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Mr. D. L. Ziemann, Chief
Mr. T. A. Ippolito, Chief
Mr. A. Schwencer, Chief
Division of Operating Reactors
U.S. Nuclear Regulatory Commission
Washington, D.C. 20555

Subject: Containment Purging During
Normal Plant Operation
Dresden Station Units 1, 2 and 3
Quad-Cities Station Units 1 and 2
Zion Station Units 1 and 2
NRC Docket Nos. 50-10/237/249,
50-254/265 and 50-295/304

References (a): D. L. Ziemann letter to C. Reed dated November 29, 1978 (Dresden 1 and 2)

(b): T. Ippolito letter to C. Reed dated November 29, 1978 (Dresden 3)

(c): T. Ippolito letter to C. Reed dated November 29, 1978 (Quad-Cities 1 and 2)

(d): A. Schwencer letter to C. Reed dated November 28, 1978 (Zion 1 and 2)

Dear Messrs: Ziemann
Ippolito
Schwencer

In response to the inquiry contained in References (a), (b), (c) and (d), a review of the containment purging operations and manual bypass override circuitry has been performed for Dresden 2 and 3, Quad-Cities 1 and 2, and Zion 1 and 2. A comparable review of Dresden Unit 1 has not been done at this time because it is judged that such a review should be conducted under the Systematic Evaluation Program due to the uniqueness of the

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Dresden 1 design and the fact that this unit is currently undergoing an extended outage during which modification to the ECCS system will be made. The plant unique responses to the referenced letters are enclosed as attachments to this letter.

Our review of the referenced NRC letters identified two primary areas of concern: (1) the design of safety actuation signal circuits which incorporate a manual feature with the potential of causing an unintended bypass of other safety actuation signals; and (2) potential failures affecting the purge penetration valves which could lead to a degradation of containment integrity and, for PWRs, a degradation in ECCS performance.

As is indicated in the attachments, a review of the circuits in question has been completed, and no bypasses for which adequate controls do not now exist were identified on either the BWR or PWR units reviewed. For this reason, no further review nor alteration of the current systems is judged to be necessary at this time.

With respect to the containment purging issue, the design objectives and equipment descriptions for the containment isolation systems on the units reviewed have been addressed both in the Final Safety Analysis Reports and Technical Specifications. These license documents have been reviewed and approved by the Nuclear Regulatory Commission in accordance with acceptance criteria in existence at the time the operating licenses for those units were granted. Unlimited purging and venting of the containment within the constraints imposed by the FSAR and Technical Specification is essential to the continued operation of these units. In as much as the circuitry deficiencies and inadequacy of administrative controls observed at Millstone 2 and Salem 1 do not exist on the Commonwealth Edison units, the suggested limitation on containment purging is considered to be unnecessary. Although it is recognized that the containment purging issue will be reviewed as a part of Systematic Evaluation Program (SEP) Task VI-4, imposition of Standard Review Plan 6.2.4 and Branch Technical Position CSB 6-4 on operating plants for which these documents were not considered in the original operating license review has not been satisfactorily justified. Therefore, Commonwealth Edison will continue to purge the containments on Dresden 2 and 3, Quad-Cities 1 and 2, and Zion 1 and 2 within the constraints of the unit operating licenses. It is judged that this position is technically justified and conforms to the applicable federal regulations.

If you have any further questions on this matter, please direct them to this office.

Very truly yours,

C. Reed

Cordell Reed
Assistant Vice-President

attachments

ATTACHMENT A
(ZION 1 AND 2)

In response to the NRC letter of November 28, 1978, a review of containment purging operations and manual bypass override circuitry has been performed for Zion Station. The results of the review are as follows:

1. Containment Purging

(a) The design objectives, along with a description of installed containment isolation systems have been presented in the Zion Final Safety Analysis Report. In addition to this review, Westinghouse has evaluated the off-site dose which might occur during the unlikely event of a LOCA concurrent with purging operations. Their analysis yielded the following off-site doses due to containment purge system activity plus containment leakage following a LOCA.

	Site Boundary	New Population Zone
Thyroid	1.75×10^2 Rem	1.59×10^2 Rem
Whole Body	6.0 Rem	5.0 Rem

Since these doses are substantially below the 300 Rem thyroid and 25 Rem whole body limits set forth in 10 CFR 100, we conclude that purging does not significantly increase the radiological consequences of a LOCA.

(b) A sensitivity study has also been performed for Zion of the impact of purging operations on ECCS performance. The study specifically calculates revised peak clad temperatures (PCT) corresponding to the reduced containment pressure caused by the open purge valves. For the 42° diameter purge line, the following values were calculated:

Total Time Purge Valve is Open Following LOCA Inception	Decrease in Containment Backpressure at Time of PCT	Resultant Increase in PCT
7 Seconds	0.65 PSI	+1 F
4 Seconds	0.3 PSI	+1 F

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(ZION 1 AND 2)

Normal closure times for the valves have been demonstrated on the order of 2 - 4 seconds. Furthermore, discussions with the valve manufacturer indicate that air flow through the valve will aid in closure due to the aerodynamic design of the disc. Based on this, we conclude that Zion Station, equipped with fast-closing purge isolation valves, exhibits little sensitivity in ECCS performance to containment purge operation at LOCA inception.

