



Commonwealth Edison  
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Downers Grove, Illinois 60515

April 15, 1994

Mr. William T. Russell, Director  
Office of Nuclear Reactor Regulation  
U.S. Nuclear Regulatory Commission  
Washington, D.C. 20555

Attn: Document Control Desk

Subject: Zion Station Units 1 and 2  
Application for Amendment to Facility  
Operating License DPR-39 and DPR-48  
NRC Docket Nos. 50-295 and 50-304

Reference: T.W. Simpkin letter to W.T. Russell dated March 31, 1993

Dear Mr. Russell:

Pursuant to 10CFR50.90, Zion Station proposes to revise Facility Operating Licenses DPR-39 and DPR-48 for Units 1 and 2 respectively. The purpose of this amendment request is to make changes to the ESFAS Technical Specification Sections to provide allowed outage times for Automatic Actuation Channel surveillance testing and restoration time for an inoperable ESFAS Automatic Actuation Channel. The need for these changes comes as a result of the Station's implementation of License Amendments 144/133 in May, 1993. The basis for the NRC's approval of Amendments 144/133, as stated in their Safety Evaluation Report, was that equipment being tested is inoperable if it cannot automatically perform its safety function during the performance of the test. This position is restated in NRC Generic Letter 91-18, "Information to Licensees Regarding Two NRC Inspection Manual Sections on Resolution of Degraded and Non-Conforming Conditions and on Operability." Implementation of this philosophy has resulted in the Station being required to perform ESFAS Automatic Actuation Channel testing without the benefit of an allowed outage time. The allowed outage times proposed are consistent with WCAP-10271, which has been previously reviewed and approved by the NRC.

This request was originally submitted via the referenced letter on March 31, 1994. Due to administrative errors, the date of the letter was in error. Additionally, a preliminary version of the markup for page 128 was inadvertently included. This submittal is intended to supercede the Reference submittal in its entirety.

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The proposed change has been reviewed and approved by both on-site and off-site review in accordance with CECo procedures. CECo has reviewed this proposed amendment in accordance with 10 CFR 50.92(c) and has determined that no significant hazards consideration exists. This evaluation is documented in Attachment C. An Environmental Assessment has been completed and is contained in Attachment D.

CECo is notifying the State of Illinois of our application for this amendment by transmitting a copy of this letter and its attachments to the designated State Official.

To the best of my knowledge and belief the statements contained herein are true and correct. In some respects, these statements are not based on my personal knowledge but upon information received from other Commonwealth Edison and contractor employees. Such information has been reviewed in accordance with Company practice and I believe it to be reliable.

Please direct any questions regarding this matter to this office.



*Mary Jo Yack* 4-15-94

Sincerely,

*Terrence W. Simpkin*

T.W. Simpkin  
Nuclear Licensing Administrator

Attachments:

cc: C. Y. Shiraki, Project Manager - NRR  
J. D. Smith, Senior Resident Inspector - Zion  
Document Control Desk - NRR  
Region III Office  
Office of Nuclear Facility Safety - IDNS

**ATTACHMENT A**

**ZION NUCLEAR GENERATING STATION**

**DESCRIPTION AND EVALUATION OF THE**

**PROPOSED CHANGES TO APPENDIX A**

**TECHNICAL SPECIFICATIONS OF**

**FACILITY OPERATING LICENSES DPR-39 AND DPR-48**

**FOR**

**LICENSE AMENDMENT REQUEST NO. 93-11**

**REVISION OF THE ESFAS AUTOMATIC ACTUATION CHANNEL**

**ALLOWED OUTAGE AND RESTORATION TIMES**

## DESCRIPTION OF PROPOSED CHANGE

Commonwealth Edison Company (CECo) proposes changes to Appendix A, Technical Specifications, of Facility Operating Licenses DPR-39 and DPR-48 to revise the Engineered Safeguards Features Actuation System (ESFAS) Instrumentation Technical Specification Sections to:

