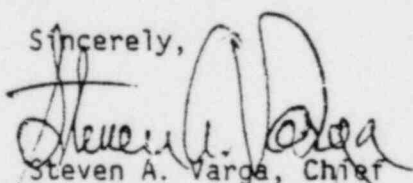
Mr. D. Louis Peoples
Director of Nuclear Licensing
Commonwealth Edison Company
Post Office Box 767
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Dear Mr. Peoples:

SUBJECT: NRC STAFF EVALUATION OF COMMONWEALTH EDISON'S RESPONSES TO IE BULLETINS 79-06A AND 79-06A, REVISION 1, FOR ZION STATION, UNIT NOS. 1 AND 2

We have reviewed the information provided by your letters dated April 27, May 17, and June 22, 1979 in response to IE Bulletins 79-06A and 79-06A, Revision 1, for Zion Station. The enclosure provides our evaluation of your responses with respect to their specificity, completeness, and responsiveness to the bulletins. In this regard, we have found that you have taken appropriate actions to meet the requirements of IE Bulletins 79-06A and 79-06A, Revision 1.

It should be noted that the staff review of the Three Mile Island, Unit 2 accident is continuing. Consequently, other corrective actions may be required at a later date. For example, IE Bulletin 79-06C was issued on July 26, 1979, requiring new considerations for operation of the reactor coolant pumps following an accident. Our reviews of the Westinghouse Owners' Group response to Items 2 and 3 of Bulletin 79-06C (Westinghouse reports WCAP-9584 and WCAP-9600, respectively) are documented in NUREG-0623 and NUREG-0611, respectively. You will be kept informed regarding the requirements for Zion Station resulting from these reviews by separate correspondence.

Sincerely,

Steven A. Varga, Chief
Operating Reactors Branch #1
Division of Operating Reactors

Enclosure:
Evaluation of Licensee's Responses
to IE Bulletins 79-06A and 79-06A,
Revision 1

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Mr. D. Louis Peoples
Commonwealth Edison Company

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May 28, 1980

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EVALUATION OF LICENSEE'S RESPONSES TO IE BULLETINS
79-06A AND 79-06A (REVISION 1)

ZION STATION, UNITS NO. 1 AND 2
DOCKET NOS. 50-295 AND 50-304

INTRODUCTION

By letters dated April 14 and April 18, 1979, we transmitted our Office of Inspection and Enforcement (IE) Bulletins No. 79-06A and 79-06A (Revision 1), respectively, to Commonwealth Edison Company (the licensee). These bulletins specified actions to be taken by the licensee to avoid occurrence of an event similar to that which occurred on March 28, 1979, at Three Mile Island, Unit No. 2 (TMI-2). By letter dated April 27, 1979, the licensee provided its response to the aforementioned bulletins for Zion Station. The licensee supplemented its response by letters dated May 17 and June 22, 1979, providing clarification and elaboration of certain of the Bulletin Action Items in response to our expressed concerns. Our evaluation of the licensee's responses, as supplemented, is provided below.

EVALUATION

In this evaluation, the paragraph numbers correspond to the bulletin action items and to the licensee's response to each action item.

1. In Bulletin Action Item No. 1, licensees were requested to review the description of circumstances described in Enclosure 1 of IE Bulletin 79-05 (issued to all licensees with Babcock & Wilcox (B&W)-designed plants for action, and to all other licensees for information) and the preliminary chronology of the TMI-2 accident included in Enclosure 1 to IE Bulletin 79-05A (same distribution as IE Bulletin 79-05).