(c) The containment purge and isolation control circuits have also been reviewed. Manual (keylock) bypass circuits have been provided on the purge exhaust valves (AOV-RV0003 & 4) and containment pressure and vacuum relief line valves (AOV-RV0005 & 6) for the purpose of hydrogen removal following a LOCA. The safety significance of the bypass circuits was specifically subject to 10 CFR 50.59 review prior to installation. These circuits have been locked in the non-bypass position and have been taken out of service with specific instructions that the bypass is to be used only in the event that containment hydrogen concentrations warrant the use of the hydrogen recombiner. Additionally, any change in status of the bypass circuits is annunciated in the control room.

Based on the above findings, we conclude that unlimited purging is justified for Zion and that no Tech. Spec. changes are required. We do not concur with limiting purge operations to 90 hours pending completion of the NRC Staff review since the effect of purging operations has been previously analyzed for Zion.

2. Override Circuitry

The design of the safety actuation circuits along with all subsequent modifications has been reviewed for manual overrides. Four valves per unit (AOV-RV0003, 4, 5 and 6) were found with manual overrides. (See discussion in Paragraph 1.c) We conclude that the physical keylocks,

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(ZION 1 AND 2)

administrative controls, specific instructions on the use of the overrides, and audio/visual annunciation of a change in circuit status provide sufficient assurance that these valves will perform their safety functions. With the exception of the above valves, we find no other manual overrides of one safety actuation signal which causes the bypass of another safety actuation signal. We conclude that adequate administrative controls and proper annunciation are provided for manual override circuits. No further review of safety actuation circuits is warranted at this time.

ATTACHMENT B
(DRESDEN 2 AND 3)
(QUAD-CITIES 1 AND 2)

Override Circuitry

The design of the safety actuation circuits on the subject units have been reviewed for potential bypasses not previously accounted for in the plant design. This review uncovered no such bypasses. A description of the review performed follows:

1. Bypass and reset features are incorporated in RPS, PCI, and ECCS systems for the purpose of infrequent logic and functional testing, bypassing failed components to allow for system operability, and for use for recovery and reset following safety actuations and accidents. These features are not used during normal plant operations since there is no need to manually override any safety actuation signals.

2. A design review has been conducted of safety actuation signal circuits which incorporate bypass or reset features. These systems included RHRS*, PCI, RPS, LPCI**, Core Spray, HPCI, Auto Blowdown, RCIC*, Nuclear Instrumentation, and Process Radiation Monitoring. This review has shown that the bypass or reset features which override a safety actuation signal do not bypass other initiation signals. The bypass devices have been identified to be key-lock switches, which are either annunciated or controlled by administrative procedure when the switches are placed in an off-normal position. Resets have been found mostly to bypass seal-in circuits after initiation signals are removed and do not affect the initiation logic itself.

3. All the above manual overrides would normally be used only after an actuation occurs and are not used during normal operation. Proper training in the use of these overrides is provided for all reactor operators. We believe that the existing annunciators and/or procedures adequately control the use of these bypasses, therefore, the station does not plan on initiating any modifications or procedure changes. Other manual overrides of

* Quad-Cities units only
** Dresden units only

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(DRESDEN 2 AND 3)
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safety actuation signals that have been investigated are the Unit 2/3 diesel generator bypass - normal switch and neutron monitor bypasses. No deficiency is found to exist in these systems.

Containment Purging

Primary containment venting and purging are necessary to inert the containment, de-inert the containment, control containment pressure, reduce containment oxygen concentration, and to establish and maintain a pressure differential between the drywell and suppression chamber. During these operations, established approved procedures are used, which do not involve the bypass of any trip functions whatsoever, and which do not render any purge or vent isolation valves inoperable. Venting and purging are necessary operations that are performed to maintain the proper containment pressures and oxygen content to mitigate the consequences of a LOCA. These operations thus cannot be prohibited or restricted without jeopardizing the availability of the units.

In as much as the potential containment isolation bypass problems identified at the Millstone and Salem units are clearly inapplicable to the BWR circuitry design, imposition of a 90 hour per year limitation on containment purging is not required. Moreover, the inherent design of the balanced butterfly valves used to perform the containment isolation function have been reviewed both by Commonwealth Edison and the equipment supplier (Pratt Co.) and determined to be capable of closing under the containment atmospheric conditions associated with all design basis events considered as a part of the plant design. The closing capability of such valves has been discussed at length in the article by Targut Sarapkaya (Paper No. 60-WA-105 -- Transactions of the American Society of Mechanical Engineers, Journal of Applied Mechanics).

This conclusion is supported by the fact that the 2" valves used to provide containment pressure control during power operation are also used to blowdown the containment following the completion of the periodic integrated primary containment leak rate test and, therefore, have been demonstrated capable of operating against full accident pressure. The 18" purge valves used to vent the containment atmosphere during the inerting and de-inerting process would, if tested, demonstrate the same

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capability. However, full scale tests of these larger valves is considered impractical. Furthermore, the design closure times of the valves associated with containment purging are such that they are judged to have an insignificant effect on off-site radiological doses. These valves are tested quarterly with typical closure times less than 10 seconds. 10 seconds was the analyzed closure time for the 20" main steam isolation valves, the closure of which controls the off-site dose for the main steam line break accident outside containment. This would, for the BWR, clearly be a more limiting event -- given the line size and fluid pressure involved.