- 1) Allow an ESFAS Automatic Actuation Channel of Technical Specification Table 3.4-1 (line items I.2, II.2, III.B.2, IV.2, and V.2) to be bypassed for up to 8 hours for master relay and logic testing and 12 hours for slave relay testing,
- 2) Allow 6 hours to restore an inoperable ESFAS Automatic Actuation Channel of Technical Specification Table 3.4-1 (line items I.2, II.2, III.B.2, IV.2, and V.2) before beginning the 4 hour clock to hot shutdown,
- 3) Modify Technical Specification Action 3.4.4 to make it applicable to all channels of a particular function of Table 3.4-1 except the Automatic Actuation Channels (line items I.2, II.2, III.B.2, IV.2, and V.2),
- 4) Change the required Minimum Degree of Redundancy from 2 to 1 for the High-High Containment Pressure Channels (items II.3, III.B.3 and IV.3) under the Containment Spray, Containment Isolation and Steamline Isolation Actuation functions in Technical Specification Table 3.4-1,
- 5) Delete footnote +++ from Table 3.4-1 which states "This channel may be placed in bypass mode during periods of active testing during safeguards equipment testing as specified in Section 4.4.2." This footnote directly conflicts with Specification 3.4.2.c which states channels being tested with the exception of the High-High Containment Pressure Channels shall be tripped,
- 6) Make an editorial change to Technical Specification 3.4.2.c to change "containment Hi-Hi Pressure" to read "High-High Containment Pressure" to be consistent with Table 3.4-1, and
- 7) Change the bases of Specification 3.4/4.4 to indicate that an Automatic Actuation Channel is bypassed (incapable of performing safety function) during testing and that the specified allowed outage times are based on WCAP 10271-P-A Supplement 2, Revision 1.

## DESCRIPTION OF PROPOSED CHANGE (Continued)

The majority of these changes are necessary because Zion Station's custom Technical Specifications provide neither an allowed outage time to perform required ESFAS Automatic Actuation Channel surveillance testing, nor any restoration time for an inoperable ESFAS Automatic Actuation Channel. The Westinghouse Standard Technical Specifications (NUREG 1431) provide allowed outage times for both of these situations.

An ESFAS Logic and Actuation Train is referred to as an ESFAS Automatic Actuation Channel throughout this License Amendment Request to be consistent with Zion Station's current Technical Specifications. This terminology is different from that in the Standard Technical Specifications and will be modified throughout Zion's Technical Specifications as part of Zion's Technical Specification Improvement Program effort.

## DESCRIPTION OF CURRENT REQUIREMENT

Currently, for the Containment Spray, Containment Isolation and Steamline Isolation Actuation functions of Technical Specification Table 3.4-1, a Minimum Degree of Redundancy of 2 and a Minimum Number of Operable Channels of 3 is required for the High-High Containment Pressure Channels (units II.3, III.B.3, and IV.3). The actual number of High-High Containment Pressure Channels is 4. Zion Technical Specification Definition 1.16 states that "the DEGREE OF REDUNDANCY is the difference between the number of OPERABLE channels, and the minimum number of these channels which, when tripped, will cause an automatic system trip." In order to meet a minimum degree of redundancy of 2 in a 4 channel system with a channel inoperable, the inoperable channel must be placed in the tripped condition. However, Technical Specification 3.4.2.c excepts an inoperable High-High Containment Pressure Channel from being placed in the tripped condition. The High-High Containment Pressure Channels are normally placed in bypass and therefore cannot be used to meet the minimum degree of redundancy. Thus the two Technical Specifications conflict.

Currently, Technical Specification Surveillance Requirement 4.4.2, Table 4.4-1, and the bases for Technical Specification 4.4 require that ESFAS Automatic Actuation Channel (items I.2, II.2, III.B.2, IV.2, and V.2 in Table 4.4-1) master relay and logic functional testing be conducted monthly and slave relay functional testing be conducted quarterly to demonstrate operability. However, Technical Specification 3.4 and Table 3.4-1 do not provide any allowed outage time for this required testing. The testing of an ESFAS Automatic Actuation Channel requires the channel to be bypassed and thus rendered inoperable. According to Technical Specification 3.4.4, when the required Minimum Number of Operable Channels (Column 3) or required Minimum Degree of Redundancy (Column 4) for the ESFAS Automatic Actuation Channels of Table 3.4-1 are not met, the Operator Action of Column 5 must be completed. The Action of Column 5, according to footnote \*\*\*, is to maintain or be in hot shutdown within 4 hours of not meeting the Column 3 or 4 requirements.