- (a) This review should be directed toward understanding: (1) the extreme seriousness and consequences of the simultaneous blocking of both auxiliary feedwater trains at the Three Mile Island Unit 2 plant and other actions taken during the early phases of the accident; (2) the apparent operational errors which led to the eventual core damage; (3) that the potential exists, under certain accident or transient conditions, to have a water level in the pressurizer simultaneously with the reactor vessel not full of water; and (4) the necessity to systematically analyze plant conditions and parameters and take appropriate corrective action.
- (b) Operational personnel should be instructed to: (1) not override automatic action of engineered safety features unless continued operation of engineered safety features will result in unsafe plant conditions (see Section 7a.); and (2) not make operational decisions based solely on a single plant parameter indication when one or more confirmatory indications are available.
- (c) All licensed operators and plant management and supervisors with operational responsibilities were to participate in this review and such participation was to be documented in plant records.

In April 1979, an NRC briefing team conducted site visits to provide a detailed review of the circumstances described in Enclosure 1 of IE Bulletin 79-05 and the preliminary chronology of the TMI-2 accident included in Enclosure 1 of IE Bulletin 79-05A to a majority of the licensed operators and plant management. The briefing team consisted of an IE Section Leader, an Operator Licensing Branch representative, and the facility Resident Inspector. Attendance was documented and the briefing was presented by the NRC Resident Inspector to any absentees at a later briefing. Both briefings also provided a detailed review of Items 1.a and 1.b of IE Bulletin 79-06A. We consider the NRC briefing to be an acceptable response to Bulletin Action Item No. 1.

2. Bulletin Action Item No. 2 requested licensees to review actions required by operating procedures for coping with transients and accidents, with particular attention to (a) recognition of the possibility for forming voids large enough to compromise core cooling capability, (b) action required to prevent the formation of such voids, and (c) action required to enhance core cooling in the event such voids are formed. Emphasis in (a) was placed on natural circulation capability.

In response to the requirements of Lessons Learned, Item 2.1.3.b of NUREG-0578, the licensee advised it is using the plant computer to display the margin of subcooling in °F on a control board meter. This modification was approved as an interim subcooling meter in our letter of February 29, 1980. Procedures have been developed by the licensee to (1) alert the operator of the potential for voiding and address actions for terminating conditions which lead to voiding, and (2) enhance core cooling should voiding take place in the reactor coolant system, taking into account both forced and natural circulation cooling.

The licensee has changed the plant emergency procedure regarding loss of reactor coolant flow to provide the operator with the indication and actions required to establish and maintain natural circulation in case that total forced reactor coolant flow is lost.

The emergency procedures dealing with a LOCA, loss of secondary coolant, and deteriorating pressure conditions were changed to incorporate the reactor coolant pump trip requirements specified by IE Bulletin 79-06C.

The licensee revised the emergency procedure for loss of reactor coolant flow to provide the operator with guidance to enhance core cooling by natural circulation. The procedure instructs the operator on methods to be used in feeding and bleeding the steam generators and the instruments to be used to verify that core cooling by natural circulation has been established.

In addition, the licensee participated, as a member of the Westinghouse Owners Group, in the effort to develop generic guidelines for emergency procedures. In our November 5 and December 6, 1979 letters to the Owners Group, we approved the Westinghouse generic guidelines regarding small break LOCAs for implementation by licensees with Westinghouse-designed reactors. The Owners Group, in conjunction with Westinghouse, has also developed generic guidelines for emergency procedures regarding natural circulation. These generic guidelines were submitted on December 28, 1979, as part of the Owners Group response to the requirements of Item 2.1.9 of NUREG-0578 regarding inadequate core cooling. In order to satisfy NUREG-0578 requirements, the licensee should have incorporated the guidelines into the Zion Station procedures (small break LOCA guidelines by January 1, 1980, and inadequate core cooling guidelines by January 31, 1980). The Office of Inspection and Enforcement will verify that acceptable guidelines have been properly implemented. Procedures based on these generic guidelines represent an acceptable method of complying with Bulletin Action Item No. 2.

We find that the licensee has provided an acceptable response to Bulletin Action Item No. 2.

