

BWST cables SDP

Issue

The raceway tracking system does not identify all zones in which conduit EB2034 is routed. Consequently, the safe shutdown capability assessment does not identify that EB2034 is located in the same fire zone (i.e. Zone 53Y) Lower North Piping Penetration Room) as EB1011. EB2034 and EB1011 are the safety related cables for the Unit 1 BWST outlet valves for the ECCS pump suction during the injection phase. These two raceways contain the power cables for CV-1407 and CV-1408. The location of these raceways does not meet the separation requirements of 10CFR50 Appendix R, Section III.G

Manual Chapter 0609 Revision 04/23/2001

Appendix F (Determining Potential Risk Significance of Fire Protection and Post-Fire Safe Shutdown Inspection Findings)

Acronym List

DID (fire protection defense in depth elements (prevention, detection, suppression))

SSD (safe shutdown capability)

FPRSSM (Fire Protection Risk Significance Screening Methodology)

IF (Ignition Frequency)

DR (Degradation Rating)

FB (Fire Barrier)

MS (Manual Suppression)

AS (Auto Suppression)

CC (Common Cause)

FMF (Fire Mitigation Frequency)

Step 1: Screening for Fire Protection Findings

Question: Identify those fire protection findings that impact the mitigation effectiveness of one fire protection DID element

Answer: Redundant BWST outlet Valves (both red and green train) electrical power cables are located in close proximity in fire zone 53 Y (Lower North Piping Penetration Room). There is not 20 feet separation (various distances as the cables run along the area. Some places are as close as a few inches others are a few feet) There is no fire wrap on either of the redundant trains. Fire Suppression is not required in this fire zone. The licensee received an exemption for suppression based 1) on the low fire loading in this zone (from combustible loading calc. 85-E-0053-16 - Insitu 200,000 BTU, Transient 200,000 BTU) 2) The only redundant safe shutdown equipment in room was the both EDG fuel oil transfer pump cables. A modification was installed to allow crossconnect to Unit 2 and area 53y was designated an alternate shutdown area. Therefore, NRC granted an exemption for area 53Y for elimination of a fire suppression system. It was not identified or known at the time that the redundant BWST outlet Valves cables were both located in close proximity in this area.

Assume for Phase 1 screening that a 1 hour fire wrap should be installed on one of the redundant BWST cables.

Information in this record was deleted
in accordance with the Freedom of Information
Act exemptions 5

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Figure 4-1 (Screening Process Phase 1 (Step 1)

Clearly stated fire protection findings - yes

Impairment or degradation of fire protection feature or DID - yes

Affects one of the following fire mitigation DID elements - yes

(1. detection and manual suppression capability - no)

(2. automatic suppression capability - no)

(3. Fire barriers - yes)

If yes, Go to Step 2 of Phase 1

Step 2: Safety Importance Determination

Figure 4-2

Assume Scheme 2 Provide a 1-hour fire barrier enclosing one of the SSD trains.

Question: Is Protection Scheme 2 used? - Assume yes

Question: Is 1-hour fire barrier that separates one SSD function affected by findings - yes

Question: Is the Automatic fire suppression system affected by the finding - exempted without knowledge of BWST cables. assume yes

If Yes, perform phase 2

F.5 Fire Protection Risk Significance Screening Methodology - Phase 2

PHASE 2:

Step 1: Grouping of Fire Protection and Post-fire Safe Shutdown Findings

No separation for redundant BWST cables.

Step 2:

Define the Fire Scenario: This was very difficult because of the low fire loading in Zone 53 Y approximately 200,000 BTU in-situ and 200,000 transient. However we will assume a fire in Zone 53Y consumes the compartment and damages the BWST cables. There are no other redundant safe shutdown equipment in this area. In addition, based on review of the other identified components and component electrical cabling in this room, there were no components or equipment whose failure would initiate a loss of off-site power or any other accident scenario.

Step 3: Qualitative Evaluation of Findings

See Attachment 2 The output of this deterministic/qualitative evaluation results in a degradation rating (DR) being assigned to each DID element

There is detection in this room

No automatic fire suppression (not required)

See Page 7 of Attachment 2, "The following examples of observed conditions that may represent a high impact (degradation) on the ability of the fire barrier or passive device to perform its intended function:

Completely removed or missing fire barrier protection or separating redundant safe shutdown systems or components."

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Therefore we assume that the degradation is High (DR=High)

Step 4: Integrated Assessment of DID findings (Excluding SSD) and Fire Ignition Frequency

The respective DID findings for a given fire area, zone or room of concern are assessed collectively by summing, using the following formula, the fire ignition frequency (IF) and the DR for each of the fire protection DID elements. This value is called the Fire Mitigation Frequency and inputs into the Significant Determination Process (SDP) to determine the change in risk.

$$FMF = \log_{10} (IF) + FB + MB + AS + CC$$

where, IF = Fire Ignition Frequency

FB = Fire Barrier

MS = Manual Suppression/Detection

AS = Automatic Suppression

CC = Dependences/Common Cause Contribution

Step 5: Assignment of Quantitative Values

Table 5.1 Quantification of Degradation Ratings (DR), 1 hour fire barrier with high degradation = 0 (DR)

Page 12 (Next to last paragraph) "Manual Suppression capability is credited even when it is highly degraded, unlike other DID elements. This credit is based upon the potential for early detection and suppression of fires by personnel using hand-held extinguishers."

Table 5.1 - Manual Fire Fighting Effectiveness (Fire Brigade) Outside Control Room = -1 (MS) normal operating state

Auto suppression (AS) = 0 (none available for Zone 53Y)

FB = 0 (no fire barrier)

Step 6: Determination of Fire Ignition Frequency (IF)

Fire Ignition frequency from IPEEE = 4.88×10^{-3}

$$FMF = \log_{10} (4.88 \times 10^{-3}) + 0(FB) + -1(MS) + 0(AS) + 0(CC)$$

$$FMF = -2.312 + -1 = -3.312$$

Table 5.4 Association of FMF to Table 5.5

(SDP Table 1) Approximate Frequencies for Calculation of Delta CDF

-3 > FMF > -4 Approximate Frequencies 1 per 10^3 to 10^4

Table 5.5 Estimated Likelihood Rating for Initiating Event Occurrence During Degraded Period 1 per 10^3 - 10^4 > 30 days = D (estimated likelihood)

Go SDP Worksheet for Arkansas Nuclear One, Unit 1 - Transients (Reactor Trip)

We used this work sheet only since no other accident scenarios would be produced (i.e. loss of offsite power) based on a fire in Zone 53Y

1) TRANS-PCS-EFW-FB

Assume Feed and Bleed goes away since no BWST Valves

Remaining Mitigation Capability Rating

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PCS=3(1 multi train system) + EFW 4(2 diverse trains) = 7

2) TRANS - PCS - EFW - EIHP

Assume High Pressure Injection goes away (no BWST Valves)

Remaining Mitigation Capability Rating

PCS= 3 (1 multi train system) + EFW 4 (2 Diverse Trains) = 7

3) TRANS - PCS - EFW - HPR

Assume no recirculation no water in sump from Injection phase

Remaining Mitigation Capability Rating

PCS=3(1 multi train system) + EFW 4 (2 Diverse Trains) = 7

Table 4 Risk Significance Estimation Matrix

Initiating Event Likelihood

Row C shows everything above 6 capability rating as green

Therefore, we conclude this is

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