## **DESCRIPTION OF CURRENT REQUIREMENT (Continued)**

As described above, the current LCO and Action of Technical Specification 3.4.4 and Table 3.4-1 require the reactor be placed in hot shutdown within four hours of an ESFAS Automatic Actuation Channel becoming inoperable. No dedicated restoration time is provided to test, troubleshoot and repair any problem with an ESFAS Automatic Actuation Channel before having to shutdown the unit.

Currently, Table 3.4-1 contains footnote +++. Footnote +++ states that "This channel may be placed in bypass mode during periods of active testing during safeguards equipment testing as specified in Section 4.4.2." Footnote +++ is applied to column heading 3 (Minimum Operable Channels) and column heading 4 (Minimum Degree of Redundancy). Placement of the footnote in these locations implies it is applicable to all the channels in Table 3.4-1. However, Technical Specification 3.4.2.c states that all channels except the High-High Containment Pressure channels must be placed in the tripped condition during the testing of Specification 4.4.2. The footnote also provides no time constraints.

Currently Technical Specification 3.4.2.c refers to the "containment Hi-Hi pressure" channels while Table 3.4-1 refers to the same channels as "High-High Containment Pressure" channels.

Currently, the bases for Technical Specification 3.4/4.4 states that bypass removal of a channel is accomplished by tripping that channel.

## **BASES FOR CURRENT REQUIREMENT**

The design basis of the Engineered Safeguards Features Actuation System is to initiate a unit shutdown and/or actuate Engineered Safeguards Features (ESF) based on the values of selected unit parameters to prevent core damage from anticipated transients and infrequent faults, protect against violating the RCS pressure boundary and limit site radiological releases to acceptable limits.

Detailed descriptions of the Zion ESFAS instrumentation is contained in the Zion Updated Final Safety Report (UFSAR), Chapter 7, and the Zion Station Reactor Protection System/Engineered Safeguards Features Actuation System Design Basis Document DBD-ZI-013. In general, ESFAS receives input from multiple process sensors or field transmitters in order to meet the design demands for redundancy and reliability. These sensors and transmitters supply signals to independent process channels. Generally, three or four process channels are used for the signal processing of the received unit parameters. Channel separation is maintained up to and through the input bays. Within the signal processing channel, the field parameter signal is compared to a predetermined setpoint. If the measured value exceeds the predetermined setpoint, an output is provided to

## **BASES FOR CURRENT REQUIREMENT (Continued)**

the logic and coincidence network. In order to meet redundancy requirements, two channels of logic and coincidence networks are provided, both of which perform the same function. The logic and coincidence network performs the decision logic and if the required logic matrix combination is completed the system will send an actuation signal to the designated ESF components. The actuation of ESF components is accomplished through master and slave relays, however not all relays apply to a single plant condition. The logic and coincidence network energizes the master relays appropriate for the condition of the unit. Each master relay then energizes one or more slave relays. The slave relays actuate equipment or other slave relays. Zion's ESF equipment is not clearly separated between the two ESFAS Automatic Actuation Channels, instead each channel's equipment is distributed over three AC buses and their corresponding DC buses (three divisions of power). The slave relays are associated with a given bus. Major pieces of ESF equipment receive actuation signals via two separate slave relays on the same bus which each receive actuation signals from separate ESFAS Automatic Actuation Channels. Some components only receive a signal from one ESFAS Automatic Actuation Channel. In addition, some slave relays actuate a single ESF component while others actuate more than one component of a single ESF equipment train.

The basis for Technical Specification Section 3.4, Safeguards Instrumentation and Control, states that the ESFAS systems are actuated by redundant logic and coincidence networks and that the channels are designed to combine redundant sensors, independent channel circuitry and coincident trip logic to ensure a safe and reliable system in which a single failure will not defeat the intended function. In addition, the ESFAS instrument channels are designed so that upon a loss of electrical power to any instrument channel, the output of that channel is an actuation signal. The only exception to this fail safe design is the High-High Containment Pressure Channel as discussed in the next paragraph.