3. Bulletin Action Item No.3 requested that licensees with facilities that used pressurizer water level coincident with pressurizer pressure for automatic initiation of safety injection into the reactor coolant system trip the low pressurizer level setpoint bistables such that, when the pressurizer pressure reached the low setpoint, safety injection would be initiated regardless of the pressurizer level. The pressurizer level bistables could be returned to their normal operating positions during the pressurizer pressure channel functional surveillance tests.

In its April 27, 1979 response, the licensee stated that the pressurizer level bistables which input to safety injection initiation had been tripped to allow initiation without reliance on pressurizer level. Trip status lights on the control board confirm that the action has been

completed. Emergency procedures were modified to require operators to manually initiate safety injection when the primary system pressure decreases to the actuation setpoint. On May 3, 1979, we issued Amendment Nos. 49 and 46 to the Zion Station Unit No. 1 and No. 2 operating licenses. These license amendments approved the design change to the safety injection initiation logic which the licensee had proposed. This design change consisted of modifying the safety injection initiation system logic so that safety injection will be initiated on a two-out-of-three low pressurizer pressure condition regardless of the pressurizer level. We consider the licensee's response to Bulletin Action Item No. 3 acceptable.

4. Bulletin Action Item No. 4 requested that licensees review the containment isolation initiation design and procedures, and implement all changes necessary to permit containment isolation, whether manual or automatic, of all lines whose isolation would not degrade needed safety features or cooling capability, upon automatic initiation of safety injection.

Initiation of safety injection at Zion Station by automatic or manual actuation signal actuates Phase A isolation of containment. Phase A isolates all non-essential process lines, but does not affect safety injection, containment spray, component cooling, service water, and steam and feedwater systems. Therefore, Phase A isolation does not degrade needed safety features or cooling capability, including the operation of reactor coolant pumps. Phase B isolation of containment is actuated by a 2/4 high-high containment pressure signal or manual containment spray actuation. Phase B isolation isolates all remaining process lines except safety injection, containment spray, and auxiliary feedwater. Although operation of the reactor coolant pumps cannot continue for very long after Phase B isolation has stopped component cooling water to the pump seals and motor bearings, the high containment pressure or need for containment spray would indicate a large rapid blowdown of the primary system. In that event, the reactor coolant pumps would not be of any use

until after longer term reflooding had taken place. The Station Emergency Operating Procedures require verification of the containment isolation status lights as an immediate action. They also require positioning all pertinent automatic isolation valve switches to the closed position prior to resetting the safety injection signal.

We find that the licensee's response has adequately addressed the concerns expressed in Bulletin Action Item No. 4 and is acceptable.

5. In Bulletin Action Item No. 5, licensees with facilities at which the auxiliary feedwater system is not automatically initiated were requested to prepare and implement immediately procedures which required the stationing of an individual (with no other assigned concurrent duties and in direct and continuous communication with the control room) to promptly initiate adequate auxiliary feedwater to the steam generator(s) for those transients or accidents, the consequences of which could be limited by such action.

The auxiliary feedwater system at Zion Station is automatically initiated, with no operator action required in order to ensure adequate flow. Therefore, Bulletin Action Item No. 5 does not apply to this plant.

6. Bulletin Action Item No. 6 requested that licensees prepare and implement immediately procedures which:
 - (a) Identified those plant indications (such as valve discharge piping temperature, valve position indication, or valve discharge relief tank temperature or pressure indication) which plant operators could utilize to determine that the pressurizer power-operated relief valve(s) are open, and
 - (b) Directed the plant operators to manually close the power-operated relief block valve(s) if the reactor coolant system pressure had

been reduced to below the set point for normal automatic closure of the power-operated relief valve(s) and the valve(s) remained stuck in the open position.

The licensee reviewed the applicable Zion Station procedures and plant indications. They advised us by letter dated April 27, 1979, that several diverse indications exist to assist the operators in determining if a pressurizer power operated relief valve is open. Also, due to the past leakage history of these relief valves, the valves are kept isolated most of the time. Procedure changes were initiated to more strongly indicate to the operators that these relief valves remain shut with explicit exceptions noted. Lessons Learned Item 2.1.3a as evaluated in our February 29, 1980 letter discusses further actions relating to valve position indicators. Based on our review, we find that the licensee's response to Bulletin Action Item No. 6 is acceptable.