The Containment Spray, Containment Phase B Isolation, and Steam Line Isolation ESFAS functions are all actuated by 2 High-High Containment Pressure Channel signals. The bistables tripped by the High-High Containment Pressure channels must energize to actuate Containment Spray because it is not desirable to have a loss of power cause an inadvertent Containment Spray event. Because of the above, four channels of High-High Containment Pressure are utilized for additional redundancy. Therefore, the ESFAS coincidence logic for the High-High Containment Pressure actuated functions is normally 2 out of 4 which is a degree of redundancy of 2. Degree of redundancy as defined in the Technical Specifications (Definition 1.16) is the difference between the number of operable channels and the minimum number of these channels which when tripped will

## **BASES FOR CURRENT REQUIREMENT (Continued)**

cause an automatic system trip. In order to maintain a minimum degree of redundancy of 2, in a 4 channel system, an inoperable channel would need to be placed in trip such that the logic becomes 1 out of 3. However, an inoperable High-High Containment Pressure channel is placed in bypass rather than trip to reduce the probability of an inadvertent Containment Spray actuation. With an inoperable channel in bypass the coincidence logic becomes 2 out of 3 with a redundancy of one. Since the High-High Containment Pressure channel provides no control functions, a 2 out of 3 logic still meets single failure criteria and the intent of IEEE Standard No. 279-1971.

The purpose of ESFAS testing is to provide assurance that the ESF systems will be operated as designed in the unlikely event of an accident. Zion's ESFAS system meets the intent of General Design Criteria 21, Regulatory Guide 1.22 and IEEE Standard No. 279-1971 regarding testability by providing online test capability for essentially all ESFAS. ESFAS components which are not actually tested online are tested by monitoring the relay and control circuit operation and continuity checks as approved in the original plant Safety Evaluation Report (SER). The original plant SER and the UFSAR state that ESFAS actuation logic testing will be done one Automatic Actuation Channel at a time under administrative control and that the Automatic Actuation Channel under test is blocked during the testing. The method of testing is described in the Zion UFSAR.

## **NEED FOR AMENDING THE REQUIREMENT**

On April 7, 1993, the NRC issued Zion Station License Amendments 144/133 which removed conditional testing from the Zion Technical Specifications. As a basis for the approval of License Amendments 144/133 the NRC SER contained an endorsement of the position established in NRC Generic Letter 91-18 regarding equipment operability during testing. The NRC position and expectation of Zion Station is that equipment will be declared inoperable when performing surveillance tests which renders the equipment incapable of automatically performing its safety function during the test. This philosophy was new for Zion Station in that the previous conditional testing provisions of Zion's Technical Specifications warranted a philosophy of not declaring equipment inoperable during surveillance testing. In order to implement the GL 91-18 position with no allowed outage time, Zion has had to modify its ESFAS Automatic Actuation Channel surveillance tests to allow completion in a segmented fashion in order to comply with the Technical Specification times. This interim solution does not provide sufficient time to complete repairs if problems are encountered, results in multiple entries into the Technical Specification Actions for the same surveillance test and relies on the use of the shutdown action clock in order to perform the testing. The proposed changes contained in this License Amendment Request provide the solution to this problem for the ESFAS Automatic Actuation Channel surveillances. The changes proposed incorporate provisions from the Westinghouse Standard Technical Specifications (NUREG 1431), and WCAP-10271-P-A Supplement 2, Revision 1, and its respective NRC SER dated February 22, 1989.



## NEED FOR AMENDING THE REQUIREMENT(cont'd)

Another reason for this submittal is to correct conflicts between Technical Specification 3.4.2.c and Table 3.4-1 regarding the Minimum Degree of Redundancy requirements for the High-High Containment Pressure channels and between Technical Specification 3.4.2.c and footnote +++ of Table 3.4-1 regarding channel mode during testing.

### DESCRIPTION OF THE PROPOSED REQUIREMENT

The following is a description of each of the proposed changes to the Zion Station Unit 1 and Unit 2 ESFAS Technical Specifications.

Technical Specification 3.4.2.d is proposed to be added to provide the following "During testing each Automatic Actuation Channel of Table 3.4-1, the channel may be bypassed for up to 8 hours for actuation logic and master relay testing and 12 hours for slave relay testing provided the remaining Automatic Actuation Channel is OPERABLE." NUREG 1431 provides a 4 hour allowed outage time for automatic actuation logic, master and slave relay testing for each Automatic Actuation Channel. However, the 4 hours is a bracketed item which means the value may be modified dependent on the specific plant. Westinghouse WCAP-10271-P-A Supplement 2, Revision 1, provided justification for 8 hours for master relay and logic testing and 12 hours for slave relay testing per Automatic Actuation Channel for plants with relay logic ESFAS such as Zion Station.

Technical Specification 3.4.5 is proposed to be added to state "With the exception of the testing allowance of Specification 3.4.2.d, should the number of Automatic Actuation Channels of a particular function fall below the limits given in Table 3.4-1 Column 3 or 4, the limit of column 3 or 4 shall be restored within 6 hours or plant operation shall be as specified in Column 5 of Table 3.4-1." This new Specification will apply to the Automatic Actuation Channels for each of the Table 3.4-1 protective functions, specifically, Safety Injection, Containment Spray, Containment Isolation, Steamline Isolation and Auxiliary Feedwater (items I.2, II.2, III.B.2, IV.2, and V.2). This new Specification will provide clarification on actions to be taken with an inoperable ESFAS Automatic Actuation Channel and will provide 6 hours of restoration time prior to entry into the shutdown action clock. A separate Action for ESFAS Automatic Actuation Channels and the 6 hour allowance to restore an inoperable ESFAS Automatic Actuation Channel is consistent with the NUREG 1431 inoperable Automatic Actuation Channel Actions.

Technical Specification 3.4.4 is proposed to be modified to except Automatic Actuation Channels since Technical Specification 3.4.5 will provide the actions to be taken for inoperable Automatic Actuation Channels.

## DESCRIPTION OF THE PROPOSED REQUIREMENT (Continued)

In Technical Specification Table 3.4-1 it is proposed to reduce the Minimum Degree of Redundancy (column 4) for the High-High Containment Pressure channel under the Containment Spray, Containment Isolation Phase B, and Steamline Isolation functions (items II.3, III.B.3 and IV.3) from 2 to 1. This change provides a needed correction to the table, since when a High-High Containment Pressure channel is inoperable it is placed in bypass (incapable of performing function) as opposed to tripped (performing its function). The Technical Specifications require a minimum of 3 High-High Containment Pressure channels to be operable. With 3 channels operable and the inoperable channel bypassed, the trip logic goes from 2 out of 4 to 2 out of 3 and the degree of redundancy goes from 2 to 1. Therefore the minimum degree of redundancy should be 1.

It is proposed to delete footnote +++ from Table 3.4-1. Footnote +++ is located on column heading 3 (Minimum Operable Channels) and column heading 4 (Minimum Degree of Redundancy) of Table 3.4-1. By being located in the column heading, it is implied that the footnote is applicable to all the channels in the table. Footnote +++ states "This channel may be placed in the bypass mode during periods of active testing during safeguards equipment testing as specified in Section 4.4.2." However, Technical Specification 3.4.2.c states that all channels except the High-High Containment Pressure channels must be placed in trip during testing. Therefore these two Specification items conflict. Zion Station places instrument channels in the tripped mode during testing with the exception of the High-High Containment Pressure channels as allowed by Technical Specification 3.4.2.c. Automatic Actuation Channels are bypassed during testing and proposed Technical Specification 3.4.2.d will provide this allowance. Therefore, since footnote +++ conflicts with Specification 3.4.2.c, and is not needed, it should be deleted.

An editorial change is proposed to Technical Specification 3.4.2.c to change "containment Hi-Hi Pressure channels" to "High-High Containment Pressure channels" to be consistent with the terminology used in Table 3.4-1.