7. In Bulletin Action Item No. 7, licensees were requested to review the action directed by the operating procedures and training instructions to ensure that:
 - (a) Operators do not override automatic actions of engineered safety features, unless continued operation of engineered safety features would result in unsafe plant conditions. For example, if continued operation of engineered safety features would threaten reactor vessel integrity, then the high pressure injection (HPI) system should be secured (as noted in b(2) below).
 - (b) Operating procedures currently, or are revised to, specify that, if the (HPI) system had been automatically actuated because of a low pressure condition, it must remain in operation until either:
 - (1) Both low pressure injection (LPI) pumps are in operation and flowing for 20 minutes or longer at a rate which would assure stable plant behavior, or

- (2) The HPI system has been in operation for 20 minutes, and all hot and cold leg temperatures are at least 50 degrees Fahrenheit below the saturation temperature for the existing RCS pressure. If 50 degrees subcooling cannot be maintained after HPI cutoff, the HPI shall be reactivated. The degree of subcooling beyond 50 degrees and the length of time HPI has been in operation shall be limited by the pressure/temperature considerations for the vessel integrity.
- (c) Operating procedures currently, or are revised to, specify that, in the event of HPI initiation with reactor coolant pumps (RCPs) operating, at least one RCP shall remain operating for two-loop plants and at least two RCPs shall remain operating for 3 or 4 loop plants, as long as the pump(s) is providing forced flow.
- (d) Operators are provided additional information and instructions to not rely upon pressurizer level indication alone, but to also examine pressurizer pressure and other plant parameter indications in evaluating plant conditions, e.g., water inventory in the reactor primary system.

In response to Bulletin Action Item No. 7.a, the licensee reviewed and revised, as necessary, the applicable operating procedures to prohibit overriding engineered safety features unless continued operation of engineered safety features would result in unsafe conditions. This constitutes an acceptable response to Bulletin Action Item No. 7.a.

In response to Bulletin Action Item No. 7.b, the licensee participated in the effort by the Westinghouse Owners Group, in conjunction with Westinghouse, to develop generic guidelines for emergency procedures. In our November 5 and December 6, 1979 letters to the Owners Group, we approved generic guidelines for emergency procedures regarding small break LOCAs for implementation by licensees with Westinghouse-designed operating

plants. These approved guidelines include the following criteria (taken from the enclosure to our letter of December 27, 1979) for termination of safety injection:

- (1) The reactor coolant system pressure is greater than 2000 pounds per square inch gauge and increasing, and
- (2) The pressurizer water level is greater than the programmed no-load water level, and
- (3) The reactor coolant indicated subcooling is greater than (insert plant-specific value, which is the sum of the errors for the temperature measurement system used and the pressure measurement system translated into temperature using the saturation tables), and
- (4) The water level in at least one steam generator is stable and increasing, as verified by auxiliary feedwater flow to that unit. Auxiliary feedwater flow to the unaffected steam generator should be greater than (a value in gallons per minute sufficient to remove decay heat after 20 minutes following reactor trip) until the indicated level is returned to within the narrow range level instrument.

Details of our evaluation of this issue are included in the report (NUREG-0611) of our generic review of Westinghouse-designed operating plants.

Our Office of Inspection and Enforcement will verify that the approved Westinghouse generic safety injection termination criteria have been properly incorporated in the Zion Station operating procedures. Pending such verification, we find that the licensee's actions with regard to Bulletin Action Item No. 7.b are acceptable.