It is proposed to modify the bases for Specifications 3.4/4.4 to remove an inconsistency in the description of how an actuation channel is tested. The current bases states that the bypass removal of a channel entails tripping the channel. This terminology is inconsistent because bypassing means it is incapable of performing its safety function while tripping means it is performing its safety function. The bases is proposed to be changed to simply state that when testing an actuation channel the channel is placed in trip mode. An exception is added for the High-High Containment Pressure Channels due to the increased probability of an inadvertent containment spray event. In addition, it is proposed that a discussion of the allowed bypassing of an Automatic Actuation Channel be added.

## BASES FOR THE PROPOSED AMENDMENT

The 8 hours allowed for master relay and logic testing and 12 hours allowed for slave relay testing of each ESFAS Automatic Actuation Channel are times which were justified in WCAP-10271 Supplement 2, Revision 1, for relay logic ESFAS plants. The NRC generically approved these times in their SER of WCAP-10271-P-A Supplement 2, Revision 1, dated February 22, 1989. The WCAP provided justification that the overall upper bound impact on core damage frequency for any plant making changes in accordance with the WCAP was less than six percent. The NRC staff also concluded that the actual increase in core damage frequency at individual plants due to these changes would be substantially less than six percent. The NRC staff considered this core damage frequency increase to be small compared to the range of uncertainty in the core damage frequency analyses and therefore acceptable. In addition, the majority of the increase in core damage frequency was due to the approved WCAP surveillance interval extensions rather than the allowed outage time extensions which are the subject of this License Amendment Request.

The six hours to restore an inoperable ESFAS Automatic Actuation Channel to operable status is consistent with the restoration time approved in NUREG 1431. This time is considered reasonable since there is another fully operable Automatic Actuation Channel and there is a low probability of an event occurring during this six hour interval. The six hour maintenance/restoration allowed outage time for an ESFAS automatic actuation channel was also analyzed and justified as part of Westinghouse WCAP-10271-P-A Supplement 2, Revision 1, and approved in the NRC's February 22, 1989, SER of the WCAP.

The NRC staff imposed two conditions on utilities seeking to implement the Technical Specification changes approved generically as a result of the NRC review of WCAP-10271 Supplement 2, Revision 1. The first condition required utilities to confirm the applicability of the generic WCAP to their plant. Commonwealth Edison's PRA group has performed a review of the WCAP and determined that the generic PRA of WCAP-10271 is conservative for Zion Station's relay logic ESFAS system. Therefore, the allowed outage time of 8 hours for master relay and logic testing and 12 hours for slave relay testing per Automatic Actuation Channel and 6 hours to restore an inoperable Automatic Actuation Channel are conservative for Zion Station.

The second NRC imposed condition was only applicable to plants making surveillance interval changes and therefore is not applicable to this License Amendment Request.

## **BASES FOR THE PROPOSED AMENDMENT (Continued)**

Correcting the minimum degree of redundancy for High-High Containment Pressure in Technical Specification Table 3.4-1 removes the conflict between the requirements of the table and Technical Specification 3.4.2.c. An inoperable High-High Containment Pressure channel is placed in bypass rather than trip to reduce the probability of an inadvertent containment spray event. When a High-High Containment Pressure channel is placed in bypass the coincidence logic goes from 2 out of 4 to 2 out of 3 versus 1 out of 3. A 2 out of 3 logic is acceptable because the High-High Containment Pressure channels do not provide a control function while at the same time the probability of inadvertent Containment Spray actuation is reduced. A 2 out of 3 coincidence logic meets single failure criteria and the intent of IEEE 279-1971.

Deleting footnote +++ from Table 3.4-1 removes the conflict between it and Technical Specification 3.4.2.c. Zion Station conducts channel testing with the channels tripped. The only exceptions are the High-High Containment Pressure channels and the Automatic Actuation channels for which bypass testing provisions and allowed outage times will be provided. Therefore, footnote +++ is not needed, is conflicting and should be removed.

### **SCHEDULE REQUIREMENTS**

It is requested this License Amendment receive expeditious approval since use of the four hour shutdown action clock to perform the required ESFAS Automatic Actuation Channel surveillance testing is undesirable, and does not provide any time for repairs should a problem arise during the testing. The Station could potentially shutdown a unit for a minor ESFAS Automatic Actuation Channel due to the lack of troubleshooting and repair time.