Another issue on which the Westinghouse Owners Group worked, in conjunction with Westinghouse, to achieve resolution with the staff was the

matter of reactor coolant pump operation following a small break LOCA (Bulletin Action Item No. 7.c). On July 26, 1979, IE Bulletin 79-06C superseded Action Item No. 7.c of Bulletin 79-06A. Bulletin 79-06C required that, as a short-term action, licensees were to trip all reactor coolant pumps after an initiation of safety injection caused by low reactor coolant system pressure. In its August 31, 1979 response to Bulletin 79-06C, the licensee stated its conformance with this requirement. This action was to remain in effect until the results of analyses specified in Bulletin 79-06C had been used to develop new guidelines for operator action.

We have completed our review of the reactor coolant pump trip issue with the Owners Group. The generic guidelines for emergency procedures regarding small break LOCAs, which we approved in our November 5 and December 6, 1979 letters to the Owners Group, contain the approved pump trip criteria for Westinghouse-designed operating plants. Basically, they are as follows:

- (1) Stop all reactor coolant pumps after high pressure safety injection pump operation has been verified, and when the wide range reactor pressure is at (plant-specific pressure derived from secondary system relief capacity, primary-to-secondary system pressure difference, and instrument inaccuracies).

Appropriate cautions have been included in the guidelines regarding isolation of component cooling water to the reactor coolant pumps and maintaining seal injection flow to preclude pump damage due to inadequate cooling. The details of our review of the pump trip issue are reported in NUREG-0623.

Pending confirmation by our Office of Inspection and Enforcement that the licensee has incorporated the pump trip criteria as specified in the approved Westinghouse generic guidelines into the Zion Station operating procedures, we find the licensee's response to Bulletin Action Item No. 7.c acceptable.

In response to Bulletin Action Item No. 7.d, the licensee noted that Zion Station operations personnel are cautioned against reliance on single indications and would use all plant parameters in assessing plant conditions. In addition, the concern expressed in this bulletin action item was incorporated in the licensee's operator training program. The licensee revised the applicable procedures to reflect these considerations. We find these items to be an acceptable response to Bulletin Action Item No. 7.d.

8. Bulletin Action Item No. 8 required licensees to review alignment requirements and controls for all safety-related valves necessary for proper operation of Engineered Safety Features.

The licensee has reviewed the Engineered Safety Systems valve lineups and associated procedures. Procedures were checked to assure proper alignment of valves and realignment to correct positions after any changes are made. Zion Station has had a program for valve lineup review and valve tagging for some time. Management verification is required by standing orders and operating department procedures. Safety related valves having control room indications are verified on a shift turnover check list to meet the requirements of Item 2.2.1c of NUREG-0578, "Shift and Relief Turnover Procedures."

Based on our review, we find the licensee's response to Bulletin Action Item No. 8 acceptable.

9. In Bulletin Action Item No. 9, licensees were requested to review their procedures to assure that radioactivity will not be inadvertently released from containment. Particular emphasis was placed on the resetting of Engineered Safety Features (ESFs) and the effects of this action on valves controlling the release of radioactivity.

In its April 27, 1979 response, the licensee listed all systems which are designed to transfer potentially radioactive fluids

from containment. It indicated those systems for which high radiation interlocks exist, and identified the means by which the operability of each system listed is assured. Information pertaining to the resetting of ESFs and its effect on valves controlling the release of radioactivity was provided in the licensee's October 18, 1979 response to Item 2.1.4 of NUREG-0578. In brief, certain automatic isolation valves would have opened upon manual reset of the containment isolation unless deliberate remote manual shutting of the individual valve had occurred first. Modifications have been completed at Zion Station to preclude this possibility.

The staff's implementation of Item 2.1.4 of NUREG-0578 provides further assurance that the inadvertent release of radioactivity from containment upon resetting of ESFs will be precluded. Our review of NUREG-0578 Item 2.1.4 implementation was reported in our letter dated February 29, 1980.

We find that the licensee has adequately addressed the concerns expressed in Bulletin Action Item No. 9.

10. Action Item No. 10 of Bulletin 79-06A required that licensees review and modify, as necessary, maintenance and test procedures for safety-related systems to ensure that they require that: (a) redundant systems are operable before a system is taken out of service, (b) systems are operable when returned to service, and (c) operators are made aware of the status of these systems.

Zion Station Technical Specifications specify the surveillance requirements that must be completed to confirm the operability of safety-related systems. A subsystem or equipment is removed from service for preventive or corrective maintenance according to maintenance operating procedures. When a subsystem fails or is removed from service, this event must be approved on an appropriate form or procedure. When maintenance has been completed, the controlling procedure ensures that testing of the subsystem equipment is performed to determine operability.

The licensee will verify, by test or inspection, that the redundant subsystem/train is operable before removal of a portion of the other subsystem/train.

The transfer of information about the status of safety-related systems at shift change will be accomplished according to the requirements of Item 2.2.1.c of NUREG-0578.

Based on our review, we find that the licensee's response to Bulletin Action Item No. 10 is acceptable.

11. Bulletin Action Item No. 11 requested licensees to review their prompt reporting procedures for NRC notification to assure that the NRC is notified within one hour of the time the reactor is not in a controlled or expected condition of operation. Further, at that time, an open, continuous communication channel shall be established and maintained with the NRC.

The existing Zion Station notification procedures were clarified to specify that the NRC be notified within one hour of the time the reactor is not in a controlled or expected condition of operating. Provisions are included for establishing and maintaining a continuous open channel of communication with the NRC. The actions specified in Action Item No. 11 of IE Bulletin 79-06A have subsequently been incorporated in the requirements of Section 50.72 of 10 CFR Part 50, immediately effective upon issuance February 29, 1980.

We find the licensee's action in response to Bulletin Action Item No. 11 acceptable.

12. In Action Item No. 12, licensees were requested to review operating modes and procedures to deal with significant amounts of hydrogen gas that may be generated during a transient or other accident that would either remain inside the primary system, or be released to the containment.

In response to this bulletin action item, the licensee reviewed the existing Zion Station procedures regarding removal of hydrogen gas from the containment. The licensee listed several methods for hydrogen removal in the primary system and should incorporate these methods into existing procedures. The licensee described the recombiner system for removal of hydrogen from the containment, indicated the secondary method for hydrogen removal through use of a controlled vent through charcoal filters, and stated that operating modes and procedures were reviewed.

In addition, the licensee participated in the Westinghouse Owners Group effort to develop generic guidelines for emergency operational procedures in response to the requirements of Item 2.1.9 of NUREG-0578. On December 28, 1979, the Owners Group submitted generic guidelines regarding natural circulation and post-LOCA long-term cooldown for staff review. Treatment of noncondensable gas in the reactor coolant system was considered in the development of these guidelines. Our review of NUREG-0578 implementation was reported in our letter of February 29, 1980.

Based on our review, we find that the licensee has provided an adequate response to Bulletin Action Item No. 12.

13. Bulletin Action Item No. 13 requested licensees to propose changes, as required, to those plant Technical Specifications which had to be modified as a result of implementing Bulletin Action Item Nos. 1 through 12, and to identify design changes necessary in order to effect long-term resolution of these items.

In its April 30, 1979 letter, the licensee proposed changes to the Zion Station Technical Specifications necessitated by actions required by this bulletin. The changes were required to implement two-out-of-three low-low Pressurizer Pressure Safety Injection actuation as discussed in Bulletin Action Item No. 3 above. Other Technical Specification changes have not been required.

We find the licensee's response to Bulletin Action Item No. 13 acceptable.

CONCLUSIONS

Based on our review of the information provided by the licensee, we conclude that the licensee has correctly interpreted IE Bulletins 79-06A and 79-06A, Revision 1. The actions taken demonstrate the licensee's understanding of the concerns arising from the Three Mile Island, Unit No. 2 accident in relation to their implications on its own operations, and provide added assurance for the protection of the public health and safety during plant operation.

Date: May 28, 1980